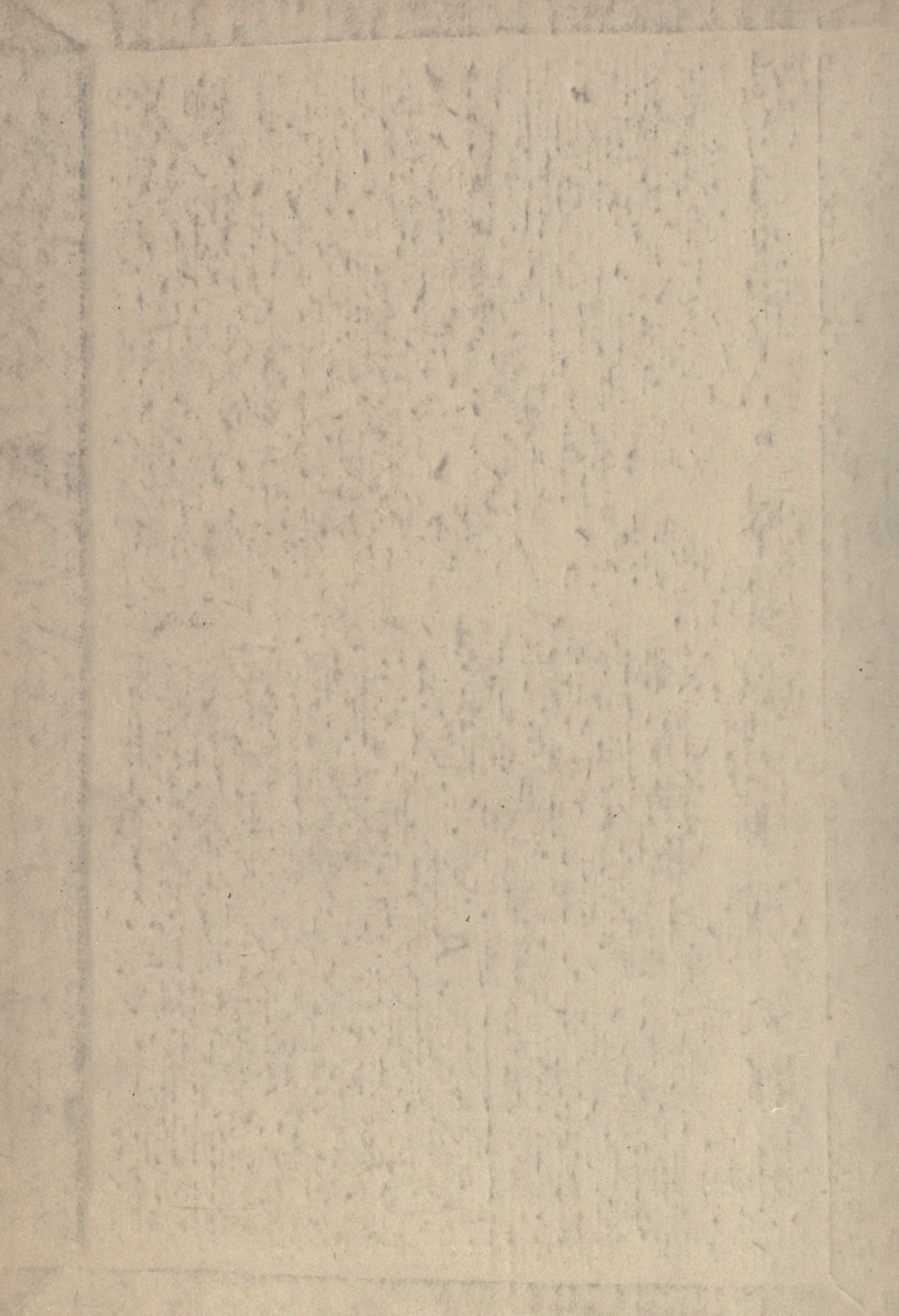


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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

High River, Alta.

P. Turner-Bone, of Calgary, Alta., has outlined plans in connection with sewerage and waterworks here.

Hamilton, Ont.

The ratepayers approved a by-law to raise \$200,000 for good roads.

Prescott, Ont.

\$5,000 was voted for the extension of sewers here.

Sault Ste. Marie, Ont.

The ratepayers approved by-laws for the extension of sewers and sidewalks.

St. John, N.E.

The civic Board of Works has recommended that \$96,000 be expended on permanent street paving, at the rate of thirty to forty thousand per year, and that tenders be called.

St. Boniface, Man.

A bylaw to raise \$200,000 for the construction of a sewer 7 feet in diameter and 1½ mile in length, to cost \$200,000, will be submitted to the ratepayers.

Thamesville, Ont.

The ratepayers voted to raise \$10,000 for waterworks.

Wingham, Ont.

The water and sewer by-laws were carried by the electors.

Winnipeg, Man.

The Board of Control, which has been experimenting with ventilators and Webb lamps as a means of deodorizing sewer air, have decided to install the ventilators as cheaper and more efficient. About four hundred will be required for the city, compared to 800 lamps, and the cost will be about \$20,000, compared with \$200,000 for the lamps.

AWARDED.

Buxton, Ont.

F. Smithson has been awarded the contract for sewer construction by the Raleigh Township Council at \$3,388.

Winnipeg, Man.

M. Peterson, Secretary, Board of Control, states that the contract for plumbing and sewer connection (list 24) has been awarded to G. L. Stephenson, this city, at \$357.50. T. Ball tendered at \$361.25.

Railroads, Bridges and Wharves

Calgary, Alta.

The bridge over the Elbow, referred to in issue of December 15th, is estimated to cost \$30,000 and will be of sufficient strength to carry street cars, as the present system will be probably extended into the district served by the bridge. Mayor Jamieson is reported as having stated that 1910 extensions will be definitely mapped out during February.

Esquimalt, B.C.

It is learned that negotiations are progressing between the Imperial and Dominion Governments which may result in the establishing of a naval base of considerable proportions on Vancouver Island. The present works at Esquimalt will be utilized in the proposed extension. It is rumored that the authorities at Ottawa are prepared to provide \$10,000,000 for the purpose of constructing docks and other accommodations.

Edmonton, Alta.

The cost of the substructure of the C. P. R. bridge here is placed at about \$500,000. It will involve about 40,000 yards of concrete work.

The money by-law to provide the sum of \$246,000 to be used for constructing the traffic, pedestrian and street railway decks of the C. P. R. high level bridge over the Saskatchewan river was endorsed by the ratepayers. The C. P. R. has promised to commence the immediate construction but cannot do so owing to the fact that the plans must be approved by the provincial legislature. The work will be delayed until after February 15. Noted in issue of December 8th.

Montreal, Que.

An appropriation, subject to the approval of the board of directors, was made providing for the construction of fifty miles of the Kootenay Central Railway this year. There is every reason to believe that the grant will be ratified. It is proposed to start work early in March on the Crow's Nest Pass Railway. Tenders will likely be called for early in February.

North Vancouver, B.C.

The adjoining municipalities and the parties proposing to incorporate the Burrard Inlet Tunnel & Bridge Company have applied for authority to build a tunnel under the First Narrows and a bridge over the Second Narrows of Burrard Inlet. Reeve McNaught, this place, is interested. Noted in issue of November 24th.

Outlook, Man.

Tenders will be received by the Assistant Chief Engineer of the C. P. R., Winnipeg, Man, until January 22nd for erection of substructure of bridge over the Saskatchewan river. Plans, etc., at the following offices: A. L. Hertzberg, Division Engineer, Toronto; C. N. Monsarrat, Bridge Engineer, Montreal; N. E. Brooks, Division Engineer, Calgary, Alta.; C. E. Cartwright, Division Engineer, Vancouver, B.C.; and J. E. Schwitzer, Assistant Chief Engineer, Winnipeg.

Ottawa, Ont.

It is stated that three English, four United States and two Canadian bridge building firms have made enquiries re the tendering upon the Quebec bridge construction. It is understood that two of the largest Canadian companies are likely to unite in putting in a bid. Save for the construction of additional piers, nothing much can be done during the year 1910. While the plans will be open for inspection at Montreal next week, tenders will

not likely be called till the 1st of May, the job being so extensive as to require a lot of figuring by the bidders. The contract will not be awarded for some weeks after that. Some of the prospective bidders claim to have the capacity for turning out the bridge castings within a year.

Prince Albert, Sask.

The G. T. P. bridges across the south branch of the Saskatchewan at St. Louis, on the proposed line between this city and Watrous, will be built this winter.

Toronto, Ont.

Tenders addressed to J. Oliver, Chairman, Board of Control, will be received until January 18th for the supply of timber piles and driving of same for the bridge on the extension of Wilton avenue crossing the River Don. Specifications at office of City Engineer Rust, this city.

Unionville, Ont.

The by-law to raise \$32,000 for bridges was defeated.

Winnipeg, Man.

Plans for the construction of a bridge over the C. P. R. track at Brown and Brant streets have been examined. They call for an expenditure of about \$250,000 and have been sent to the railway commission and the C. P. R. for approval.

AWARDED.

Edmonton, Alta.

The McInnis Lumber Company have received the contract for the supply of bridge and culvert timber and fence posts to be used in constructing the first 100 miles of the Alberta & Great Waterways Railway. Noted in issue of December 29th.

Hamilton, Ont.

M. S. Kappelle has been awarded the contract for supplying 40,000 feet of timber for re-decking the Stewart bridge at \$978.96.

Vancouver, B.C.

Murray Bros. secured the contract for the erection of the pipe-railing on the Westminter avenue bridge at \$1,472.

Public Buildings, Churches, Schools, etc.

Amherstburg, Ont.

A by-law to provide \$20,000 for the erection of a new school was approved by the ratepayers.

Beaverton, Ont.

The new town hall by-law was approved by the ratepayers.

Chilliwack, B.C.

A by-law will be submitted to raise the amount required to buy a site and erect a school building. Estimated expenditure, \$26,000.

Edmonton, Alta.

The Young Liberal club has decided to erect a club house at a cost of \$100,000. Work will be commenced in the spring.

E 54
V. 24**Fergus, Ont.**

The ratepayers approved a by-law in favor of the erection of a free library.

Forester's Falls, Ont.

Tenders addressed to P. R. Pounder, secretary-treasurer S.S. No. 6, will be received until January 22nd for the erection of a school house. Plans, etc., at office of Stewart Bros., Renfrew, or at the office of the secretary-treasurer, this place.

Galt, Ont.

The by-law to raise \$5,000 for the extension of the market was defeated.

Granby, Que.

Tenders for the erection and construction on the race track of the "L'Hippodrome Granby Limitee" will be received up to the 7th January. Address L'Hippodrome Granby, Limitee.

Goderich, Ont.

A new Masonic temple will be erected in the spring at an approximate cost of \$12,000. Stores, ground floor; club rooms and offices, second floor; hall, reception and banqueting room, top floor. A. J. Barclay, architect.

Hamilton, Ont.

By-laws providing for the erection of a registry office and to raise \$50,000 for new police offices, station and cells, were approved at the recent elections.

Halifax, N.S.

It is reported that the local Masonic lodges have purchased the lot at the north corner of Salter and Barrington streets. Nothing can be done with the property until the meeting of the Grand Lodge next summer, when it is hoped that a lodge will be erected, or, that failing, a building for commercial purposes will probably be erected.

Killarney, Man.

A by-law to complete the town hall at a cost of \$10,000 has been carried.

The installation of a heating plant in the town hall, to cost about \$3,000, is being considered.

Lindsay, Ont.

The by-law for the erection of new ward schools carried.

London, Ont.

It is stated that the incoming Board of Education will recommend the rebuilding along modern lines of the Colborne street school.

Markdale, Ont.

Plans were presented to the town council for the erection of a new town hall on the present site of the Marsh Hall, to cost about \$6,000.

New Westminster, B.C.

Prizes of \$400 for the first, \$300 for the second, and \$200 for the third, are offered by the board of managers of the Royal Columbian Hospital for competitive plans for the new building on which construction is proposed to be started by March. The building is to cost around \$100,000, and be able to accommodate 100 patients. The competition is open to all, and will close about the first of February. Noted in issue of December 1st.

Owen Sound, Ont.

The ratepayers approved by-laws to build a new library and a new wing to the general hospital, and defeated a measure to spend \$7,000 on the old town hall.

Ottawa, Ont.

A building permit has been granted for the new theatre to be erected on Queen

street. Estimated cost, \$25,000. W. H. George, architect.

The ratepayers voted in favor of the by-laws for improvements at the city hall and the construction of an incinerator.

Smith's Falls, Ont.

The electors decided in favor of spending \$46,500 upon the erection of a new Collegiate Institute.

Peterborough, Ont.

The electors defeated a measure to raise \$19,000 for the erection of an isolation hospital.

Parry Sound, Ont.

A by-law to raise \$25,000 for the erection of a municipal building was defeated.

St. John, N.B.

The Board of Directors of the Children's Hospital have purchased two and a half acres of land where the institution formerly known as the Ladies' College in St. John stood for \$20,000. The permanent building will be erected as soon as finances permit.

St. Catharines, Ont.

A by-law to grant \$15,000 to a new hospital was defeated.

Tenders addressed to N. Tessier, secretary, Department of Public Works, Ottawa, Ont., will be received until January 14th for post office fittings. Plans, etc., on application to Mr. A. Clark, local caretaker, post office; Mr. T. A. Hastings, custom house, Toronto, and at the Department of Public Works, Ottawa.

Teeswater, Ont.

The ratepayers approved a by-law in favor of the erection of a public library.

Toronto, Ont.

The Board of Education have purchased property adjoining Elizabeth Street School, where the intention is to erect an addition.

The Presbyterian Church will erect a new building at the northeast corner of Elm and Elizabeth streets at an estimated cost of \$35,000. Rev. S. B. Rohold, superintendent.

Plans are being prepared for a new residence for Victoria College to accommodate 150 students. Stone construction, Gothic style of architecture. A feature will be a dining hall to accommodate 250. A dean's residence will be attached to main building. Architects, Sproatt & Rolph, 90 Yonge street, Toronto, Ont.

The bylaws to appropriate \$320,000 for new Exhibition buildings and \$262,000 for fire-halls and police stations were carried.

The Canadian Order of Foresters is preparing to build on the lot on the north side of College street, near Yonge, owned by the society. Application for a building permit has been made to the city architect. The structure is to be a five storey office building and Foresters' Hall. The cost is estimated at \$50,000.

The revised plans for the new St. Paul's Church on Bloor street have been adopted. Estimated expenditure, \$231,000. Noted in issue of December 8th.

The new Baptist church, mentioned in the issue of December 22nd, will be built on the corner of Queen and Callendar streets at a cost of about \$40,000. Tenders will shortly be called. Architects, Burke, Horwood & White, 28 Toronto St.

Victoria, B.C.

A bylaw to raise \$184,000 will be submitted to the ratepayers on January 13th for school purposes.

The Government has acquired the entire square bounded by Belleville, Government, Superior and Menzies streets, and, it is stated, will proceed at once to consider designs and plans for the additions to the Provincial buildings. F. M. Rattenbury, former architect, will be asked to report.

The tenants occupying buildings on the site chosen by the Y. M. C. A. will vacate on February 1st, when tenders for the excavation will be called. Plans committee, E. W. Whittington, W. A. Gleason, and R. C. Horne. A. J. Brace, secretary. Noted in issues of December 15th and 22nd.

Vancouver, B.C.

It is stated that Mr. T. Matthews will erect on the northeast corner of Pender and Abbott streets a new fireproof theatre at a cost of more than \$75,000. Plans have been prepared by A. J. Bird, architect, and approved by Building Inspector Jarrett. Work will be started early in the spring.

The Royal Vancouver Yacht Club have decided to replace their club house recently destroyed by fire by an up-to-date building to cost \$10,000. Building committee, R. H. Alexander, J. J. Banfield, C. A. Godson and others. Contracts will probably be let at the end of the month. Noted in issue of December 29th.

Waterloo, Ont.

The ratepayers have approved a by-law for the erection of a new market building.

Winnipeg, Man.

The by-law for baths has been sanctioned.

AWARDED.**Montreal, Que.**

The following tenders for tile flooring for the city hall building have been received: Calkins Tile & Mosaic Company, Montreal, \$840; G. Gilbert, Montreal, \$900; A. T. Riopelle, Montreal, \$13,350. The lowest was accepted.

Residences**Halifax, N.S.**

Herbert E. Gates, architect, has prepared plans for additions to house for Mr. A. L. Wood on Morris street, for a house on Coburg road for G. A. J. Boak and for house at Bedford, N.S., for Dr. C. F. Fraser, also for additions to Waegwoltic Club House, Halifax, N.S.

Montreal, Que.

The residence of Mr. Barry, of the firm of J. Barry & Sons, 179 McGill street, was badly damaged by fire on or about the 27th ult. Estimated loss, \$8,000.

Building permits include: A. Beaudlie, 607 Mentana street, one house containing one dwelling, \$3,000; Deguise & Cloutier, 1890 St. Catherine street east, two houses containing four dwellings, \$4,000; Jos. Rinfret, 5916 Berri street, one house containing five dwellings, \$6,000; Mad. Martel, 883 Drolet street, one house containing three dwellings, \$3,000; M. D. Riopel, 527 Rachel street, two houses containing six dwellings, \$8,000; Adelard Tremblay, Forsyth street, two houses containing six dwellings, \$4,500; J. E. Birks, Cedar avenue, one house containing one dwelling, \$7,500; Jos. St. Jean, 308 Cartier street, alterations to property at 920 Dorchester street, \$1,500.

Quebec, Que.

It is reported that Mr. L. P. Pelletier, acting for the St. Louis Hotel Company,

has purchased the old Academy of Music property. It is understood that a large apartment house is among the plans.

Toronto, Ont.

The residence occupied by Mr. E. P. Brown, 107 Woodlawn avenue, was damaged to the extent of \$4,000 by fire on the 29th ult.

Recent building permits include: W. J. Brooks, pair semi-detached two storey brick dwellings, St. Clarens, \$4,500; J. M. Ternley, two storey brick dwelling, near Sorauren, Fermanagh, \$3,000; F. Gentle, three storey brick store and dwelling, corner of College and Beatrice, \$4,000; R. Temple, two storey and attic brick dwelling, Russell Hill road, \$5,800; Agnew Bros., pair semi-detached two storey brick dwellings, Riverdale, \$5,000; J. Farrell, pair semi-detached two storey brick dwellings, corner of Campbell and Sarnia avenue, \$4,000; J. Curry, two storey brick addition to apartments, northwest corner Church and Charles streets, \$16,000; R. C. Vaughan, two storey and attic brick dwelling, Russell Hill road, \$5,000; S. Weber, pair semi-detached two storey and attic brick dwellings, Simcoe street, \$6,000; Star Publishing Company, three storey brick addition to printing office, King street west, \$10,000; T. W. Barrett, three detached two storey and attic brick dwellings, Howard Park avenue, \$7,500; Mrs. M. Smith, pair semi-detached and one detached two storey frame dwellings, Kingston road, \$4,000.

Victoria, B.C.

It is reported that a large apartment house of brick and stone is to be erected on the corner of Government and Elliott streets. R. Hetherington has the contract for the removal of the building occupying the site at present.

Vancouver, B.C.

The following building permits have been issued recently: Mrs. H. J. Gilbert, frame dwelling, 2425 First avenue, \$5,000; R. Alexander, frame dwelling, 1640 Larch street, \$5,000; Wakley & Bodie, frame dwelling, 1290 Eleventh avenue, \$5,000.

Business Buildings and Industrial Plants

Altona, Man.

A business block occupied by the Bank of Montreal and others and Massey-Harris warehouse were destroyed by fire on the 27th ult. Total estimated loss, \$20,000.

It is stated that the Bank of Montreal has purchased a corner lot with 75 feet frontage, where a new bank building will be erected.

Brandon, Man.

The plans for the new four storey hotel to replace the present Brunswick have been approved. W. A. Elliott, architect. Noted in issue of November 10th.

As the result of negotiations between representatives of the city and the C. N. R. two more storeys will be added to the new hotel, making it one of not less than 100 rooms. Mayor H. L. Adolph and Ald. M. Mackenzie are interested.

Barrie, Ont.

The ratepayers defeated a by-law for the loan of \$20,000 to the Barrie Carriage Company.

Collingwood, Ont.

The Morril Shipyard by-law was approved by the ratepayers.

Durham, Ont.

The by-law guaranteeing the debentures of the McGowan Milling Company for

\$15,000 was approved at the recent elections.

Essex, Ont.

Several buildings, four of which were owned by Mr. J. E. Stone, implement dealer, were destroyed by fire on the 30th ult. Total estimated loss, about \$60,000.

Fernie, B.C.

P. Zarotti will build a new hotel in New Michel.

The Home Bank will erect in the spring an office building where the Triton-Wood block stood.

Guelph, Ont.

General Superintendent Osborne, of the C. P. R. has stated that a new station will be built here. The construction work will start early in the spring.

Halifax, N.S.

The Dominion Chair Factory at Bass River, Colchester county, was destroyed by fire on the 30th ult. Estimated total loss, \$25,000. E. Fulton, managing director.

Kingston, Ont.

The store occupied by Messrs. Crumley was damaged by fire on the 20th ult. Estimated total loss, \$5,000.

Montreal, Que.

The premises of the Canada Leather Goods Company was damaged by fire to the extent of about \$5,000.

The Carleton Hotel Company have been incorporated with a capital of \$2,000,000. The incorporation is in the names of R. T. Heneker, A. H. Duff and W. S. Johnson, advocates. Noted in issue of November 24th.

At a meeting of the St. Louis council the plans for the construction of a new station by the C. P. R., to replace the old Mile End station, were considered and an agreement to have the station built during the coming year was approved of, signed by the Mayor and sent to the Railway Commission for approval.

The Saxe Clothing store, corner of St. Catherine and St. Lawrence boulevard was destroyed by fire on the 30th ult. Total estimated loss, \$25,000.

Niagara Falls, Ont.

The Niagara Falls milling plant, corner of Clark and Robinson streets, was destroyed by fire on the 31st ult. Estimated total loss, \$50,000.

Port Dalhousie, Ont.

The by-law granting fixed assessment to the Maple Leaf Rubber Company was approved by the ratepayers.

Port Dover, Ont.

The ratepayers have voted in favor of granting a free site and \$10,000 to an implement company to locate here.

Parry Sound, Ont.

By-laws to loan \$30,000 to the Union Iron Works for the establishment of an iron working plant and to grant a bonus of \$10,000 for the erection of an alcohol plant were carried.

Prescott, Ont.

The by-law granting certain concessions and a small bonus to an Ogdensburg soda pulp factory to locate in the town was approved by the ratepayers.

Prince Albert, Sask.

It is stated that J. F. MacKenzie will erect a meat packing plant here to cost about \$50,000. Winnipeg capital is interested.

Regina, Sask.

Mayor Williams, it is stated, has purchased property on Eleventh avenue and Hamilton street, on which, the intention is, to erect a brick and steel departmental store.

St. Hyacinthe, Que.

The building occupied by the Eastern Shoe Company and others was destroyed by fire on the 26th ult.

Souris, P.E.I.

Plans have been prepared for store building for J. J. Hughes & Company, size 50 x 100 feet. C. B. Chappell, Charlottetown, architect.

Sydney, N.S.

A plebiscite will be taken on January 8th to consider the proposition of the National Rolling Mills, to locate here. In the event of that taking place, work would be started on the construction of a plant about February.

St. John, N.B.

The building at present occupied by the Auer Light Company has been purchased by J. M. Robinson & Sons, Prince William street. The intention is to thoroughly overhaul and remodel.

Thessalon, Ont.

The buildings occupied by the Wilson Printing Company and others were destroyed by fire on the 29th ult. The Sandie block, the Imperial Bank premises, the Masonic Hall and the Opera House were also badly damaged. Total estimated loss, \$5,000.

Three Rivers, Que.

The Canada Iron Corporation have decided to rebuild their iron pipe foundry which was destroyed by fire several weeks ago.

Toronto, Ont.

The offices of the Jones & Moore Electric Company, 296 Adelaide street west, were badly damaged by fire recently. Total estimated loss, \$5,000.

The Toronto Wire, Nail & Tack Company will build a one-storey brick factory on Edwin street at a cost of \$4,500.

The Star Publishing Company will put up a three storey brick addition to their printing office at a cost of \$10,000.

The Bell Telephone Company will erect a new north exchange, with a regulation ten thousand unit board, to take the place of the present Hayden street exchange, as soon as the spring weather permits. A suitable site has been bought on Bismarck street, about 160 feet east of Yonge street.

It is stated that the site recently purchased by the Metropolitan Bank on the corner of Bay and Adelaide streets will be used eventually for the head office.

Tenders are being invited until January 5th for the clearing of present site and excavation required for the Union Bank, southeast corner Bay and King streets. Darling & Pearson, 2 Leader Lane, architects.

Victoria, B.C.

Honeyman & Curtis, of Vancouver, are mentioned as the architects in charge of the erection of the Empress hotel here. Plans call for steel, buttressed by brick, with concrete roof. Estimated cost, \$150,000. It is expected that it will be finished before the close of the year. Noted in previous issues.

Vancouver, B.C.

A company has been formed with a capitalization of \$150,000 for the manu-

facture and sale of the Jordan improved automatic street car fender and other inventions of Mr. Henry Clay Jordan of this place. Negotiations are now in progress to secure a building site near the city.

Windsor, N.S.

The store occupied by W. H. Roache was destroyed by fire on the 30th ult. Total estimated loss, \$15,000.

Winnipeg, Man.

The Kilgour Rimer Company are extending their premises on Princess street by building a five storey addition to cost about \$100,000. Pauline Chambers Company are erecting a big office and distributing block behind their present factory.

It is rumored that the Marshall-Field Company, of Chicago, has purchased a site on Portage avenue for a departmental store. Price involved, \$950,000.

AWARDED.

Edmonton, Alta.

The contract for A. Cristall's new five storey business block on First street has been awarded to C. R. Sloan for about \$100,000.

Toronto, Ont.

Sproatt & Rolph, 90 Yonge street, have awarded the following contracts for the new building to be erected on Centre avenue by Col. J. B. MacLean: Masonry, W. Hughes; carpentry, A. Weller & Company; reinforced concrete, floors, columns and beams, Leach Concreting Company; steel frames, Expanded Metal Company; roofing, A. Matthews.

Victoria, B.C.

G. C. Mesher & Company have secured the contract for the construction work on the new building for the Colbert Plumbing & Heating Company, Limited, to be situated on Fort street next to the old Philharmonic Hall. Work will be commenced within the next few weeks.

The alterations to the premises at present occupied by T. N. Hibben & Company on Government street will be undertaken within a short time, the contract having been awarded to W. F. Drysdale.

Power Plants, Electricity and Telephones

Brantford, Ont.

Application has been made to the Council by T. R. Varding, of Buffalo, N.Y., for a franchise to construct and operate an electric railway in the township of Brantford.

Brampton, Ont.

The ratepayers have approved a by-law to raise \$40,000 for a distribution plant.

Bridgeburg, Ont.

The ratepayers have passed a by-law granting to the Canadian Niagara Power Company the privilege of bringing electric energy into the town.

Dundas, Ont.

The by-law authorizing a contract with the Hydro-Electric Commission was carried at the recent elections.

Ingersoll, Ont.

The by-law to raise \$30,000 for the erection of an electrical distribution plant was defeated by the ratepayers.

Kingston, Ont.

The by-law confirming an agreement between the city and the Trenton Electric & Water Power Company for a franchise to

light the city for three or five years was approved by the ratepayers.

Lethbridge, Alta.

The power house of the electric lighting plant for the city was entirely destroyed by fire on the 31st ult.

Montreal, Que.

It is reported that a project is under way to build a six-track subway from the eastern end of the city to the western, taking in all the railway stations, etc.

Norwich, Ont.

The power by-law was approved by the ratepayers.

Ottawa, Ont.

The ratepayers have approved the purchase of the Metropolitan Light & Power plant.

Prince Rupert, B.C.

The Board of Trade is agitating the installation of a civic lighting plant. It is not expected that anything will be accomplished as it is probable that the Columbia Tie & Timber Company's sawmill at Seal Harbor will be rebuilt and a larger electric lighting plant installed in connection with it.

Port Arthur, Ont.

An extension four miles in length will be built by the Port Arthur & Fort William Electric Railway during 1910. N. C. Pilcher is purchasing agent.

The ratepayers approved the power by-law at the recent elections.

The Conmee power by-law was defeated by the ratepayers.

Peterborough, Ont.

The by-law in favor of a thirty-year agreement with the Peterborough Light & Power Company was carried.

Quebec, Que.

It is reported that the Quebec Railway, Light & Power Company will soon place contracts for the construction of a sub-station at Ste. Anne de Beaupre. The company has submitted a proposition to the council of Montcalmville for the extension of its tracks from the boundary of the city of Quebec through the municipality to Cape Rouge and St. Foye Church.

St. Thomas, Ont.

The ratepayers defeated a by-law to raise \$25,000 for street railway improvements.

Stratford, Ont.

The ratepayers defeated the by-law to raise \$108,000 for the purchase of the electric light plant.

Toronto, Ont.

Milton, Toronto Township, Port Credit, Mimico and Brampton have made application to the Hydro-Electric Power Commission for electricity. If the service is furnished another transformer station will be established.

Vernon, B.C.

The council have endorsed the scheme for an electric railroad, the supplying of power and light, which Mr. E. G. Warren, representative of the Couteau Power Company, presented. Involved expenditure, \$2,000,000.

Vancouver, B.C.

At a recent meeting of the B. C. E. R. managers the car-building programme for 1910 was mapped out. It calls for five powerful locomotives and 100 freight cars and 38 double truck cars of the latest type, as well as additional equipment for Vic-

toria, etc. Estimate outlay, \$500,000. Approval of the London board received. Contracts for the part of the equipment not supplied by the New Westminster shops, will be called for.

Welland, Ont.

An electric railway will be built in the near future between Niagara Falls, Welland and Dunnville, a distance of about fifty miles, with branch lines. The following are the directors: J. Carlton Gardner, engineer, Niagara Falls; William Maxwell, the Dain Manufacturing Company, Welland; F. S. Buell, capitalist, Buffalo; F. R. Lalor, M.P., merchant, Dunnville. Hugh A. Rose, Welland, is solicitor for the company.

Winnipeg, Man.

In the installation of the municipal lighting and power plant, Prof. L. A. Herdt, of Montreal, has associated with him W. Kennedy, jr., and Prof. Ruttan, of Montreal, Que. Estimated expenditure, \$2,000,000. Noted in issue of December 29th.

The contract for the construction of the terminal power station at Point Douglas is to be let at once. The building will stand approximately on 60 feet by 100 feet, two storeys in height and of brick with stone foundation. Estimated expenditure, \$308,800.

AWARDED.

Calgary, Alta.

The street railway commissioners recommended that the Ottawa Car Company's tender for three car bodies and Brill trucks, total \$3,145 f.o.b., Chicago, be accepted, and that the Preston Car & Coach Company's tender for three car bodies and Brill trucks, total \$3,193 f.o.b. Preston, be accepted. The commission also recommend that three sets of Canadian Westinghouse brakes be secured at \$395 per set, f.o.b. General Electric Company's brakes at \$325 per set f.o.b. Peterborough. They advise the acceptance of the Westinghouse Company's tender for controllers, viz.: \$333 per car f.o.b. Hamilton. This includes trolley base, motor, cables, controllers and circuit breaker. Noted in issue of December 29th.

Edmonton, Alta.

The contract for telephone poles for the Alberta Government telephone service has been awarded to W. Lennard, of Wabamun, and he has the contract for 7,000 poles which are to be furnished at different points along the G. T. P. right of way west of Edmonton. The contract for supplying 2,000 telephone poles for the extension of the Government telephone service in the northern part of the province has been awarded to A. T. Walker, of Lamont. Mr. Walker last week secured the contract for poles, etc., for the Alberta and Great Waterways Railway.

Preston, Ont.

The Canadian Westinghouse and Kilmer & Pullen, agents, General Electric Company, Sweden, McKinnon Building, Toronto, have been awarded the contract by Mr. Yeates, Hydro-Electric engineer for Niagara power distribution. These contracts to be awarded only on the condition that the money by-law to grant the \$18,000 necessary is carried. Voting takes place in about three weeks.

Verdun, Que.

Watson, Jack & Company, 109 Power Building, Montreal, have secured the contract for the supply of boilers for the new power plant here manufactured by the Polson Iron Works, known as the "Heine" safety water tube boiler.

Miscellaneous

Belleville, Ont.

The ratepayers have voted to raise funds for the purchase of a new fire engine.

Halifax, N.S.

At a meeting of the Board of City Works the estimates of the department for 19010-11 were adopted. They include:—Cleaning paved streets, \$5,500; streets, \$25,000; internal health, \$17,000; lighting streets, \$23,800.

Tenders addressed to C. E. W. Dodwell, resident engineer, Public Works Department, this place, will be received until January 15th for the supply and delivery on the Government pier at Digby, N.S., of about 97M. feet b.m. Georgia pine on or before the 15th of March.

Montreal, Que.

Plans have been prepared for the ice palace, and it is stated tenders will be invited shortly.

The three storey block owned by J. A. Aumais, 2069 St. Lawrence boulevard, was destroyed by fire on the 2nd inst. Estimated total loss, \$10,000.

Moncton, N.B.

The New Brunswick Petroleum Company have discovered natural gas in large quantities twelve miles from here, and it is proposed to lay pipes to Moncton.

New Westminster, B.C.

Tenders have been opened for the proposed new incinerator. Richard Taunton, of Winnipeg, agent for the Heenan & Froude patent incinerator, made in Manchester, England, gave three or four prices for different varieties of the machines, and did not go into details. The other bid, by a Portland company, was for \$18,468. Its incinerator had a capacity of fifty tons every twenty-four hours. After some discussion a committee of Alderman J. Carter Smith and City Engineer Blackman was appointed to see Mr. Booth, who has charge of the Vancouver plant, to look over the situation here and obtain his advice on means of disposal of the city's garbage.

Ottawa, Ont.

It is believed that Hon. Mr. Brodeur, when bringing down the naval bill on January 12, will definitely announce that the ships of the proposed Canadian navy will be constructed in Canada, for which tenders will be called in Canada. Two offers from British shipbuilding firms—Harland & Wolff and associate interests, and Swan & Hunter, have been received. The former proposition, as previously stated, was regarded as asking too much. The latter firm's representatives have had interviews with the Minister of Marine, and a third British firm is also in communication with the Government respecting the subject. The Government has positive assurance that bids will be forthcoming from reputable shipbuilding concerns in Great Britain, who are willing to start branch establishments in Canada.

Regina, Sask.

A programme has been prepared by the Public Works Committee involving the expenditure of half a million dollars on public improvements for the coming year, which includes trunk sewer, \$363,000; pavements, \$113,000; and sidewalks, \$113,300, and Albert street subway, \$50,000.

Victoria, B.C.

It is stated that a new stern wheel steamer for the Skeena river trade will be built this winter. It will be put into com-

mission by a new company of Vancouver capitalists. Captain Bucey is interested. Contracts will be called shortly. Estimated cost, \$40,000.

AWARDED.

Halifax, N.S.

At a recent council meeting tenders for 10,000 brick were opened. The General Contractors' Supply Company tendered at \$7 per 1,000 at the depot or \$7.50 at the Cotton Factory Siding. J. Simmonds & Company at \$6.95 at the depot and \$7.25 at the Cotton Factory Siding. The latter was accepted.

Toronto, Ont.

The Polson Company, Toronto, have secured the contract for the new ferry boat to cost \$80,000.

New Companies

Cassiar Construction Company, Limited, Toronto, Ont., incorporated, capital \$20,000. Incorporators, J. S. Lovell, W. Bain and R. Gowans, all of Toronto, Ont.

Temiskaming Lumber Company, Limited, Toronto, Ont., incorporated, capital \$75,000. Incorporators, G. H. Kilmer, J. A. Andrew and W. H. Irving, barristers, all of Toronto.

Thedford, Arkona & East Lambton Telephone Company, Limited, Thedford, Ont., incorporated, capital \$10,000. Incorporators, A. J. Grant, physician, W. N. Ironside, hardware merchant, both of Thedford.

Lafrance Improved Pipe Joints Company, Limited, Montreal, Que., incorporated, capital \$50,000. Incorporators, A. Chagnon, general contractor; L. D. Latour, real estate agent, and J. Medard Guindon, merchant, all of Montreal.

Universal Engineering & Manufacturing Company, Limited, Montreal, Que., incorporated, capital \$95,000. Incorporators, J. J. Campbell, J. D. Lachapelle and J. C. Dudley, electrical engineers, all of Montreal.

Suggestions on Oiling Macadam

At a meeting of the California League of Municipalities, V. M. Frodden, street superintendent of Alameda, Cal., gave the following directions for oiling macadamized streets, as the result of several years' experience.

The preliminary step, and one on which he lays great stress, is to clean the macadam thoroughly. He cleans the gutters and sweeps the street as free as possible of all loose dirt and dust. Then the oil is spread as lightly as possible, but in sufficient quantity to cover the surface thoroughly. We quote as follows:

There is more danger in getting too much oil on the street than not enough, as all that is necessary is to cover the surface evenly and not leave any dry spots.

I oil only one-half of the street at a time, unless all travel can be shut off it, and immediately after oiling I cover all crossings and driveways with clean rock screenings, thus preventing the oil from being picked up by vehicles. I am very careful to use only the cleanest screenings, as sand and dirt work very badly on the oil. The time taken for drying is owing entirely to the amount of sun or shade that the streets gets. In the sun it generally takes about two weeks.

I have had the best oil from the Associated Oil Company. It is from 12 to 14 gravity and contains about 85 per cent. asphalt. It must be heated in the car to

about 200 F. by means of live steam before pumping into the distributor.

On old macadam roads I find that I can cover from 500 to 600 square feet per barrel of 42 gallons. On new macadam roads, oiled before any travel has been on them, it will take double the amount, as the oil penetrates very quickly and deep. On streets that have been previously oiled it will take considerably less, a barrel covering from 800 to 1,000 square feet.

In making repairs to depressions or chuckholes, I find by experience that it will not do to put too much oil in and fill up the hole with screenings, as the tendency is to shift and bunch up. The best way, I find, is to square the edges of the chuckhole, then fill in with some clean rock, concrete size, cover that with oil and then cover the oil with about one inch of clean rock screenings, all to be well tamped in during construction.

I have oiled all the improved streets in Alameda once and some of them a second time, in my opinion oil being the only present protection against the destructive wear of automobile traffic. The oil will last from two to five years, according to the amount of travel and according to the winter conditions, long continued wet weather being rather trying to oiled streets.

It is not necessary to sprinkle the streets when oiled, the saving of water being one of the best results of oiling. The dust is laid by it and the road may be swept, if need be, like an asphalt pavement with a sweeping machine.

Cost of Small Concrete Houses

The use of concrete for small buildings presents a vast field for operation. Its use for larger buildings has proven its efficiency, and is attracting the attention of men interested in the building of homes. The question of cost is naturally of great importance to such men. Frame construction is of such a character that its cost has a considerable range, depending on the manner in which it is put up, but a first-class frame house will cost more than concrete.

Brick construction will cost for a 13-inch wall from 36 cents to 50 cents per square foot of wall, and a 9-inch wall will cost from 25 cents to 35 cents per square foot of wall. To these figures must be added, for the finished wall, cost of furring, lathing and two brown or scratch coats of plaster and the white coat.

Hollow tile construction, which has an advantage over brick, by reason of its air space, averages about the cost of brick or a trifle under.

The cost of block construction is from 18 cents to 35 cents per square foot of wall, having a thickness of 8 to 12 inches, inclusive. For the finished wall and the cost of the white finish coat, which is put directly on the concrete, thus saving the cost of furring, lathing and plaster.

A hollow, reinforced concrete wall will cost from 15 cents to 25 cents per square foot of wall, plus the finish coat.

A 6-inch wall, with furring, lathing or metal sheathing, will cost 11 cents to 18 cents per square foot for the concrete, plus the furring, lathing and plaster.

Two-inch partitions will cost 16 cents to 20 cents per square foot of concrete floors, and cost from 25 to 40 per cent more than wooden floor construction, but little more than wooden shingles.

Properly constructed, artistically finished concrete houses will, in the writer's opinion, find ready acceptance when it is realized that they are permanent, fireproof, and can be erected at moderate cost. The Architect and Engineer.

Tenders and For Sale Department

Tenders for Steel Substructure for Louise Bridge

Sealed tenders addressed to the Chairman, Board of Control, will be received at the office of the undersigned up to 11 a.m. **TUESDAY, JANUARY 18TH, 1910**, for removing the present superstructure and furnishing and erecting new superstructure and floor complete for Louise Bridge across the Red River. Plans, specifications and forms of tender, together with conditions governing tenders, as prescribed by by-law, may be obtained at the office of the City Engineer, Winnipeg. The lowest or any tender not necessarily accepted.

M. PETERSON.
Secretary.

Board of Control Office,
Winnipeg, Canada, Dec. 8th, 1909.

Electrical Machinery for Sale

Two 120 k.w. Single Phase T. & H. Alternators, 125 Cycles, 2,000 Volts, complete with exciter, switchboards, etc. One 100 k.w. Direct Current Generator, 550 Volts, complete with switchboards, etc. A number of 500 Volts D. C. Motors, of various sizes and types. 3 Arc Machines, 10, 20 and 35 light capacity, respectively. 16 Arc Lamps nearly new. One waterwheel about 200 h.p. under 30 feet head, complete with shaftings, boxes, crown gear, pulleys, belts, etc., also endless belts, friction pulleys, etc. All of the above machinery in first-class operative condition and most all in operation at present time. Will be sold for future delivery at a sacrifice. Machines may be seen in actual operation. Price and further information given upon request to The Superintendent, Electrical Department, Coaticook, Que.



Tenders

Sealed tenders endorsed "Tender for Sewage Tanks" or "Tenders for Valves" etc. as the case may be, will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, until noon on **FEBRUARY 15TH, 1910**, for the following work and materials:

- | | |
|-------------|--|
| Contract 3. | Laying Sewer Outlet. |
| 4. | Building Sewage Tanks. |
| 5. | Supply of Iron Castings. |
| 6. | " " Structural Steel. |
| 7. | " " Sludge Valves, Penstocks and Pedestals |
| 8. | " " Cast Iron Pipe. |
| 9. | " " Cranes |
| 10. | " " Special Tile. |

Plans may be seen and specifications obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

JOSEPH OLIVER (Mayor)
Chairman, Board of Control.

City Hall, Toronto, December 14th, 1909.

City of Wetaskiwin, Alberta

Sealed tenders will be received by the undersigned up to **FEBRUARY 15TH, 1910**, for the drilling of a Gas Well in the City of Wetaskiwin, at so much per foot. A certified cheque for \$500.00 must accompany each bid.

The lowest or any tender not necessarily accepted. Specifications and form of tender may be received from

E. ROBERTS,
Secretary-Treasurer



Notice to Contractors

Piling for Wilton Avenue Bridge

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on **TUESDAY, JANUARY, 18TH, 1910**, for the supply of timber piles and driving of same for the bridge on the extension of Wilton Avenue crossing over the River Don.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

JOSEPH OLIVER, (Mayor).

Chairman of Board of Control.

City Hall, Toronto, December 31, 1909.

Resisting Power of Building Materials

Some interesting tests were made recently in the fire underwriters' laboratories in Chicago of the fire resisting qualities of various building materials. The tests were made by the United States Geological Survey.

The materials were subjected to two hours of heat and were then exposed to a stream of water. The report says the trials were unusually severe and that not one of the different kinds of material passed perfectly, but the temperature to which they were subjected was greater than that to be expected at any ordinary fire.

One of the principal points demonstrated was the low transmission quality of Portland cement, mortars and concretes. Brick sustained the test the longest and showed the greatest resisting powers. Fifty per cent. of the new brick split while from sixty to seventy per cent. of the old brick were not damaged. The hydraulic pressed brick proved to be better than the sand and lime variety. The various natural building stones were so seriously damaged that no comparative figures were made.

Such severe tests as these are valuable chiefly in establishing a standard for the manufacture of building material to work to. Cement which showed such low heat

transmission qualities in these tests was the very thing that stood best in the San Francisco fire, the fire that put all building materials to the greatest test in actual experience.

Along with the publication of this report there comes a story from Pittsburg of the destruction of an office building erected in modern steel construction twelve years ago. This was the first of the big steel frame structures in the country to be dismantled, and it was torn down only to make room for a larger and more modern building. This has proven the claims of the steel men as to the durability of this kind of building. The material is reported to be in just as good condition when uncovered to the elements as it was when it was erected twelve years ago. The rivets were tight and even grillage upon which the beam columns rested, and which were under the ground, was in perfect condition. This same material will be used again in the construction of another office building in a different section of that city.

The Use of Calcium Chloride to Prevent Freezing

Any one familiar with the action of cement in setting knows that this hardening is due to a crystallization of the component salts of the cement, silicates, aluminates, etc.; and for this hydration and crystallization it is patent that the presence of water is absolutely necessary, says Concrete. In running concrete in the field when the temperature is below the freezing point of water, the problem met with is the difficulty of keeping the water in the concrete in a liquid state until after the initial set has taken place. In other words, in the language of the field, to "keep the concrete from freezing." There are two radically different methods of securing this result. One is to so heat the water, the sand and the aggregate, that the concrete retains enough latent heat to keep above the freezing point until after the concrete can take its initial set.

Another method is to so lower the freezing point of the water by the addition of salt that it can be taken up by the cement in crystallization before it freezes.

It is a well known fact that solutions of calcium chloride freeze at a lower temperature than solutions of common salt (sodium chloride). Experiments show that a 20 per cent. solution of common salt freezes at 7 degrees F., while the same solution of calcium chloride freezes 8 degrees lower, at -1 degree F.

In experiments recently conducted at one of the eastern laboratories, numerous briquettes were made, some with water gauged with common salt, others with water gauged with calcium chloride, and others with clear water. These briquettes were exposed to the most vigorous climatic conditions, in every way possible stimulating the field, and in every case the briquettes in which the calcium chloride was used, showed up the best under tests.

In the very nature of the case, the calcium element should be a valuable addition to the composition of cement. French experiments have proven that the addition of this compound improves the quality of the cement, relative to time of setting, waterproofing and other qualities.

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New Year Reflections

"There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune."

With this issue we enter upon the work of another year. Nineteen hundred and ten is before us. According to the measure of our confidence and enterprise, so we shall be recompensed during the next twelve months. The most optimistic predictions for 1909 were fulfilled. With a practical show of enthusiasm and aggressiveness the brightest forecast for 1910 will be away behind the mark, and if we have not raised ourselves to a higher plane of prosperity by the end of the year we shall have been unworthy of our citizenship.

*

Here in Canada we have the goods. There is no question about that. Our part is to watch for the tide at its flood and to learn how to make the most of our God-given opportunities. If Shakespeare had lived in this age and visited Canada he would have been inspired to greater things than he ever accomplished in mediaeval England. Nevertheless, the familiar lines of the great bard may provide food for reflection at this time. The "Contract Record" wishes all its friends a right prosperous New Year. May the developments of 1910 redound to the success of us all!

Inconsistencies of Law Courts

The inscrutable workings of the legal mind and the apparent inconsistencies of the law courts have provided for many a long day a fertile source of inspiration for the humorist and for the unenlightened layman, a by-word for many a joke—of the bitter as well as the palatable variety. Those who have never been concerned very much with litigation and who, consequently, are on the outside track in regard to legal matters, may well

congratulate themselves upon their position. Often, when a man goes to law, having what he believes to be a strong case, he finds himself brought by the intricacies of the game to the old issue, "Heads I win, tails you lose."

*

In the case of an engineer (reported elsewhere in this issue), who was endeavoring to secure what he considered complete and proper payment for services rendered, judgment was given against him owing to the provisions of the Municipal Drainage Act, which were admitted by the court not to be in accordance with the dictates of reason. The conclusion of the finding was framed as follows. "Much as I regret the result, it is in my view inevitable. The Legislature has in effect determined that an engineer employed under the Act is not to be paid what his services are worth, but what the County Judge thinks they are worth. The appeal must be quashed."

*

This might appear to be a piece of exceptionally hard luck, but in reality it is not so. History repeats itself. Ever since legal proceedings were instituted, there have been decisions of this kind. The letter of the law and legal technicalities have come into occasional conflict with justice ever since the old fashioned methods of trial by combat or ordeal gave way to the more tranquil but almost as unsatisfactory proceedings of the courts. There is a moral in this. The law is to be avoided rather than courted. If there is one vulnerable point in a man's case, it is far better for him to be content with what he can obtain by his own wits—outside the courts.

Education of the Engineer

One not infrequently hears complaints from engineers regarding the insufficient respect and wages paid the members of their profession. The explanation of the treatment, it seems to us, lies not in the profession, but in the men. When engineers receive and assimilate the same education that is commonly found in physicians and lawyers, their profession will be accorded an equal standing in the popular mind. Too many students of engineering make no effort to obtain from their educational opportunities anything but engineering information—not even spelling or literary expression. In a single examination students of an engineering college were guilty of the following: Verticle line; either to short or two long; subsiquent ware (subsequent wear); crust (crushed) stone; typographical survey.

*

It would seem that a regular college course should precede technical training. There can be no question that such a step would help to raise the profession in popular estimation, and would assist in increasing the number of educated engineers. Many young men, it is argued, cannot afford to spend two additional years in obtaining an education; but the same is equally true of students of law or medicine. Even admitting this argument, a great deal would be gained if the young men and students of the profession could be persuaded that their own personal standing in their communities and that of the profession at large would be greatly advanced if they would be as particular in their use of language as in the foundations of their engineering structures; careful to express themselves as clearly in words as in drawings; and appreciative of the undoubted fact that the respect accorded to them by the community at large will be based less upon their work than upon their personality.

Cobalt's Waterworks and Sewer Systems

Details of timely and important improvements under way in the Silver City—Constructive difficulties encountered in early stages

Specially contributed by H. W. SUTCLIFFE, O.L.S.

As Cobalt is situated practically in the centre of one of the richest silver mining camps of the world, a stranger would first think of it as being a somewhat rough and rocky place; and after having paid the town a visit, he would be in no way disappointed so far as those characteristics are concerned. The rich silver bearing part of the camp covers approximately five square miles, so that the town could really be said to



A portion of the contractors' plant on Prospect Avenue. In the centre of the picture is shown one of the six steam drills used in the work.

cover the whole camp. What is considered, however, the town proper, lies to the west of Cobalt lake and covers parts of mining properties owned by the city of Cobalt, Buffalo, Coniagas and Nipissing Mining Companies. The main part of the town covers less than one hundred acres, and in this space about 6,000 people are accommodated. Houses are not only built fronting on the streets, but in many places on the lanes.

The writer first saw Cobalt in the spring of 1905. At that time the railway station buildings were not built, and excepting a few log shacks and tents, there was very little evidence of a town. However, during this same year, owing to the great number of people coming to the new mining camp (many of whom were building along the west shore of Cobalt lake), the Government found it necessary to lay out the present townsite. Thus, phenomenally, in less than five years, the town has grown to what it is to-day. It is estimated that in the town of Cobalt five times more business is done daily than in any other town of the same population in Ontario. It is only due to the fact that the space allotted for building is very limited that the town is not twice the size it is. Instead, people do their business in Cobalt during the day and live the remainder of the time in other towns. Haileybury is the nearest town, and it being only five miles distant from Cobalt, many find it preferable to keep their families there. Others go farther north, to New Liskeard.

In the year 1907, the question of water supply presented itself, and the installation of a waterworks system was proposed. However, organization in the town

was not yet perfected, and, besides, Cobalt being but a young mining town, it was considered too much of a venture by many, and as a result the matter was dropped for a time. In 1908, the question again arose, and to overcome the difficulty of placing debentures, the Provincial Government was asked to authorize the township of Coleman to guarantee bonds for the town of Cobalt to the extent of \$75,000. This was passed accordingly, but it was in March, 1909, before any definite step was taken. The engineering firm, Sutcliffe & Neelands, of New Liskeard, Ont., were asked to make estimates for both a waterworks and sewers system. They, with the assistance of Mr. O. W. Smith, of Messrs. Galt & Smith, consulting engineers, Toronto, estimated that the systems without filters could be installed for \$73,800.

The Provincial Board of Health had already approved of Clear Lake, which is about a mile west of the town, as suitable for a source of water supply, but as Sasaginaga lake was a larger body of water and not over half a mile distant from the town, efforts were made to obtain their approval of the water in this lake, the main object in this being to reduce the expenditure as much as possible. This was eventually obtained, but on condition that filters be used, as the water in this lake contained considerable quantities of algae.

Considerable difficulty was experienced in getting the council of the township of Coleman to submit a by-law authorizing the guarantee of the above bonds, as it was generally believed that the work could not be done for anything near what the estimates called for. However, it was eventually given its first and second reading in the council, and put before the people. After tenders



Cobalt street, looking north, towards Prospect avenue. In lower right hand corner are shown logs used for covering rock when blasting.

were called for and the bids showed that the work could be done for about \$3,000 less than the figure of the estimates, the by-law respecting the guarantee of bonds was given its third reading. The sale of debentures was immediately arranged for by the town and the contracts awarded. These negotiations took up most of the sum-

mer, and it was not until the latter part of August that the contracts were awarded.

In the meantime, the town was so much in need of water that it was necessary to put in a temporary system. This was laid on the surface of the ground, and consisted of a six-inch main and a four-inch distribution system. A 200-gallon Deeming triplex pump forces the water from Sasaginaga lake to a small standpipe placed on one of the hills within the town limits.

The installation of the permanent systems is a somewhat difficult one, owing to the fact that most of the excavation is in a conglomerate rock of the Huronian formation—a very hard and difficult rock to work. Also, the town is so thickly settled that great care has to be exercised in blasting. A system of sewers has been designed to accommodate practically the whole town, but as the physical features are so irregular, there are a few places where mechanical means will have to be adopted to take care of the sewage. The cost of rock excavation is so great that deep cutting is not warranted. The water pipes are placed six feet below the surface.



Prospect avenue looking east. The main part of the town is below the hill on top of which the contractors' boiler may be seen.

The sewers are from 6 to 8 feet deep, and in one instance run 16 feet below street grade.

It is not yet finally decided which of Clear and Sasaginaga lakes will be the source of water supply. Before installing a pumping plant, it was considered advisable to make a study of the water in both lakes during the summer season. Meantime, water was pumped from Sasaginaga lake into the temporary system. As only a small portion of the system was installed last fall, the pumps used on the temporary system are being operated during the winter. The water of Sasaginaga lake, as said before, contains large quantities of algae, and will require filtering. It is only during the summer months, however, that the algae occurs in large quantities, so that, in the event of using this water, sand filters will be quite sufficient.

A steel standpipe, 25 feet diameter and 50 feet high, is to be erected. When full, this will give a pressure of approximately 120 pounds per square inch in the lower part of the town. It is also necessary to treat the sewage, as the effluent from the system must flow across mining properties and some residential districts. This is being done by means of septic tanks and percolating filters.

The installation is being made by William Newman

& Company, of Winnipeg, Man., and under the direction of Mr. H. C. French, vice-president of the company, good progress has been made. Water was delivered in the centre of the town about the middle of last November, but despite the satisfactory progress made on the work last season, the resumption of activities in the spring will find plenty ahead. It is hoped to treat of later phases of this work and to furnish interesting data on constructive features in a future number of the "Contract Record."

Conventions for 1910

The National Brick Manufacturers' Association will hold their annual convention at Pittsburg, Feb. 7-12. Mr. T. A. Randall, Indianapolis, is secretary.

The annual meeting of the National Association of Cement Users will be held in Chicago, Feb. 21-25. Communications should be addressed to E. E. Krause, Harrison Building, Philadelphia, Pa.

The annual meeting of the Canadian Society of Civil Engineers will be held at Ottawa, Ont., January 25-27. For further particulars address Mr. McLeod, secretary, 413 Dorchester street west, Montreal, Que.

The American Society of Engineering Contractors will hold their annual convention at Chicago, Feb. 24-26. Full particulars may be obtained from the secretary, Mr. D. J. Hauer, Park Row Building, New York City.

The annual meeting of the American Society of Heating and Ventilating Engineers will be held in New York City on Jan. 18-20. For particulars address the secretary, W. H. MacKay, P.O. Box 1818, New York City.

The annual convention of the American Society of Inspectors of Plumbing and Sanitary Engineers will be held at Trenton, N.J., Jan. 20-22. Full particulars may be obtained from C. S. McCosker, secretary, Mobile, Ala.

The annual convention of the American Society of Civil Engineers will take place in New York City, Jan. 19-20. Communications should be addressed to the secretary, Mr. Chas. W. Hunt, 220 West 57th street, New York City.

The annual convention of the Ontario Association of Architects will be held in the association rooms, 96 King street west, Toronto, on Tuesday, Jan. 11th, and Wednesday, Jan. 12th. On the former day various routine business will be transacted. In the evening the annual banquet will be held. The agenda for Wednesday include a paper, entitled "Architectural Education in Canada," by Prof. Nobbs, of McGill University, Montreal, and also a paper, entitled "Architecture and its Relation to Art," by John M. Lytle, Toronto. The following are the nominations for three members of council for 1910, 1911 and 1912: John E. Belcher, Peterborough; Edmund Burke, Toronto; Frank Darling, Toronto; C. J. Gibson, Toronto; Alfred H. Gregg, Toronto; James Mather, Ottawa; Colborne P. Meredith, Ottawa; Lawrence Munro, Hamilton; A. E. Nielsen, St. Catharines; W. L. Symens, Toronto; Jules F. Wegman, Toronto; J. J. Woolnough, Toronto; Prof. C. A. C. Wright, Toronto.

At Hamilton, Ont., during the past year additions were built to 33 factories, at a cost of \$110,450. Eleven new factory buildings were erected at a cost of \$90,300.

Problem of Sanitation in Towns and Cities

Brief Criticism of Septic Tank and other Methods—Land Treatment of Sewage—Principles of the Biological System

BY T. AIRD MURRAY

Sewage and water purification have, during the last 50 years, passed through an evolutionary period. The two subjects are closely related. Sewage contamination to a large extent provides the most objectionable impurities usually found in water. There are certain diseases which are recognized as capable of being water borne; such as typhoid, dysentery, cholera, etc. On the other hand, there may be impurities connected with water which are organic and may have nothing to do with sewage contamination. Two distinct public duties are now recognized in order to guard health from the evils of impure water; one, prevention in the first instance, or the guarding of water supply sources from pollution; and the other in taking proper measures to remove and counteract any pollution, either organic or inorganic, in the water before serving it out to the public.

Full of Organisms

The problem of prevention comprises the subject of efficient sewage disposal. Wherever one or more persons locate, sewage is a necessary product.

Domestic sewage, as well as containing effete poisonous organic matters, is charged with innumerable microscopic organisms to the number of from 30 to 40 million per thimbleful or cubic centimeter. Many of these organisms are known to be harmful, and are the effective carriers of the infection of disease.

Canada in one respect is in a fortunate position inasmuch as it can profit by the experiences of other countries and the great amount of experimental and research work done.

Many old pre-conceived theories with reference to sewage disposal have received their deathblow. Chief among these is the well known and well advertised septic tank.

Septic Tank Experiments

At one time, advocates of the septic tank held that it solved the sludge question, inasmuch as all the organic solids were digested by putrefaction. The Royal Commission, by extensive experiment at the parent septic tank installation at Exeter, have shown that not more than 25 per cent. of the sludge is thus got rid of, while other authorities put the putrefaction elimination as low as 6 per cent.

It was also held that zymotic germs were killed by septic action. Nothing of the kind happens. The effluent from a septic tank is bacteriologically as impure as the sewage entering it.

The germs are changed into putrescible inorganic forms by a process of nitrification, by which organic nitrogen is oxidized to nitrates and nitrites. This is the natural process which takes place in soils, by which organic effete matter is rendered into forms suitable for the rebuilding of plant life.

Land Treatment of Sewage

The process of nitrification is connected with the presence of oxygen and micro-organisms and may take place either in ordinary soil or in specially designed biological filter beds.

By allowing sewage to run over land of an open and friable nature, the sewage gradually percolates into the

sand, the organic matter is absorbed by the soil in the upper layers and is then gradually oxidized or nitrified.

"Broad irrigation" and "intermittent filtration" are the two recognized methods of land treatment.

Broad irrigation simply means using the sewage for irrigation purposes on crop lands and distributing it by means of ridges and furrows. Intermittent filtration means the employment of land devoted solely to sewage disposal apart from any crop consideration, the land being divided into lots, which alternately receive a dose of sewage, thus giving time for the liquid to pass out of the soil pores, for the admission of oxygen, higher nitrification, and a possible maintenance of equilibrium as between retention and oxidation.

When land is resorted to as the purification medium, the system of intermittent filtration provides the greatest measure of success. The continued success depends, however, entirely on the suitability of the land.

The Biological System

Hence the biological system of sewage purification. This system makes sewage purification independent of the character of the land; all that is required is a solid base on which to build simple structures, ideal homes built for the propagation and maintenance of the nitrifying and other organisms, homes or filter beds, if you like to so call them, in which under proper conditions and management the equilibrium between retention, absorption and oxidation can be successfully maintained.

Any degree of purification required can be obtained. It is, however, a question of reasonable purification and of cost.

The success of the system depends upon the following essential features:

(a) Preliminary treatment for removal of as much of the solids from the sewage as possible.

(b) Secondary treatment of passing the sewage through filtering media about walnut size. The depth of the media should not be less than 3 feet, and it is unnecessary to have it more than 8 feet.

Such a biological system will so chemically change any ordinary sewage that it is no longer sewage. The effluent will be non-putrescible.

The biological method or the land intermittent filtration process will greatly reduce the number of *B. Coli*. and other bacteria.

A further reduction is effected by the retention of organic solids in suspension and organic solids in solution absorbed in the filter to the amount of about 85 per cent. of the number entering the filter. So large, however, is the original bacterial count, that the resultant percentage is still in a proportion to render the non-putrescible effluent unsafe for dietetic purposes unless mixed with a large volume of pure water. The life of the resultant bacteria, an effluent practically free from organic matter and thoroughly oxidized, is very short.

It therefore cannot be denied that although it is absurd to speak of nitrified sewage as potable water, a great and beneficial work is accomplished.

This nitrified and non-putrescible sewage effluent can be rendered practically sterile if required. The process, however, is in most cases unnecessary.

Contract Work and Day Labor

The City Engineer of Fort William, Ont., Mr. H. S. Hancock, presented to council a comprehensive and interesting annual report, from which are culled the following conclusions in regard to contract work and day labor, and other interesting matters:

"Contract work—With a good contractor and honest capable inspectors, good work can be secured, because the contractor has his personal fortune at stake, and in work of the same calibre as we undertake, he is able to give it personal attention. If the contractor is thoroughly competent, this factor alone makes a considerable percentage of profit over day labor, but seldom sufficient to satisfy the average contractor. If it is sufficient and the two conditions of good contractors and rigid inspection be fulfilled, contract work is a success. The main features to be watched by council are: (1) That the contractor is thoroughly reliable and efficient, seldom the lowest bidder in the average small city; (2) That inspectors of absolute integrity and with a thorough knowledge of their work are selected.

"Day labor—The same conditions of honesty and integrity are equally necessary in this case, and the success of the policy is greater in accordance with the extent to which these qualities permeate the whole working force. Of course, the plan on which the force is organized and controlled has a most important bearing on the results obtained. This organization we have attempted to improve from year to year, and as the work grows in magnitude and importance further changes become necessary.

"The changes I propose for the coming season, if a day labor policy is adopted, are three in number, and the work has assumed such proportions that I am convinced of their absolute necessity. In fact, they are vital to the success of a day labor policy:

"First—The stores department must be centralized and an efficient store-keeper installed at the board of works yard. Also, the stock books now kept in this office must be kept by him and audited monthly. This man will have full charge of the yard and be responsible for all material. He can also do what small purchasing is left over from the 'calling for tenders' system of purchasing, adopted with complete success during the present year, and, above all, furnish this office with a daily cost record of the material supplied to each job.

"Secondly—The offices of street commissioner and general foreman must be separated. The work is too much for one man, and in any case construction work needs the supervision of a man with scientific, as well as practical, training, or, in other words, a 'cost engineer,' especially so, now that the work has reached such an important stage as at present.

"Thirdly—To make the costs engineer's work effective, a complete system of daily reports on all works in progress, giving daily detailed records of the progress made and the daily cost. This may appear to mean increased cost, but many thousands of dollars can be saved by such an efficient system.

"The above reforms added to those already instituted, should go far towards making day labor work as effective as human nature can make it. I am fully aware that day labor work in the past has not reached perfection, and probably never will do, but in quality of work and reasonableness of cost, it has come a great deal closer to perfection than the major portion of municipal contract work in Fort William.

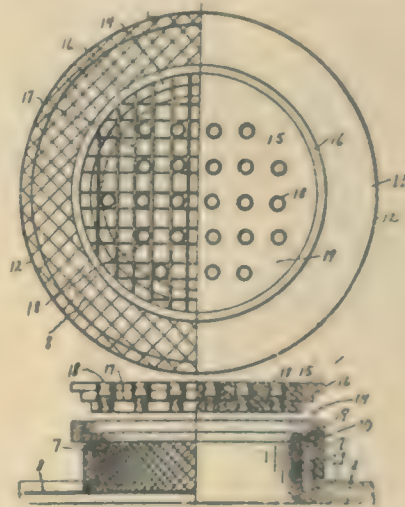
"The total construction work of this department during the past year, including sewers, waterworks, street railway, etc., has amounted to over \$500,000. I have grave doubts as to the ability of any contractor to do this

work at this figure and make 15 per cent profit which is the lowest percentage usually figured or made by contractors; in this case, a profit of over \$65,000.

"It will be necessary next year to purchase some excavating machinery, but I will defer a recommendation until you have decided on the work to be undertaken. During the past season the sewerage system has been extended 3.32 miles, which brings the total mileage to 20.33."

Concrete Manhole Head

City Engineer John P. Rogers, of Topeka, Kan. has designed a reinforced concrete manhole head which is being used successfully in connection with sewers and other underground structures. It consists of a metal lattice work collar, a metal base and metal rim which form the skeleton of the head, the main bulk being given by concrete for which this forms the reinforcement. The



Details of Concrete Manhole Head and Cover.

cover is made with an outer protecting rim or shield of iron, showing in section concentric steps. On one of the steps or ledges are laid steel rods to reinforce the concrete which composes the body of the cover. Mr. Rogers states that this design requires but 90 pounds of cast iron as against 350 pounds, the weight of the cast iron heads which have been used in Topeka.

New Engineer's Club at London, Ont.

At the annual banquet of the S. P. S. London Club held last week in the Forest City, it was unanimously decided to form a London Engineers' Club, the society to consist of engineers from all branches of the profession resident in the city. The banquet was attended by a large number of graduates and undergraduates of the School of Practical Science, Toronto. Replying to the toast of "The City of London," Mr. E. I. Simon, City Electrical Engineer, outlined the growth of the city from the time that it had been composed of only one house until the present day. In the course of his remarks he spoke strongly against the marring of the streets by unsightly poles. Those present included Messrs. E. I. Simon, C. Talbot, W. C. Cooper, W. Ferguson, A. C. Spencer, B.A. Sc.; J. A. Stiles, B.A. Sc.; C. Moore, B.A. Sc.; L. S. O'Dell, J. Nash, P. G. Delford, B. Haymen, R. H. Cunningham, F. Brickenden, H. E. Ekin, W. Lawrence, H. Eckert, L. P. York, C. Smith, W. Kelley, R. Pickard, Mr. Folles, H. M. Kew, J. MacKenzie, C. Flynn and D. Harvey.

tion has been given to future extensions, provision for which has been made at sides at rear of building.

The basement floor contains amply lighted and ventilated playrooms for boys and girls, with lavatories for each. Simplicity in the plumbing arrangements has been carefully considered. A special feature in the lavatories are the individual automatic closets for pupils. Ample space has been provided at rear of building for fuel and coal, janitor's store and boiler room, and all well lighted. Two spacious staircases have been provided near centre at sides of building for boys and girls, with separate entrances.

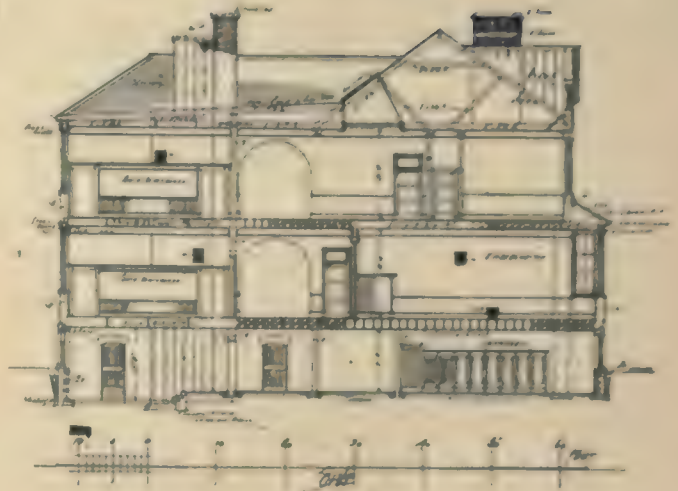
On the ground floor are four well lighted and ventilated classrooms, with cloak rooms to each. A splendid feature on this floor is the large kindergarten, divided from the main hall by sliding glass doors, and which can be thrown into one large room for assembly purposes.

On the first floor are four classrooms, similar to ground floor, also principal's or board room and teachers' room, with lavatories attached.

The heating and ventilating system has been laid out whereby the building will be heated by direct radiation, combined with a system of natural draft ventilation. The system is a one pipe low pressure gravity system. The system of natural ventilation is considered the best for a school building such as this. Under this system the cold air is taken from the outside in basement, is passed through a volume damper, the air then passing through direct heating radiators into the ducts, and through the registers into the classrooms.

The general layout of the different floors has been arranged to produce a well balanced symmetrical effect, the classrooms being mostly of a uniform size, grouped round a commodious centre hall, the rooms being so arranged as to bring the rays of light only over the left shoulder of the pupil, thus avoiding any possibility of conflicting shadows.

An effort has been made to meet the most modern requirements in the matter of light, heat, ventilation and sanitary equipment, and further, the location of the classrooms and their proximity to the entrances, so as to permit of ready ingress and egress without congestion. Spacious and well lighted and ventilated staircases are

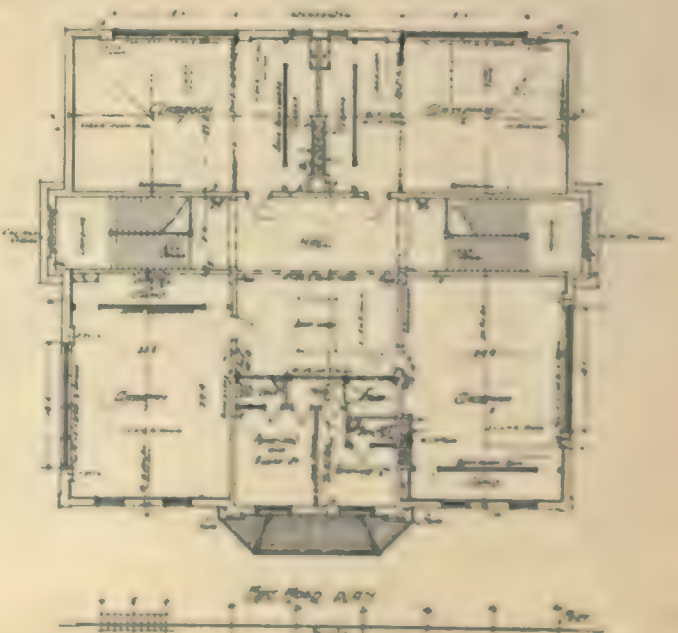
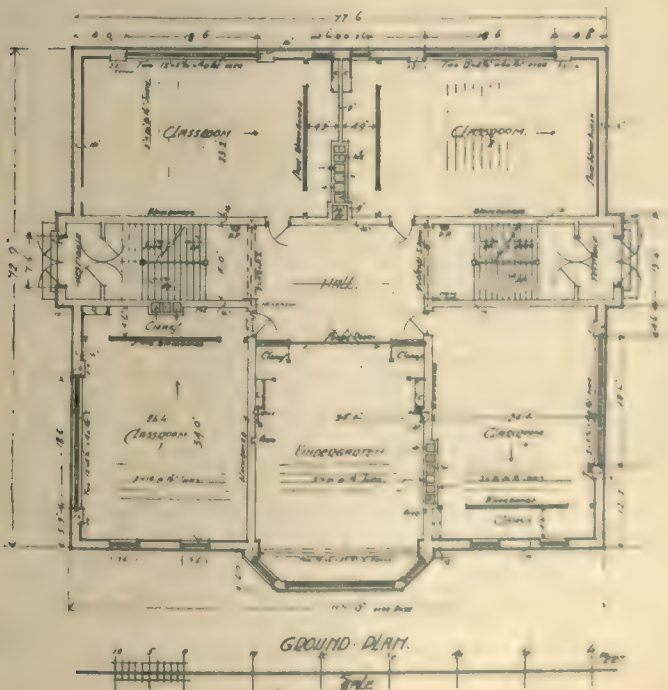


Section.

provided, these being arranged so as to lead directly to the entrances, the sexes, also, being properly segregated in basement.

The various contracts on this building were awarded as follows: Masonry and brick work, C. A. Reid & Company; carpentry and joiner work, Goderich Planing Mills Company, Limited; heating and ventilating, Chas. C. Lea; plumbing and galvanized iron work, Chas. J. Harper; painting, D. Munro; all of Goderich, Ont.

The new Wellington street viaduct at Ottawa was formerly declared open for traffic last week by Mayor Hopewell and City Engineer Ker and members of the city council. Formerly at this point Wellington street was crossed by four tracks, three of the C.P.R. and one of the G.T.R., within a space of 1,000 feet. Some time ago the Railway Commission, owing to the frequency of accidents, ordered a viaduct to be built. Work was commenced in June, the city constructing the approaches and the C.P.R. the actual steelwork. While the bridge is now ready for traffic, there still remain the macadamizing of the approaches and concrete curb on top to be built.



Valuable Data on Building Construction

Loads to which a Structure is Subject—Dead, Live, Snow and Wind Loads—Principles of Tension and Compression

BY PAUL T. LESHER

One of the first and most important things to take into consideration in the study of building construction is the different kinds of loads a structure is liable to have. These may be divided into three classes; dead loads, live loads, and the snow and wind loads.

Dead Loads on Structures

The weight of the structure itself is the dead load; for instance, the weight of the roof forms a portion of the dead load on the walls and columns; the floors cause a dead load to come on the walls and columns; and then the total dead load of the structure is transferred through the walls and column footings to the supporting soil.

In order to figure this dead load we must know the average weight of the materials, and the following table gives the weights of the most common building materials:

WEIGHTS OF BUILDING MATERIALS

White pine,	2½ pounds per square foot, 1 inch thick.
Hemlock,	2½ pounds per square foot, 1 inch thick.
Spruce,	2½ pounds per square foot, 1 inch thick.
Yellow pine,	4 pounds per square foot, 1 inch thick.
Oak,	4 pounds per square foot, 1 inch thick.
Structural steel,	0.29 pounds per cubic inch.
Cast iron,	0.26 pounds per cubic inch.
Wrought iron,	0.28 pounds per cubic inch.
Ordinary soil or earth,	100 pounds per cubic foot.
Brickwork in lime mortar,	120 pounds per cubic foot.
Brickwork in cement mortar,	130 pounds per cubic foot.
Stone concrete,	130 to 140 pounds per cubic foot. Best to use 140 pounds.
Compact cinder concrete,	about 100 pounds per cubic foot.
Light cinder concrete (such as is used in filling),	80 pounds per square foot.
Granite,	170 pounds per cubic foot.
Marble or limestone,	160 pounds per cubic foot.
Sandstone,	140 pounds per cubic foot.
Ordinary lath and plaster,	6 pounds per square foot of surface.

To calculate the dead load of a proposed building it is necessary first to fix upon the general arrangement, disposition and approximate dimensions of all the parts and to estimate approximately their weights. After the calculations are made and the construction detailed, the actual dead loads should be checked to make sure that they agree closely with the assumed load. If considerable variation is found, it can be taken care of by increasing or diminishing the size already determined proportionally, as may seem necessary.

The weights of the various systems of fireproof floors may vary from 60 pounds to 125 pounds per square foot of floor, including the necessary steel and other items used in their construction, and the weight should be justified before finished calculations are made. Generally an assumed load of 80 pounds per square foot of floor will be sufficient for the dead load. In buildings with movable partitions an allowance should be made for their weight in the dead load, if a small dead load is taken.

Live Loads

The live or accidental load for floors is a quantity for which there is no standard, as it consists of the weight

of people, machinery, furniture, etc. The requirements of the building laws of Philadelphia, which are a very conservative standard to adopt, are as follows:

"Dwellings, tenant houses, apartment houses, hotels, hospitals and asylums, use a live load of 70 pounds per square foot.

"For office buildings use 100 pounds per square foot.

"For places of public assembly, light manufacturing buildings and retail stores, use 120 pounds per square foot.

"For storehouses, warehouses and heavy manufacturing buildings, use 150 pounds per square foot and upwards in proportion to the loads they may have to carry."

The following data is fairly conservative and may be properly used where there are no building laws to the contrary:

The load of 70 pounds per square foot for dwellings will probably never be realized, but inasmuch as a city dwelling house is liable to be taken and used for some other purpose at any time, it is not advisable to use a lighter load. In the case of a country or seashore house or hotel, or a building of like character, where economy demands it, and where the actual use of the building for a long time is certain, a live load of 40 pounds per square foot of floor is ample for practical purposes, for rooms not used for public assembly. For rooms of public assembly a live load of 80 pounds per square foot is sufficient. If the desks or chairs in a room of this character are fixed, as in a school room, church, etc., a load of more than 40 to 50 pounds per square foot of floor will never be realized, but it is not general practice to consider this, although there are sometimes special cases where economy demands it. Office building floors have been designed for live loads ranging from 20 pounds to 150 pounds per square foot of floor. Retail stores should have floors proportioned for live loads of 100 pounds per square foot and upwards. The floors of wholesale stores, warehouses, machine shops and the like should be designed for live loads of 150 pounds per square foot and upwards. The static loads in textile factories will seldom exceed 40 pounds per square foot. In most cases a live load of 100 pounds per square foot, including the effect of moving machinery should be ample. In general, a conservative rule would be not to assume loads less than the above, but in all cases to be sure that in the actual use of the building, so far as can be foreseen, the loads do not exceed the above.

Furthermore, be sure that the loads used, together with the sections used, do not give excessive deflection or vibration. In a building, stiffness or freedom from vibration is a factor almost as important as mere strength. It is also well to bear in mind that the deflection due to the dead load is permanent and that the only variable deflection is that due to the live load, and that this deflection is the cause of plaster cracks and the like.

The practice in the case of plastered work where a considerable deflection is harmful, is to proportion the beams or girders so that their total deflection will not exceed 1-80 of an inch per foot of span. If the span is

not more than 20 times the depth of the beam, the deflection will be within the above limit.

Wind Loads

The wind load on a roof depends upon the pitch or slope of the roof and is usually assumed to be 40 pounds per square foot, horizontal wind pressure; that is, the wind is considered as blowing at this pressure in a horizontal direction; but the resulting pressure upon the roof is always taken normal (at right angles) to the slope.

The wind pressure against a vertical plane depends on the velocity of the wind, and is as follows:

WIND PRESSURE.

Velocity (Miles per hour)	Pressure (Lbs. per sq. ft.)	
10.....	0.4.....	Fresh breeze.
20.....	1.6.....	Stiff breeze.
30.....	3.6.....	Strong wind.
40.....	6.4.....	High wind.
50.....	10.0.....	Storm.
60.....	14.4.....	Violent storm.
80.....	25.6.....	Hurricane.
100.....	40.0.....	Violent hurricane.

The wind pressure upon a cylindrical surface is one-half that upon a flat surface of the same height and width.

On the assumption of 40 pounds per square foot horizontal wind pressure, use the following for the various slopes, pressure at right angles or normal to the slope of the roof:

WIND PRESSURE FOR VARIOUS SLOPES

Rise 4 inches per foot, use 17 pounds per square foot.
Rise 6 inches per foot, use 24 pounds per square foot.
Rise 8 inches per foot, use 29 pounds per square foot.
Rise 10 inches per foot, use 33 pounds per square foot.
Rise 12 inches per foot, use 36 pounds per square foot.

(45 degree angle.)

Rise over 12 inches per foot, use 40 pounds per square foot.

In regard to the wind pressure against the sides of a building, use not less than 52 pounds per square foot for the tenth storey, $2\frac{1}{2}$ pounds per square foot less on each preceding storey, and $2\frac{1}{2}$ pounds per square foot more for each succeeding upper storey to a maximum of 35 pounds at the 14th storey and above.

Snow Loads

The snow load on a roof is generally taken at about 12 pounds per square foot of roof (horizontal area covered) when the slope of the roof is under 12 inches rise per foot of horizontal run, but when the slope is over 12 inches rise per foot, a load of 8 pounds per square foot is considered ample. By "horizontal area covered" we mean the span of the truss multiplied by the distance apart of the trusses.

Tension and Compression

When the forces which act upon a body are exerted in directions away from each other, tending to elongate or stretch the body, this character of the stress is called tensile stress or tension. It is also evident that the forces in the body which resist tension must act inward or towards each other.

When the direction of the forces which act upon a body act toward each other, their combined action tends to shorten or compress the body; this character of stress is called a compressive stress, or compression. It is evident that the forces of the body which resist compression must act outwards or away from each other.

The ultimate strength of any material is that stress which is just sufficient to break it.

ULTIMATE TENSILE STRENGTH OF MATERIALS

White pine,	6,000 pounds per square inch of cross section.
Hemlock,	4,000 pounds per square inch of cross section.
Spruce,	6,000 pounds per square inch of cross section.
Yellow pine,	8,000 pounds per square inch of cross section.
Oak,	10,000 pounds per square inch of cross section.
Wrought iron,	52,000 pounds per square inch of cross section.
(Rods or bars of unusual size.)	
Rolled structural steel,	64,000 pounds per square inch of cross section.
Cast iron,	18,000 pounds per square inch of cross section.

For timber, steel and wrought iron, use a factor of safety of four, and for cast iron a factor of safety of six. Thus, to get the safe working value for a certain material, we divide the ultimate value by the factor of safety. The following cement values are the least that should be allowed for a first class cement of Portland grade: Neat Portland cement, one day in air, six days in water, 450 pounds per square inch of cross section. Portland cement and sand in a portion of 1 to 3, one day in air, six days in water, 160 pounds per square inch of cross section. Between the first class Portland cement and ordinary lime mortar, there are a number of grades. Their adaptability will depend upon the special requirements of each case.

Paving and Sewer Work at St. Catharines, Ont.

The amount of money spent in St. Catharines last year on permanent pavements was nearly \$62,000. The material used was bitulithic, asphalt block and vitrified brick.

Since permanent pavements were first adopted in this city, in 1906, the following statement shows the class and mileage laid since that year:

PAVEMENTS

Year	Brick Miles	Asphalt Block Miles	Bitulithic Miles	Total Miles
1906	0.500	0.870	0.208	1.578
1908		0.770		0.770
1909	0.380	0.710	0.181	1.271
Total	0.947	2.377	0.449	3.773

The total length of concrete curbing laid this year was 2.228 miles; of sewers, 1.56 miles, and of sidewalks and crossings, 1.250 miles.

The Winnipeg Board of Control, which has been experimenting with city ventilators and Webb lamps as a means of deodorizing sewer air, has decided to install the ventilators, as cheaper and more efficient. About 400 will be required for the city, compared to 800 lamps, and the cost will be about \$20,000, compared with \$200,000 for the lamps.

According to an official report issued by the Canada Cement Company, shipments of cement from the company's various plants for the eleven months of 1909 ending Nov. 30th amounted to 3,246,014 barrels. The total shipments for last year are estimated at 3,400,000 barrels. These shipments do not include cement in warehouses ordered by purchasers but not sent out.



[NOTE.—Contributions suitable for publication in this Department are invited from subscribers and readers.]

High Pressure Connections for Steam Heating

BY J. F. BENNETT

Generally speaking, heating work nowadays is usually in the form of one or two-pipe, low pressure gravity return systems, or what is known as the vacuum-vapor systems. Occasionally, however, high pressure work, or steam circulation under high pressure, is required.

Just what really constitutes high pressure is a question about which many fitters disagree. The ordinary low pressure gauge registers only 30 pounds, consequently it is customary to call a pressure in excess of 30 pounds, above the atmosphere, high pressure.

Low pressure gravity return systems are usually designed with a sufficient quantity of radiation to heat a building at from one to five pounds' pressure.

The temperature of steam increases, according to the increase in pressure, approximately as follows:

Pounds	Temperature.
1.....	212 degrees
5.....	228 degrees
10.....	240 degrees
25.....	267 degrees
50.....	295 degrees
75.....	320 degrees
100.....	337 degrees

Obviously, a 100 square foot radiator at 100 pounds pressure, will emit more heat than will a radiator of the same size at one pound pressure. Thus, where the question of space for radiation enters into consideration, a building may be heated by less radiating surface under high pressure than under low pressure.

Again, the radiator connections and general piping for high pressure may be of much smaller sizes than the piping for low pressure. The best practice on high pressure work is the two-pipe system, feed and return. It should also be borne in mind that ordinary cast iron radiators are not built or designed for high pressure, and in ordering radiators it will be advisable to mention the pressure they are intended to carry. The best radiators for high pressure are the tubular pipe radiators, or radiators made of vertical rows of wrought iron pipes, rising from a cast iron base, each two pipes being connected at the top by return bends. Circulation coils, or box coils, are also well adapted for high pressure work, as they will withstand a higher pressure than cast iron radiators will stand.

Most of a steam fitter's work on high pressure heating is in factories, such as mills, woodworking establishments, textile manufactories, and other places where drying rooms are used. Most driers are designed with the intention of getting the greatest possible heat out of the heating coils in the shortest space of time. Sometimes with this object in view, the fan, or blower system, is used under high pressure. Should a pump be used for returning the condensation to the boilers, the returns are connected to a receiving tank from which the condensation is pumped into the boiler.

Sometimes a return trap is used to deliver the con-

densation to the boiler. The returns in this case are carried to a receiver which is connected to a return trap, set from two to three feet above the water line of the boiler.

When the returns come back below the boiler level, two traps are sometimes used; one on the floor and another above the boiler. The lower trap delivers the condensation from the receiver to the upper trap, which, in turn, delivers it to the boiler. The return trap is a satisfactory method of delivering condensation to a boiler, as the trap will deliver the condensation to the boiler at a much higher temperature than a pump will deliver it.

All up-to-date plants provide for automatic water

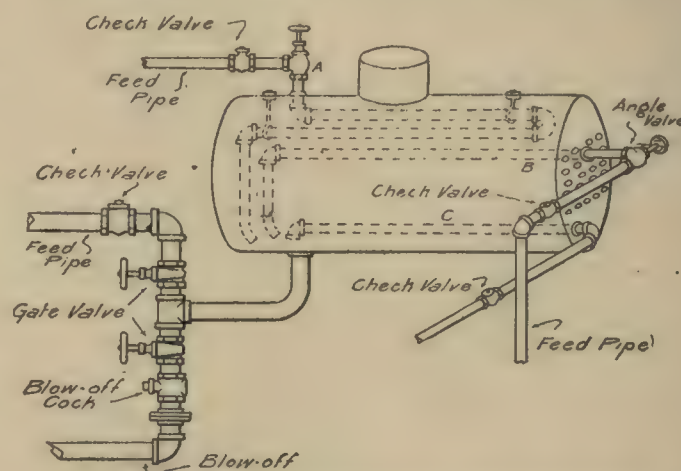


Fig. 1.—Four Methods of Connecting Boiler Feed Pipes to Horizontal Tubular Boiler.

regulation, and there are many and various devices on the market for this purpose. The Vigilant feed water regulator will do for an illustration. This regulator is set so that the bottom of the regulator chamber is from eight to ten inches above the second or middle gauge cock in the water column. A $1\frac{1}{4}$ -inch pipe is connected from the bottom of the chamber to a point below the water line of the boiler. This has a special valve, by means of which the regulator may, if desired, be cut off from the boiler. This valve has an opening on the bottom, from which a drain pipe, with a valve attached, should be run to drain the chamber. The drip from the exhaust valve may be connected to the drain pipe below the drain valve.

The second, or middle, gauge cock is taken off the water column, and in its place is screwed a special angle valve A, fig. 2, which is connected to air valve on top of the regulator chamber. A $\frac{1}{4}$ -inch steam connection is run from some convenient point to steam connection at B. A $\frac{1}{4}$ -inch pipe is connected from the pressure and exhaust valve at C on the regulator, to the top of the controller valve on the feed line. This controller should, if practicable, be placed below the regulator, to ensure a supply of water over the rubber diaphragm. Should it not be feasible to place the control-

ling valve in this manner, the $\frac{1}{4}$ -inch pipe should be trapped with a U trap bent in the pipe. From the exhaust valve at D a vent, or drain pipe, is connected into the drain pipe below the drain valve, as shown at D.

When the water reaches the opening of the special angle valve (A) in the water column, shutting off the steam, the chamber will fill with water from the boiler, thus reducing the weight of the displacement body by the amount of displacement. The weighted lever will now fall, allowing the pressure valve to open, permitting the pressure to act on the diaphragm of the controlling valve, closing it, and stopping the feed.

When the water falls and exposes the mouth of the special angle valve to the steam, the water in the regulator chamber will be thrown into balance, and the displacement body will resume its lowest position. The rocker arm will be brought into contact with the stem of the valve, opening the exhaust and closing the pressure, relieving the diaphragm and permitting the controlling valve to open and start the feed. The chamber of regulator has to be vented through valve on top of chamber once in 24 hours, in case of accumulated air in the chamber of the regulator.

On the steam line to the pump a diaphragm regulating valve, or pump governor, is placed with a $\frac{1}{4}$ -inch connection from the diaphragm to the feed pipe, fig. 8. The counter-weight on this governing valve is adjusted to maintain a pressure of from 10 to 15 pounds more in the feed line than in the live steam line to the pump. This is as nearly perfect automatic feed pump control as the writer ever saw, and the writer (who has no in-

erally enters the front of the steam drums above the tubes and at a point below the water line of the boilers.

On tubular boilers the feed is sometimes delivered through the blow-off pipe, though this method is questionable, as the feed water, instead of tending to keep the blow-off pipe clean, often causes it to become coated with sediment far worse than if the pipe was used for blow-off purposes only. This is possibly due to the fact that the blow-off pipe from a tubular boiler is generally

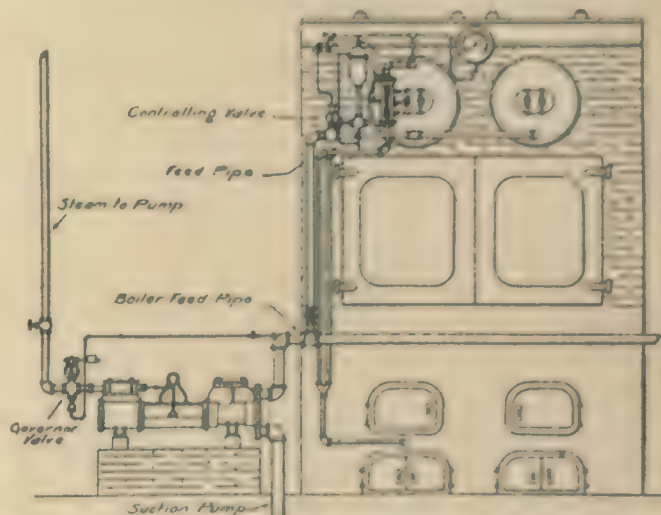


Fig. 3—Vigilant Feed Water Regulator and Fulton Pump Governor applied to Horizontal Water Tube Boiler.

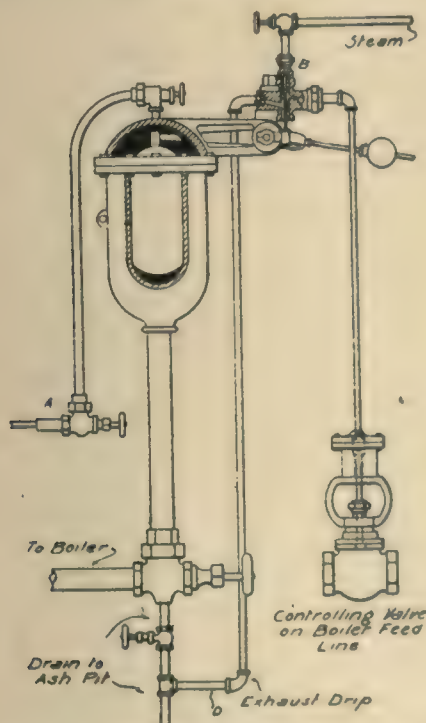


Fig. 2—Sectional View of Vigilant Feed Water Regulator.

terest in the regulator, or knowledge of the people who control it) has had opportunities of seeing it operating under different conditions in several plants.

There are various methods of connecting feed pipes to high pressure boilers, depending, of course, on the style or the type of boiler. In the Stirling water tube boiler, the feed enters through the top of the rear drum, at the top of the boiler, below the water line. In the Babcock and Wilcox water tube boilers, the feed gen-

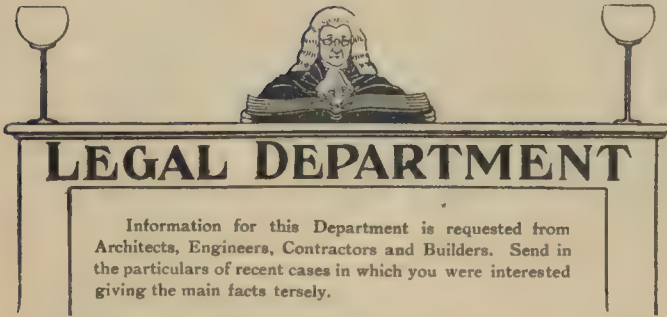
erally enters the front of the steam drums above the tubes and at a point below the water line of the boilers. The horizontal tubular boiler is meant in this connection.

Another method is to run the feed pipe through the top of the shell of the boiler at a point near the back, and to carry it nearly to the front end, from which point it returns to the back end, dropping to below the water line, over the blow-off opening, as in (A) fig. 1.

Again, the feed pipe may be carried through the front head as in B, dropping below water line at the back or the rear end, of the boiler. Or it may be taken through the front head, at a point six or eight inches above the bottom of the shell, and carried directly to the back, discharging as near to the blow-off opening as possible. In all cases the pipe inside of the boiler shell is supposed to heat the feed water before it enters the water being used in the boiler.

Annual Meeting of Winnipeg Builders' Exchange

At the annual meeting of the Winnipeg Builders' Exchange, held recently, Mr. W. H. Carter, of the Carter, Halls, Aldinger Company, was re-elected president. When Mr. Carter was elected to office a year ago, the membership of the exchange consisted of only 100. In one year this has been increased to over 300. Other officers elected were: F. H. Davidson, 1st vice-president; Thos. Kelly, of Thos. Kelly & Sons, 2nd vice-president; T. D. Robinson, treasurer; J. H. Buxton (re-appointed), secretary. Messrs. W. P. Alsip, J. W. Marley, H. C. McMartin and Chas. S. Shipman were re-elected to the directorate for a further period of three years. Considerable enthusiasm was manifested on the part of the members in the decision to secure a central site and erect a fine new structure to be known as the Builders' Exchange Building.



Information for this Department is requested from Architects, Engineers, Contractors and Builders. Send in the particulars of recent cases in which you were interested giving the main facts tersely.

Payment for Engineering Services—Moore v. March, Divisional Court of Ontario. Held, that accounts of engineers and surveyors employed by municipalities under the Municipal Drainage Act may be audited by the County Court Judge, and no appeal will lie to the Divisional Court from his certificate, as it is not an affirmative order that can be enforced, there being no direction for payment of what the judge found to be due the engineer or surveyor by the municipality. This action was an appeal by J. H. Moore from a certificate of Judge McTavish, of the Carleton County Court, disallowing \$896 of charges made for engineering services to the township of March. The total amount of the account was \$3,189.74. The \$896 deducted was disallowed by the County Court judge on the main ground that the engineer had charged for the services of certain persons, to whom he had delegated parts of the work, a larger sum than he had actually paid these persons. In stating the finding of the court, Mr. Justice Riddell said: “

... the County Judge disallowed a very large part of the account, proceeding, as I think, upon a wrong principle. I may say that, had I been auditing this account, the amount disallowed would have been of a trifling character. The judge is no doubt given jurisdiction. The method in which this jurisdiction is to be exercised is prescribed: (1) the bill is to be filed with the clerk with all requisite details; (2) the clerk is to deliver the account to the County Judge; (3) the County Judge is to appoint a time and place at which he will proceed with the audit; (4) the clerk is to give at least two days' notice of the audit to the engineer and the head of the municipality; (5) at the time and place fixed the County Judge shall audit the account, being given the power to disallow any charges which he may deem unreasonable (not which are unreasonable in fact or in the opinion of some other judge or tribunal), and (6) he shall certify to the amount to which in his opinion (not the opinion of someone else) the engineer is entitled. Much as I regret the result, it is in my view inevitable. The Legislature has in effect determined that an engineer employed under the Act is not to be paid what his services are worth, but what the County Judge thinks they are worth. The appeal must be quashed.”

A Bag of Cement is One Cubic Foot of Cement

The commercial unit of measure of cement is the barrel. The output of a cement mill is counted in barrels; the listed price of cement is the price per barrel. The paradox is that almost no cement is shipped in barrels; few cement mills could fill an order for cement in barrels without inconvenience, says “Engineering-Contracting.” The unit of shipment is the bag. Its only relation to the commercial unit of measure is that a bag of cement is one-fourth of a barrel. This means that a bag of cement is 95 pounds net of cement, that is one-fourth of 380 pounds, which is the net weight of cement in a barrel. This weight, 380 pounds, is the only definite

thing about a barrel of cement. Its volume is variable, somewhere between 3 and $3\frac{1}{2}$ cubic feet. This is volume of packed cement. A packed bag of cement contains then from 0.75 to 0.875 cubic feet. Pour a bag of cement into a box loosely and its volume is 20 to 30 per cent. more than it was packed in a bag. Mix this loose cement with water into a paste and its volume is decreased about 15 per cent., but it is yet more than when packed in the bag.

The points we wish to bring out are that a bag or a barrel of cement are both variable in volume and that barrels are no longer used to any extent to ship cement. The contractor receives his cement in bags: if he wishes or finds it necessary to measure or proportion in terms of barrels he calls four bags a barrel, and proceeds accordingly. What reason is there for continuing further to use the barrel as the unit of measure of cement in proportioning concrete? The barrel of cement no longer exists as an actual unit of measurement; it is merely the fictional unit of the book writer and statistician.

This leads to the question, why not, therefore, consider the bag as the unit of measurement in proportioning concrete? Contractors invariably make it the unit. A concrete proportion is to them invariably one or more bags of cement to so many cubic feet of sand plus so many cubic feet of stone. A 1:2:4 concrete means to the contractor 1 bag of cement, 2 cubic feet of sand and 4 cubic feet of stone, and this is exactly how he proportions the mixture unless the specifications prohibit him from so doing. This brings us to another question: Why not consider a bag of cement of full weight as 1 cubic foot of cement? Some engineers are doing so and have gained much in facilitating work without any significant loss, so far as we can see, in any respect. The following specification has been used for the last five years by a prominent Chicago engineer.

“The unit of measurement for cement shall be the bag received from the manufacturer having a gross weight of not less than 95 pounds. Such a packed bag shall be considered as equal to one cubic foot of cement. The contractor shall mix his concrete in batches calling for even bags when possible. If compelled to use fractions of bags, said fractions shall be weighed upon the assumption that the neat cement weighs not less than 94 pounds per cubic foot. If bags received from the manufacturer contain less than 94 pounds net of cement the contractor shall bring up the weight with additional cement. If the bags weigh uniformly more than is here called for the contractor shall be allowed to remove the excess cement provided each bag thus altered is altered by weight. The inspector shall weigh one bag in forty as the cement is received, in order to check weights.”

Is there any good reason why such a specification should not become general? We believe it would meet with favor from contractors. What serious objections can engineers offer to it?

A company with a capital of \$500,000 has been incorporated for the purpose of finding and developing slate quarries in New Ontario. It is said there are fine deposits in the new north lands.

At least one city engineer in the Dominion played the part of Santa Claus this Christmas. At London Ont., every year a number of pathetic little notes from poor children are addressed to this deity (Santa Claus) through the mail. City Engineer Graydon conceived the idea of having these letters sent to him and of gladdening the hearts of the youngsters by fulfilling the requests contained therein. Everyone will commend such generosity, but it is to be feared that next year will witness a phenomenal run on Santa Claus in the Forest City.

Personal News and Notes

Mr. McCullough, city electrical engineer of Vancouver, B.C., has resigned.

A visitor to Ottawa at Christmas was Mr. Ed. Petrie, of the harbor engineering staff of the G. T. P., Prince Rupert, B.C.

Mr. C. H. Topp, city engineer of Victoria, B.C., has resigned. Assistant City Engineer Bryson is filling the position temporarily.

City Engineer Laternell, of Edmonton, Alta., in company with Mayor Lee, will visit eastern and southern cities to secure new ideas on civic administration.

Mr. Chas. Murray, formerly a contracting plasterer of Winnipeg, Man., where he resided for the past 30 years, died suddenly last week at the age of 60 years.

Mr. E. J. Cagney, formerly contracting agent for the Montreal Light, Heat & Power Company, now in charge of the Central Georgia Power Company, spent Christmas in Montreal.

Arthur Freeman, consulting engineer, has opened an office at 514 Continental Life Building, Toronto. Mr. Freeman's specialties are heating, ventilating, sanitary plumbing, and kindred lines.

The entrance examinations of the Province of Quebec Association of Architects will be conducted at 5 Beaver Hall Square, Montreal, and at the City Hall, Quebec Que., on Jan. 24th and following days.

The death occurred last week of Mr. William Baker, a well known building contractor of Warwick, Que. The late Mr. Baker was born in Birkswell, England, in 1836. He emigrated to Canada and settled in Arnprior in 1857, carrying on a successful business for many years.

An employee of the Hamilton Bridge Works, named Wm. J. Kearney, met with a fatal accident last week. He was caught between an electric carrier and a heavy girder, and died the following day from his injuries. He was 51 years of age.

At the regular meeting of the Toronto branch of the Canadian Society of Civil Engineers, on the 30th ult., Mr. C. N. Monsarrat, engineer of bridges for the C.P.R., gave an illustrated address upon the construction of the Lethbridge viaduct. Mr. Monsarrat's interesting account of this important work appeared in the "Contract Record" in the issues of December 22 and 29.

Mr. Robert Patterson, one of the earliest western pioneers, formerly well known as a railway contractor, died at Knowlton, Que., on Christmas Eve. The late Mr. Patterson had been associated in the course of his enterprises with Mr. J. J. Hill and Lord Strathcona. He was 82 years of age and was especially well known and respected by old timers of the West. Mr. Patterson was a native of St. Andrews, Fifeshire, Scotland.

Mr. John Wagner, junior member of the firm of John Wagner & Son, Cleveland, Ohio, contractors for the high level intercepting sewer at Toronto, met with a serious accident last week. Mr. Wagner, who was superintending the work, fell down a shaft of the sewer at the corner of Adelaide and John streets, a distance of about 30 feet, sustaining a fractured collar bone, fractured shoulder blade and three broken ribs, one of which penetrated his lung. Mr. Wagner is 39 years of age. From enquiries at the Grace Hospital, we learn that while the condition of the injured man is very grave, he is resting quietly and doing as well as can be expected at this stage.

Recent Publications

"Structural Details, or Elements of Design in Heavy Framing." By Henry S. Jacoby, professor of bridge engineering in Cornell University. Profusely illustrated with figures in the text, six folded plates and 34 full page illustrations. Cloth, \$2.25 net. New York: John Wiley & Sons. Presents complete information on design of joints, beams and trusses in a lucid and systematic manner; also practical data on timber construction.

"Masonry Construction." By I. I. Baker, professor of civil engineering, University of Illinois. Contains 746 pages, over 100 tables and 244 illustrations. Cloth, \$5 net. New York: John Wiley & Sons. Tenth edition. Additional information will be found on plain concrete and in the three new chapters on reinforced concrete, concrete building blocks, etc. Latest and approved engineering practices. Should prove of material assistance to the progressive contractor.

Calendars for 1910

The Hamilton Bridge Works Company, Limited, have favored us with an exceptionally fine calendar for 1910. The illustration is entitled, "Where the Fox Ran," and is a colortype reproduction from an original painting by W. Verplanck Birney, A.N.A., exhibited in the National Academy, New York, 1908. It were hard for the Hamilton Bridge Works Company to have chosen a more interesting subject. The red coat of the huntsman, the world over, has a peculiar fascination for the Britisher. Those who were fortunate enough to receive a copy of this calendar will have a constant reminder of a fine old sport that is linked with some of our most honored traditions. And what is perhaps more significant, they will have a creditable souvenir of one of the most enterprising bridge building concerns in Canada.

The Kerr Engine Company, Limited, Walkerville Ont., sent out a particularly attractive calendar entitled "The Shepherdess and Her Flock." A delightful picture reproduced from a painting by Willem Stoolink. The object of the calendar as defined by the company is to serve as a daily reminder of the company's increased desire and ability to render satisfactory service in every detail of their business.

The B. Greening Wire Company, Limited, Hamilton Ont., have favored us with a copy of their 1910 calendar, which is well adapted to office requirements. A view of the extensive works of this concern is shown above the date sheets, also photos of the president and former founders.

Another good plain office calendar was that sent out by F. H. Hopkins & Company, dealers in railway and contractors' supplies, Montreal, Que. The leading lines of the company are illustrated on the various sheets of this calendar.

The customers and friends of Muesons, Limited, of Montreal, dealers in machinery and supplies of all kinds, were favored with a large office calendar containing illustrations and lists of a few of their various lines.

The head line on the calendar dispatched by the Universal Portland Cement Company, Chicago and Pittsburgh, reads as follows: "It's so good that 23,000 barrels are made every day."

A paper entitled "Artistic Park Bridges" will be read before the Canadian Institute, 198 College street, Toronto, on Saturday, Jan. 8, by Mr. C. R. Young, B.A.Sc., of the firm of Barber & Young, consulting engineers.

Ambitious Contractors at Hamilton, Ont.

An interesting circumstance in connection with the contest for aldermanic and other civic honors at Hamilton, Ont., this year, was the number of candidates connected with building and contracting interests. Of the contractors, we noted Mr. Benjamin Johnson and Geo. H. Milne, both for alderman, and Mr. John Allan and ex-Ald. Findlay for the Board of Control. The plumbing industry was represented by Mr. Andrew Rodgers, manager of the Rodgers, Wray & Greenway Company, and Mr. Hugh S. Wallace. Another aldermanic candidate was Mr. W. Barrett, painting contractor.

Mr. John Allan was born in Guelph, and went to Hamilton when six years of age. He spent his boyhood in the city, and later went to New York, where, for many years, he was a successful builder. He is a past vice-president of the International Bricklayers' Union, and was treasurer of the Harlem Union, No. 37, for 15 years. Mr. Allan has since retired from business.

Mr. Andrew Rodgers, manager of the Rodgers, Wray & Greenway Company, plumbers, has been a resident of Hamilton all his life. He has conducted a plumbing business in the city for the past 20 years.

Mr. Hugh S. Wallace, a former plumber and steam-fitting contractor, was for 29 years in business in Hamilton. For eight years, from 1900 to 1907 inclusive, he served in the city council, and during that time was for four years chairman of the sewers committee. He was also a member of the finance, harbor and beach, and fire and water committees.

Ex-Ald. Findlay is a native of Scotland, and a well known contractor at Hamilton. He has been in the city since 1868, and has been much in the public eye during that time. He was a member of the city council for about 12 years, and for two years was chairman of the board of works. He opposed John S. Hendrie, in 1901, and T. J. Stewart, in 1907, in mayoralty elections, but was unsuccessful in either case.

Mr. W. Barrett, painting contractor, went to Hamilton from London, Eng., about 36 years ago, and has been in the business he now follows for about 30 years.

Railroad Work Exciting at Prince Rupert

Some interesting problems are encountered occasionally on Grand Trunk Pacific construction out Prince Rupert way. A recent dispatch from this city describes a piece of the work recently carried out by Ross & McColl, who are building the second section of the line out of Prince Rupert. It was found necessary to make an attack upon 40,000 yards of rock which had the appearance of a solid precipice. A charge of 36,000 pounds of virite was used and after the shot was fired nothing remained of the bluff but a fragmentary mass of boulders. The writer of this account states that, "It is an item in the humdrum of the day's proceedings to rush to the hill tops and shiver and gasp, as with a great convulsion the hills are torn asunder with a mighty roar, a flash, and the sky is blackened with what, a second before, was a solid precipice and now a cloud of dust and fragments of rock." This is what might be termed local color.

Vancouver has received an expert report from Chicago that wood blocks are now favored by the best authorities as paving material.

A fire escape recently patented by a New York man consists of a fireproof tower, containing a separate spiral tube leading from each floor to the street, to lessen the confusion should a single tube be used for all floors.

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Dorval, Que.

Tenders will be received until January 18th for the construction of about six thousand feet of cement sidewalk, plans at the office of D. H. Dupont, 62 St. James street, Montreal. Alphonse Decary, 415 New York Life Building, Montreal, secretary-treasurer.

Moncton, N.B.

The city engineer has presented his report regarding the new water supply. Estimated cost of second reservoir is placed at \$212,000.

Montreal, Que.

Mr. T. H. Pitcher, general manager and chief engineer of the Montreal Water and Power Company, is authority for the statement that his company will proceed with the construction of a modern filtration plant. It is expected that the work will be so far advanced by next winter that the plant may be placed in operation.

Rainy River, Ont.

A bylaw to raise \$7,000 for sewer construction was carried.

Trail, B.C.

Plans for the installation of waterworks here, have been submitted to the provincial government for approval.

Toronto, Ont.

Tenders addressed to G. R. Geary, Chairman, Board of Control, will be received until January 18th for the construction of the following sewers: Dingwall avenue, from Pape avenue to east end; Albany avenue, from C. P. R. to Davenport road; Campbell avenue, from Lytton to Davenport road. Envelopes containing tenders must be plainly marked on the outside as to contents. Specifications, etc., at the office of City Engineer Rust.

Welland, Ont.

The bylaw to raise \$125,000 for pavements was defeated.

AWARDED.

Montreal, Que.

The contract for the supply of structural steel for power racks and tail race bridge has been awarded to the Dominion Bridge Co., of Lachine, by the Canadian Light & Power Company.

The Canadian Light & Power Company have awarded to the John MacDougall Caledonian Iron Works Company, Limited, the contract for the supply of cast iron wheel chamber drain pipe required for their power development at St. Timothee, Que.

Verdun, Que.

In connection with the new municipal power house the following tenders for the installation of pumps were received:—Messrs. Laurie & Lamb, \$2,300; Canada Buffalo Forge Company, \$1,170; Peacock Bros., 1,920; Drummond McCall, \$1,600. On the recommendation of the special com-

mittee it was decided to award the contract to Laurie & Lamb on the ground that their pumps were more economical in steam consumption. This company will supply high efficiency centrifugal pumps which will be direct connected to Bellis Morcom engines. The following tenders were received for the supply of a 250 horse power boiler: Polson Iron Works, \$4,615; Kobb Engineering Company, \$4,990; Babcock & Wilcox, \$5,500. The design tendered by the Maxim Boiler Company being too large for the space available the contract was awarded to the Polson Iron Works.

Railroads, Bridges and Wharves

Edmonton, Alta.

McLeod Bros., who have the sub-contract for 240 miles of G. T. P. construction east of Prince Rupert, say steel-laying there will begin in the spring. Work is progressing very fast.

Howick, Que.

Tenders addressed to D. R. Hay, secretary-treasurer, this place, will be received until January 25th by the municipal council of the parish of Tres St. Sacrement, in the County of Chateaugay, for furnishing the necessary material and building the concrete abutments for the Allen's Corners bridge. Also, the erection of the iron and steel structure for the same bridge. Plans, etc., at the office of the above mentioned.

Montreal, Que.

The G. T. P. during the current year anticipates building from Wolf Creek to Tete Jaune Cache, a distance of 109 miles also to complete the line in British Columbia from Copper River to Aldermere (on the west end), a distance of 135 miles.

The Grand Trunk Pacific Dock Company, with a capital stock of \$150,000, has been organized on the coast. The officers are: President, Chas. M. Hays; secretary-treasurer, Henry Phillips, Montreal. One of the first undertakings of the new company will be the construction of new docks at Seattle, Victoria, and additional docks at Prince Rupert. Previously mentioned.

North Vancouver, B.C.

G. A. Stimson & Company, Toronto, Ont., have purchased \$128,000 debentures bearing five per cent. interest and maturing 1949. The bonds are issued for building a new ferry and wharf, etc.

Port Burwell, Ont.

Marine Inspector Capt. G. C. Cole, of Collingwood, who has been inspecting the harbor here, will recommend to the Department of Marine the construction of a breakwater off the piers to stop the drifting sand. He estimates the expenditure at \$20,000.

Regina, Sask.

G. H. Pope, right of way agent for the G. T. P., has finished his work in connection with the line to run south to the international boundary, and he states construction will be commenced early in the spring. This will be a continuation of the

line which will run to Ice Pass, where it will connect with the proposed government line to Fort Churchill on Hudson's Bay.

AWARDED.

Quebec, Que.

The contract for removing the debris in connection with the collapsed Quebec bridge has been awarded to Capt. Charles Koenig, this city, for \$90,000.

Winnipeg, Man.

M. Peterson, Secretary, Board of Control, writes that the contract for supply of labor and materials for additions to piers of Louise bridge, across the Red river, have been awarded to John Green & Sons, contractors, this city, at \$13,890.

Public Buildings, Churches, Schools, etc.

Dauphin, Man.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ottawa, Ont., will be received until January 24th for post office fittings. This place.

Plans, etc., on application to Mr. T. H. Richards, caretaker, public buildings, Dauphin, and at the Department of Public Works, Ottawa.

Estevan, Sask.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ottawa, Ont., will be received until January 21st for local post office fittings. Plans, etc., to be sent on application to Mr. G. E. Faulkner, caretaker, public buildings, this place, and at the Department of Public Works.

McKenzie & Provost Company, general contractors, this place, state that a new 8 room school is contemplated, work to commence early in the spring. Work on the new hotel, for which they have the contract, is being pushed, with the expectation of having it finished by the first of May.

London, Ont.

The promoters of the new Masonic Temple have been incorporated, with officers as follows: President, P. W. D. Brockbank; vice president, A. B. Green; secretary-treasurer, S. Baker. \$25,000 worth of stock has so far been subscribed and tenders will be called for as soon as the design has been selected. Noted in issue of December 29.

No. 2 Committee, Board of Education, was instructed to obtain plans and call for tenders for the new school on Colborne street. Dr. Wyckoff, chairman.

Montreal, Que.

The Italian Methodists of Montreal are considering the erection of a church building in Laurier ward.

The Lathellier Club contemplate the erection of a club house at an early date.

Dr. Desautels, M.L.A., announces that the new military school will be built on the South Shore at a point between St. Lambert and Longueuil. This has now been decided by the Federal Government.

after considerable investigation of other sites offered. Noted in issue of December 24th.

A delegation representing the advisory board of the Children's Home waited upon the provincial government to ask for financial aid towards the new building for which plans have been prepared, which call for the expenditure of \$80,000, not including inside furnishings. J. H. Ahsdown, J. Galt and J. A. M. Aikins, K.C., are members.

Nelson, B.C.

The private hospital owned by Miss De-bissay has been purchased by the directors of the general hospital. It is understood that the site will be used for a new modern hospital next summer.

Quebec, Que.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ottawa, Ont., will be received until January 14th for alterations to examining warehouse, this city. Plans on application to A. E. Decary, District Engineer, Post Office Buildings, Quebec.

Owen Sound, Ont.

Erratum.—The bylaw for the erection of the public library, according to the latest count, has been defeated by the ratepayers, and not passed as reported in last issue.

Ottawa, Ont.

With regard to the new Masonic Temple, mentioned in issue of November 10th, a company has been incorporated as the Masonic Temple, Limited, capital \$1,000,000. Only preliminary plans for building have been made, which call for five or more storeys, of brick and stone structure. Provisional directors, G. S. May, W. Northwood, H. W. Wilson, merchants; R. W. Stephen, deputy clerk in the Senate of Canada.

Mayor Hopewell is quoted as having said that the council will begin at once on the improvements to the City Hall.

Port Arthur, Ont.

E. Brotherton, of Indian Harbor, Ind., it is reported, has been engaged to prepare plans for a public library to be erected at a cost of \$25,000.

Strathcona, Alta.

The Massey estate, of Toronto, has donated \$50,000 towards the erection of a Methodist theological college on the University grounds. The college will be built next summer at a cost of \$100,000.

St. Jacques L'Achigan, Que.

Mr. D. A. Lafortune, K.C., M.P., is stated as having said that he had secured \$15,000 for the erection of a local post office.

St. Sylvester, Que.

J. W. Gregoire, architect, 95 Wellington street, Sherbrooke, Que., has under supervision the restoration of the interior of the church here. Approximate cost, \$10,000.

St. Lambert, Que.

It is stated that work will be commenced in the spring on the erection of a new post office for this town, estimated cost \$10,000.

Toronto, Ont.

The building committee of the Y. M. C. A. have reported favorably on a site on College street for their new building.

Vancouver, B.C.

The church committee of the Grandview Roman Catholic church have decided to

erect a new church to replace the one damaged by fire recently. Father F. Lardon is in charge.

Architect Hooper has been engaged to prepare plans for the new Labor Temple. Plans to be submitted on January 13th. Estimated cost, \$60,000. Materials: reinforced concrete, brick veneer and stone trimmings. Noted in issue of November 10th.

Victoria, B.C.

The ratepayers will be asked to vote on a bylaw to empower the corporation to grant to a local company a site for a theatre from the rear of the Empress hotel. Noted in issues of December 8th and November 3rd.

Woodstock, N.B.

Tenders addressed to J. C. Hartley, secretary-treasurer Carleton County, will be received until January 17th for furniture and fittings required in the new court house. Plans at office of the above mentioned, and of the architect, F. Neil Brodie, St. John, N.B.

Winnipeg, Man.

It is expected that a \$50,000 permit for alterations in the old post office building on Main street will be issued shortly.

At the last meeting of the City Council a unanimous resolution was passed urging upon the Dominion Government the necessity of building a new drill hall.

Tenders are being invited for \$200,000 4 per cent. 25-year school bonds. R. H. Smith, secretary-treasurer, Public School Board.

AWARDED.

Fort William, Ont.

The Separate School Board have awarded the contract for the erection of a new school building at the corner of Mary and Edward streets to M. Ferguson. Approximate cost, \$16,000. Work will be started at once.

Strathcona, Alta.

The provincial government have awarded the contract for supply of brick required in construction of the Arts Building, Alberta University, to Pollard Bros., this city.

Woodstock, Ont.

The contract for tearing down the old section of the Beale school and for erecting in its place a four-roomed addition was let to the firm of Nagle & Mills, of Ingersoll, at \$11,054, the lowest tender. Heating and plumbing systems are not included. The Delatre street school will cost \$15,197, also exclusive of the heating and plumbing systems. The contract for this was divided up. Geo. Adams secured the masonry work at \$8,300; Jas. Campbell, carpenter work, \$5,672; G. Jarvis, slating, \$527; Alex. McDonald, tinsmithing, \$150.60; F. J. Fowler, painting, \$390; J. W. Brown Bros., blackboards, \$157.60. The contracts include clauses providing a penalty of \$10 per day for each day the buildings are not completed after the time set. Work on the new buildings is to be commenced, according to the contracts, on April 1st, and the buildings are to be completed by September 1st, in time for the opening of the fall term.

Residences

Montreal, Que.

Plans are under way for the erection of a first-class modern apartment building on the Phillips property on Bishop street, next year, and as soon as spring opens the present houses will be torn down to make

room for the new structure. The new apartment building will be built around a courtyard, and will be four storeys high with 70 feet frontage. The front will be of Roman stone and artistic design. The sale was effected by Cradock, Simpson Company.

Ottawa, Ont.

W. E. Noffke is preparing plans for a brick residence for P. G. Connally, M.D., of Renfrew, Ont., to cost about \$12,000.

St. John, N.B.

Mr. Haley, 221 Germain street, will have a new residence built to be ready when he gives up possession of his present dwelling in the fall.

Toronto, Ont.

A three storey brick apartment house, to cost \$14,000, will be erected on Foxbar road, near St. Clair avenue, by Mrs. E. D. Y. Cohen, 291 St. George street.

Winnipeg, Man.

Tenders are being called until January 22nd for all trades, except the excavations, for the erection and completion of a solid brick apartment block on Sherbrooke street. Plans, etc., at office of Smith & Bruce, the architects.

Recent building permits include: J. T. Bergman, apartment block, Furby street, \$3,500; J. T. Bergman, three dwellings on Home street, \$2,500 each; Geo. Neil, four dwellings, Aynsley, between Jessie and Rosser avenues, \$2,000 each; F. Lovedale, dwelling, Glenwood crescent, \$3,500.

AWARDED.

Montreal, Que.

Messrs. Hogle & Davis, 80 St. Francois Xavier street, have awarded the contract for roofing Mr. Greenshield's residence to D. Nicholson & Company, 690 St. Paul street.

Finley & Spence, architects, 74 Guardian Building, have awarded the contract for alterations to residence at 552 Sherbrooke street for C. W. N. Aitken, to Leblanc & Aquin, cost \$3,500.

Vancouver, B.C.

H. B. Watson, architect, has awarded the contract for the heating system for the apartment house, corner of Bute and Georgia streets, to Barr & Anderson, and that for the building construction to J. J. Disette. Plans call for five storeys, brick and stone, covering an area of 66 by 132 feet. Estimated expenditure, \$100,000.

Business Buildings and Industrial Plants

Arnprior, Ont.

The building occupied by I. Willoughby was destroyed by fire on or about the 2nd inst. Estimated loss, \$5,000.

Brantford, Ont.

It is stated that the Goold, Shapley & Muir Company, Clarence and Wellington streets, are thinking of enlarging their premises. W. H. Whitaker, secretary-treasurer.

Chatham, Ont.

The ratepayers voted against the bylaw to grant a fixed assessment to the Chatham Fruit Growers' Association for the erection of a cold storage plant to cost \$15,000.

Cowansville, Que.

The McClatchie block was destroyed by fire recently. Total loss about \$15,000.

Davidson, Sask.

The American House was destroyed by fire on the 3rd inst. Estimated loss, \$3,000.

Fort William, Ont.

The bylaw authorizing an agreement between Fort William and the Superior Rolling Mills Company has been carried. According to the agreement, the company is to erect a thoroughly up-to-date wire and nail factory, employing at least one hundred men for 250 days in the year at ten hours each day. F. W. Thompson, managing director of the Ogilvie Company; H. S. Holt, president of the Montreal Light, Heat & Power Company; T. Drummond, vice-president of the Dominion Steel Corporation are interested. Noted in October 20th issue.

Grenfell, Sask.

The building owned by the Grenfell Milling Company and the one occupied by R. B. Taylor were destroyed by fire on the 31st ult. Estimated loss, \$10,000.

Gilbert Plains, Man.

Fire destroyed the Gilbert Plains grist mill and elevator on the 31st ult. Estimated total loss, \$30,000.

Grandmere, Que.

The Robeson Process Company, of Aulsebrook Forks, N.Y., will erect a large factory, this place, for the reclamation of waste sulphite liquors and other by-products in the tanning and foundry industries.

Inglewood, Ont.

The elevator here was burned. Total estimated loss, \$5,500.

Kingsville, Ont.

The bylaw to grant tax exemption to Mettawas Hotel Company, who will build a \$50,000 summer hotel here, was passed.

Little Current, Ont.

The potter building, occupied by J. Elington and E. Stephenson, the Mansion House and telephone and telegraph office, were destroyed by fire on the 10th inst. Total estimated loss, \$100,000.

Minitonas, Man.

The brick building occupied by the Trading Company was destroyed by fire on the 3rd inst. Estimated total loss, about \$10,800.

Moose Jaw, Sask.

It is reported that a large garage will be built early in the spring. Dr. McMillan is interested.

Montreal, Que.

Architect H. C. Stone, St. Francois Xavier street, is preparing plans for extensive alterations to the premises at 232-234 McGill street for the Childs Company, of New York. Estimated expenditure, \$40,000.

Work will be commenced this week on the erection of an ice storehouse for the City Ice Company, on a siding of the C. P. R. at Mile End. The building has been designed by Mr. Shaw, of this company, and will also be erected by him.

The property, No. 357 St. Catherine street west, at present occupied by the Art Photo Emporium, will be taken over in the spring by Allan, the clothier, 401 St. Catherine street west, when alterations will be made.

The shoe factory and warehouse of Ald. M. E. Guay, 230 St. Marguerite street, were destroyed by fire. Total estimated loss, \$4,000.

The premises occupied by H. Hart, 307 St. Lawrence street, were badly damaged by fire on or about the 6th inst. Total estimated loss, \$5,000.

The plans for the new C. P. R. depot at Mile End, now submitted to the Railway

Commission, call for a building 170 by 40 feet, with a platform 140 feet in length. Construction is expected to start in the spring. Noted in issue of January 30th.

It is reported that the G. T. P. will erect a twelve story office building at the southeast corner of St. James and St. Francois Xavier streets. It is also reported that plans are being prepared, and that an outside firm of contractors are likely to secure the contract.

The Roads Committee of the City Council recently approved of the erection of an East End terminal for the Lachine Jacques Cartier and Maisonneuve Railway. This new railway was incorporated at the last session of the Quebec legislature to operate between Lachine and Maisonneuve as a branch line of the G. T. R., and it is stated that it will be used ultimately for the G. T. P.'s entrance into Montreal. The Roads Committee have agreed to the closing of certain streets to permit the erection of the new station, which will be built on St. Catherine street, between Harbor and Frontenac streets. Noted in issue of December 29th.

It is reported that the C. N. R. Company will erect a large passenger station in the western end of the city on the block surrounded by Osborne, Mountain, Dorchester and Stanley streets. It is further stated that their lines from Toronto and Ottawa will be connected to this station, by tunnelling under the mountain, while eastern connection will be made by the construction of a line along the harbor front.

North Bay, Ont.

A number of stores on Oak street were destroyed by fire on the 7th inst. Total estimated loss, about \$20,000. Those affected, Angus & Company, McCubbin and others.

North Vancouver, B.C.

The council have agreed to grant certain privileges to the Imperial Power Shipbuilding & Dock Corporation. The company will probably spend \$300,000 on plant alone, and will enter into all kinds of railway construction.

Ottawa, Ont.

Colborne P. Meredith, architect, has prepared plans for extensive alterations to the Lemoine property on Sparks street, occupied by E. P. Charlton fancy goods store and Stroud Bros.

It is stated that the Beaver Manufacturing Company, of Beaver Mills, N.Y., are negotiating with a view to locating a branch factory here, to manufacture wood fibre, wall paper and wall boards. The site proposed is near the Booth mills.

According to a judgment recently issued by the Dominion Railway Commission, the C. P. R., G. T. R., and C. N. R. must, within fixed dates, construct and maintain buildings for freight and passenger accommodation along their lines of rail in Manitoba, Saskatchewan and Alberta.

Parry Sound, Ont.

The buildings owned by S. A. Sine were damaged by fire on the 6th inst. Estimated total loss, \$20,000.

Port Arthur, Ont.

The bylaw to aid and bonus the Port Arthur Steel & Wagon Company, of which J. B. Tudhope, Orillia, is president, has been carried. The report from Port William is to the effect that the bylaws to bonus the linen and leather industries were both defeated by a small majority.

Prince Rupert, B.C.

P. Burns, of Calgary, cattle buyer, is interested in the building of a cold stor-

age plant here with freezing station attached. Estimated cost \$1,500,000.

Portage la Prairie, Man.

R. H. M. Peck, vice-pres., writes that the outbreak will and that there will be no damage to their plants next season.

Regina, Sask.

D. W. Bode, ex M.P. for Winnipeg, Man., is stated as having said that plans for a branch warehouse of the National Drug Company, of Montreal, are being prepared, and that the building will be ready, if possible, before 1911. F. H. Bode, of the Bode Drug Company, is also interested.

Sault Ste. Marie, Ont.

The buildings occupied by J. R. Strong, learn and W. J. Thompson & company, were damaged by fire on the 11th inst. Total estimated loss, \$8,000.

St. Boniface, Man.

A shoe firm of Quebec, which is anxious to secure a greater western trade, is contemplating the erection of a factory here.

Sackville, N.B.

J. G. Pinner and J. T. Cunningham, of New Glasgow, have interviewed the Board of Trade with a view to establishing an industry here to manufacture the rubber bearing wheel, of which the first named is the inventor.

Sydney, C.B.

The ratepayers voted in favor of the establishment of the National Rolling Mills. Construction of the buildings will, it is expected, start early in April. Estimated expenditure in material, \$550,000; in wages \$150,000. The company is composed of H. McNeil, of Glace Bay, C. V. Williams, H. Mitchell, of Donalton, and F. A. Stewart, of Sydney. Noted in last issue.

Toronto, Ont.

The site formerly occupied by Harold A. Wilson at 35-37 King street west has been sold. It is understood that a large business building with stone front will be erected. H. H. Williams effected the sale.

Victoria, B.C.

Construction of a handsome hotel for Queen Charlotte will be begun shortly. It is to be a two story structure, with 100 guest rooms.

Vancouver, B.C.

It is stated that fifty thousand dollars has been appropriated by the Royal Bank of Canada for the remodeling of its Vancouver premises.

Work of tearing down preparatory to excavation, has been started on the two story office building to be erected. Estimated expenditure, \$15,000. Mr. W. Hadden is interested.

Windsor, Ont.

It is stated that a contract, valued at \$100,000, for the construction of a third automobile factory in the local industries, has been secured. All the companies are located at Detroit, Mich.

Welland, Ont.

The International Tool Steel Company, Limited, having an extensive plant well known here as Mr. John J. McNeil, general manager of the Pullman Iron Works, Limited; Mr. J. F. Murphy, president, and Mr. Marston Campbell, president of the Canadian Wire Company, Limited, Chatham, has recently been organized to manufacture steel by a special process out of mineral sands found in the Province of Quebec. It is reported that the plant will be located here.

Winnipeg, Man.

It is stated that Chase & Harkness, agents for Chase Bros. shoe manufac-

ers, of Preston, Ont., have secured a building site for a warehouse. G. A. Clare, M.P., is interested.

J. T. Gilmore, representative of the Marshall Field Company, Chicago, writes us to the effect that the company's plans do not at present embrace any location of branch houses here or elsewhere. Noted in last issue.

Yorkton, Sask.

Wilton Bros.' wholesale fruit warehouse was destroyed by fire on the 5th inst. Estimated loss on building, \$5,000.

AWARDED.

Medicine Hat, Alta.

W. Overpack, manager, Alberta Clay Products Company, Webster City, Iowa, U. S., writes that the following contracts for the clay products plant in this city have been let: E. Leonard & Son, London, Ont., boilers; Murray Iron Works, Burlington Sound engine; Bromnell Company, Dayton, Ohio, heater; National Pump Company, Upper Sandusky, Ohio, pump; Stewart Machine Company, Winnipeg, Man., 42 inch gap lathe, iron planer, 30 inch drill press, 5 horse power gas engine, blower and blacksmith tools; Minneapolis Steel Machinery Company, Minneapolis, Minn., post caps, base plates, I beam, heavy line shafting, bore and drum pulley. Contracts for sewer pipe machinery and equipment and structural steel for elevated track have not yet been awarded.

New Westminster, B.C.

The Vulcan Iron Works has secured the contract to supply large and expensive boilers and other machinery for the Willamette Iron Works Company, of Portland.

Orillia, Ont.

Phillips & Company have received the contract for the plumbing of the big Tudhope factory. The contract includes nine complete lavatories—three on each flat.

Victoria, B.C.

The contract for the erection of the "Times" new building, on the corner of Broad and Fort streets, has been awarded to Adkinson & Dill, at about \$70,000. Plans call for a building of five storeys with basement, of reinforced concrete, faced with pressed brick, the lower storeys being faced with sandstone and granite. Architect, H. S. Griffith.

Power Plants, Electricity and Telephones

Belleville, Ont.

The bylaw to grant the Trenton Electric & Water Power Company a five-year franchise was carried. This was erroneously reported as relating to Kingston.

Chatham, Ont.

The Board of Railway Commissioners has authorized the Chatham, Wallaceburg & Lake Erie Railway Company to construct and operate a branch line on several streets in this city.

Hamilton, Ont.

The Hamilton Street Railway Company have placed an order with the Ottawa Car Company for nine double-truck cars to be ready by June 1st.

Niagara Falls, Ont.

It is stated that the proceeds of the bonds issued by the Niagara Falls Power Company, amounting to \$404,285, are to be used on additions to the plant of its auxiliary company, the Canadian Niagara Power Company.

Application has been made to the Dominion parliament by the Niagara Falls, Welland & Dunnville Electric Railroad Company for permission to construct an electric railroad from Niagara Falls, Ont., to Dunnville, a distance of about 50 miles. Franklin S. Buell, of Buffalo, N.Y., is interested.

Peterborough, Ont.

The Canadian General Electric Company are in the market for the supply of large steel castings for dynamos.

Port Credit, Ont.

As Brampton has decided to take power from the Government commission, it is probable that a sub-transformer station will be built here.

Preston, Ont.

The ratepayers will be asked shortly to vote on the question of raising \$18,000 by debentures for the establishment of an electric power distribution plant. H. C. Edgar, clerk. Noted in last issue.

Regina, Sask.

The council has decided to advertise that the city is prepared to consider proposals relative to the granting of franchises for the operation of street railway and gas works, subject to the right of the city to take over the undertakings at the expiration of a definite term of years at a realization to be fixed by arbitration and subject to conditions with regard to charges to be made by the company's outstanding franchises.

The city invites negotiations with capitalists and others, for the purpose of obtaining proposals for a special franchise for street car services and gas works for the city, subject to the right of the city to take over the undertaking at the expiration of a definite term of years, at a price to be fixed by arbitration. Angus Smith, City Engineer.

Victoria, B.C.

The contract system will be followed by the city in carrying out the scheme for a system of ornamental lights which are to be erected on Douglas street between Humbolt and Cormorant, and on Yates street between Douglas and Blanchard streets.

The B. C. Electric Railway Company has taken option on Douglas street property lying between Discovery and Chatham streets, to be used as site for terminals. Messrs. Grant & Lineham put through the deal.

Waterloo, Ont.

It is stated on good authority that tenders will be called shortly for electrical equipment for the proposed municipal electric plant. Contracts for the construction of the power house have been awarded. Geo. Grosz, this place, is engineer; Ford S. Kumpf is secretary of the light commission.

AWARDED.

Montreal, Qué.

The Montreal Light, Heat & Power Company recently awarded the contract for the installation of additional units in their Lachine power house as follows: Canadian General Electric, four 800-kw. generators, four 2,000-kw. transformers, and switchboard equipment. S. Morgan Smith Company, York, Pa., four vertical type water wheels.

The Canadian Light & Power Company have awarded the contract for the supply of three 7,200 horse power water wheels to the S. Morgan Smith Company, York, Pa., U. S. A. These will be direct connected to 4,000 kw. generators which are being supplied by the Allis-Chalmers-Bul-

lock, Limited. The Smith Company will also supply two 450 horse power exciter water wheels which will be direct connected to 250 kw. direct current exciters also supplied by the Allis-Chalmers-Bullock, Limited.

The Canadian Light & Power Company have awarded the contract for penstocks required for their St. Timothee development, to the John Inglis Company, of Toronto.

Verdun, Que.

The contract for the electric wiring in connection with the Municipal Electric Light plant has been awarded to W. J. O'Leary & Company, whose tender was for \$205. This company was also awarded the contract for the conduit work and for installing the exciter and generator leads at \$145.

Vancouver, B.C.

The contract for excavating and concrete work for the new lighting system on Granville street, has been secured by Scott & Ledingham. The installation of the electrical work has been let to the Electrical Construction Company, and the Canadian General Electric Company have the contract for the lamp standards.

Winnipeg, Man.

Nelson & Cassidy, of this city, have been awarded the contract to supply the Manitoba government with 150,000 telephone poles. Estimated expenditure, \$200,000.

Miscellaneous

Belleville, Ont.

The barns owned by John Huffman on the fifth concession of Thurlow, were destroyed by fire at a loss of about \$5,000.

Fredericton, N.B.

Tenders for lumber for Tobique Narrows steel highway bridge will be received at the Department of Public Works, Fredericton, until January 17th. Specification to be seen at Public Works Department, Fredericton. John Morrissey, Chief Commissioner.

Kingston, Ont.

The ratepayers have passed the bylaw for purchase of fire engine and extension of streets. Erroneously reported as referring to Belleville.

London, Ont.

It is understood that a proposition is on foot to dredge the river to Springbank.

Montreal, Que.

Tenders addressed to L. O. David, city clerk, will be received until January 17th inst. for (1) uniforms; (2) for hose and covers; (3) for steam fire engine; or (4) for aerial ladder truck, as the case may be. Specifications, etc., at the office of the chief of the fire department, corner of Craig and Chenneville streets.

Recent building permits include: — Jenkins Bros., 103 St. Remi street, factory and office, \$5,000; Chas. Boon, 492 St. Charles Borromeo street, house containing four dwellings on St. Urbain street, \$4,000; Jos. Rinfret, 5916 Berri street, house containing five dwellings, Delormier avenue, \$6,000; Deguise & Cloutier, 1890 St. Catherine street east, two houses containing four dwellings, 168 Forsyth street, \$4,000; F. A. Pinoteau, Parc Lafontaine, two houses containing four dwellings on Christopher Colomb street, \$4,000; A. Beaulien, 224 Boyer street, a two storey house, 607 Mentana street, \$3,000.

Toronto, Ont.

Tenders will be received until January 18th for the supply of limestone dust for

Tenders and For Sale Department

City of Wetaskiwin, Alberta

Sealed tenders will be received by the undersigned up to FEBRUARY 15TH, 1910, for the drilling of a Gas Well in the City of Wetaskiwin, at so much per foot. A certified cheque for \$500.00 must accompany each bid.

The lowest or any tender not necessarily accepted. Specifications and form of tender may be received from

E. ROBERTS,
Secretary-Treasurer

The Simcoe Railway and Power Company, Limited, Midland, Ontario

Tenders for Hydraulic and Electrical Equipment

Sealed tenders endorsed "Tender for Hydraulic Equipment," or for other respective sections, will be received by the Secretary of the Simcoe Railway and Power Company, Limited, at the Head Office, Ontario, until February, 1st., 1910 for the following:—

For Generating Station at Big Chute, Severn River.

Hydraulic Equipment
Penstocks
Electrical Equipment

For 27 Mile Transmission Line

Wire
Insulators
Crossing Towers

For Receiving Station at Midland

Electrical Equipment

Specifications for the above may be seen at the office of the Secretary, Midland, Ontario, or at the office of Engineers, C. H. & P. H. Mitchell, Traders Bank Building, Toronto, Ontario. No tender necessarily accepted.

W. FINLAYSON,
Secretary.

Midland, January 6th, 1910.

1910. G. R. Geary, Chairman, Board of Control.

Recent building permits include: Chas. Simmons, alterations to pair of dwellings, 128 Edward street, \$4,000; Geo. Jackson, Jr., two and a half storey brick dwelling, 254 Dufferin street, \$2,500; T. P. Hodgson, 10 attached two storey brick dwellings, Dingwall avenue, \$18,000; E. Sharp (in trust), pair two storey brick dwellings, Bloor street west, \$4,800; W. N. McEachren, pair two storey brick dwellings, Winona avenue, \$4,000; Geo. Rennie, two pair semi-detached brick dwellings, Garden avenue, \$12,000; Lake Simcoe Ice Company, Limited, two storey metallic siding stable, Esplanade street east, \$2,000; H. J. Rae, two storey brick dwelling, Spencer avenue, \$5,500; Mrs. E. D. Cohen, three storey brick apartment, Foxbar road, \$14,000; G. S. Hope & Son, pair two storey semi-detached brick dwellings, Dovercourt road, \$5,000; Toronto Bedding Company, three storey mill construction addition to bedding factory, Jefferson avenue, \$21,000; C. B. Hodgson, two pair two storey semi-detached and one detached dwelling, St. John's road, \$10,000.

Winnipeg, Man.

The Board of Control recently awarded to the Fort Frances Lumber Company the

contract for a million feet of lumber. Owing to a wrong quotation in figures, a revision of contracts will probably be necessary. The contract called for 700,000 feet plank, 150,000 feet culls, 150,000 feet miscellaneous. Tenders for this were received from three firms, as follows: D. E. Sprague, \$22,637.50; T. D. Robinson, \$21,175; Fort Frances Lumber Company, \$20,430.

AWARDED.

Montreal, Que.

Mr. Theo. Daoust, architect, 113 St. Francois Xavier street, has awarded the contract for the erection of the Ice Palace to Coriveau & Brunet. Estimated cost, \$6,300.

Messrs. D. Nicholson & Company, 697 St. Paul street, have been awarded the following contracts for roofing: Two houses on Grosvenor avenue, Westmount, for Mr. Kerr; architects, Ross & McFarlane; house for Mr. J. Ash, McDougall avenue, Outremont; architects, Wright & Son; house for Mr. Champagne, Letourneau avenue, Maisonneuve; filter house for the St. Lawrence Sugar Refining Company; and two houses on St. Catherine street west, for Sir Thos. Shaughnessy, architects, Wright & Son.

Blistering and Peeling of Paint on Frame Houses

One of the complaints occasionally met in connection with the painting of frame houses is that the paint blisters and peels from the outside of the buildings—in some cases peeling clear to the wood. This is attributed in a measure to bad priming and painting when the wood is green or damp, and in some cases it is found that ready-mixed paints applied by inexperienced workmen cause a great deal of trouble to the man who does the repainting. A Canadian correspondent, writing to a recent issue of the "Painters' Magazine," asks the best way to avoid this blistering and peeling when the old painted surface is done over with good material by practical and experienced hands. He says he is burning off all the blistered paint, but is afraid he may have trouble with the balance where the paint appears to be in good condition.

In reply to the above correspondent the authority in question says:

We fully agree with you that much of the blistering and peeling is due to green or damp wood and inferior material for priming. The old-fashioned notion that anything is good enough for priming is still in the minds of many, but it is like building a house on sand without piling. Rotted or fatty oil has no place in a priming paint for wood nor should a priming be stout.

There is nothing better than pure lead and well settled but not fatty oil, mixed fairly thin and without driers for new work, and such prime should be rubbed in well into the dry wood. Over such a priming, paint is not likely to blister or peel, unless there are some local defects in the surface or behind it, such as plastered in damp weather, leaky gutters on roof, etc.

In repainting old-painted exterior surfaces, as an act of precaution the painter should, before he undertakes the job, assure himself of the actual condition of the old

paint, which may appear to be sound and intact all over and yet where the new paint has been applied over it, for six months or a year, blisters its hold, taking the new paint with it and coming off in large blotches. A trap here must come in the old paint was, tell whether it is adhesive and solid or whether it is loose.

The new paint cannot penetrate through the old paint and fasten it to the surface, or, on the contrary, in contracting on drying it is liable to draw it away still more from the wood, especially when the priming has been inferior. We would advise you to remove all of the old paint, either by scraping or scraping.

Notes on Concrete Work

Objections are often heard as to the unsightly appearance of concrete buildings when finished. With a little care concrete structures may be made as beautiful in the eye as buildings built of any other material. Concrete work is subject to various sorts of surface imperfections, the two most common being irregular surface texture and variability of color, or mottling. When these are successfully avoided or eliminated by the concrete worker, he is within reach of producing a satisfactory finish.

Plastering as a method of obtaining this finish is emphatically condemned by most authorities, who declare that it is practically impossible to apply mortar in thin layers to a concrete surface and make it adhere for any length of time and when it once begins to scale off, the result is a surface many times worse in this than the unfinished concrete that it was intended to render more slightly.

A method of finishing concrete surfaces which is preferred by many experienced engineers is to dress the concrete after it has hardened, by means of hammers or pointed chisels. This process is very similar to stone dressing and any of the forms of finish employed for cut stone can be employed equally well for concrete. In connection with holed surfaces, it is common to mould the concrete to represent a certain masonry, by means of a moulded and weathered patterned joint lines. This style of finish has been extensively used by Romans, who give the following directions for securing it: In finishing rough dressed work the mould is removed from the concrete while it is yet tender and with small light picks the face is picked over with great rapidity, an ordinary workman finishing about a thousand square feet a day.

For imitation of finer faced work, the concrete should be left to harden longer before being spiced or cut and the work should be done with a chisel. Most natural stone and especially granite makes excellent material for a face, but ordinary gravel will do.

Whatever is used let it be uniform in color and of even grade. When a very fine and close imitation of natural stone is desired take the same stone, wash it and mix it with cement colored to correspond. The finer the stone is crushed the nearer the resemblance will be upon close inspection, but for fine work it is generally sufficient to reduce the stone to the size of bank shot or fine gravel.

Cement Piant for Steel Structures

It is claimed by Prof. F. E. Geisecke, of the Architectural and Mechanical College of Texas, after a series of experiments, that a coating of neat cement paint applied to structural steel before it is used in the construction of a building will prolong the life of the steel and will bring about a better adhesion than if other treatment were used.

Mr. Geisecke supervised the new engineering building and the building for the Texas experiment station. In both of these a large amount of structural steel was used, and he made the experiments referred to on this account, and also in the nature of scientific research.

Mr. Geisecke says that in reinforced concrete construction, where small bars or rods are used, it is comparatively easy to cover the same with concrete, but when large beams are to be covered this is much more difficult, partly because it is difficult to make the concrete run so as to fill all cavities between the forms and the steel and partly because the larger beams are exposed to the weather for a considerable time before the concrete can be poured and are therefore apt to be partially covered with scales of rust, which prevent a contact between the concrete and the steel, and which may act as carriers for carbon dioxide and moisture, thus producing a continuation of the rusting process under the concrete coating. It is, therefore, desirable to coat the structural steel before it has begun to rust thoroughly with some material which prevents rusting and which has no injurious effect on the adhesion between the concrete and the steel.

On June 3rd, of 16 steel rods $\frac{3}{8}$ of an inch in diameter and about 18 inches long, four were painted with red lead, four with boiled linseed oil, four with neat Portland cement, and the remaining four were not treated. The painted rods were allowed to dry in the shade for one week and then each rod was placed in a cylindrical tin can so that one end projected about one inch through a hole in the centre of the bottom. The cans were then filled with concrete of 1 to 3 and stored in a shaded place, where the concrete was allowed to set.

When the concrete was one week old one-half of the specimens were tested in an Olsen testing machine by pulling the steel rods. The adhesion was found to be, expressed in pounds per square inch: Oil coated rod, 34; red lead coated rod, 68; uncoated rod, 136; cement coated rod, 170. The remaining specimens were tested when the concrete was nine weeks old, and the following adhesion was found: Red lead coated, 38; oil coated, 72; uncoated rod, 170; cement coated rod, 465.

It appeared from these tests that the adhesion between steel and concrete was materially increased by coating the steel with neat cement. The test of the first four specimens showed that a coating of oil and one of red lead had very injurious effects upon the adhesion between the steel and the concrete. In this experiment, however, the red lead paint had been allowed to dry for only one week.

Mr. Geisecke, therefore, tried another test, and on June 19th four rods were painted with red lead and allowed to dry for two months. On August 9th, eight rods were painted with neat cement. Four of these were placed in the shade to set and four were exposed to the weather. On August 18, these twelve rods and four which had not been treated, were embedded in

concrete as described above. When the concrete was one week old, eight of the specimens were tested and the adhesion found as follows: Red lead coated rod, 9 and 4; uncoated rod, 160 and 190; cement coated in the shade, 190 and 210; cement coated exposed to weather, 160 and 390.

At one month old four specimens were tested as follows: Red lead coated, 17; uncoated rod, 220; cement coated rod in shade, 410; cement coated exposed to weather, 390. At two months old specimens were tested and the adhesion found: Uncoated rod, 254; cement coated rod in shade, 272; cement coated exposed to weather, 305. The fourth rod, painted with the red lead, was damaged.

Mr. Geisecke deduces, first, that the adhesion in the case of the red lead coating is not increased by allowing a greater period of time for the drying of the paint; second, that the adhesion, in the case of cement coating, is not affected injuriously by exposing the coated steel to the weather. It was found that the best results can be obtained if the cement coating is moistened repeatedly for several days by either rain or dew or an artificial spray of water.

If the adhesion between concrete and uncoated steel is taken as a basis, it is evident: 1, that the adhesion is reduced about 90 per cent. by a coating of red lead; 2, that the adhesion is reduced about 80 per cent. by a coating of linseed oil; 3, that the adhesion is increased about 35 per cent. by a coating of neat cement.

Mr. Geisecke estimates that for sizes and shapes commonly used and which represents average values, the cost would be about 63 cents per ton, a little less than 1 per cent. the cost of structural material erected in the building.

Bonding New Concrete to Old

Clean off with clear water and stiff broom the surface of the old concrete. Mix one part commercial muriatic acid or hydrochloric acid and three parts water, make several applications one after another with a brush containing little or no metal. This will not injure the concrete, as the acid does not sink to a sufficient depth before it is neutralized.

This will have the effect of removing the cement from the top surface of each grain of sand or piece of stone and the other aggregates that may have been used, exposing the clean surface of these aggregates in exactly the same condition as they were before being mixed.

After applying the acid, wash the surface with clear water, scrubbing with a stiff broom or brush, removing all the dead particles. While the surface is still wet (and it should be thoroughly wet), apply the new concrete. Protect this new concrete by keeping it damp for at least a week. Do not let it dry out at any time during the first week.

It will be found that the new concrete will bond to the old as strongly as if both had been mixed at the same time.

The Ontario members of the Canadian Manufacturer's Association, connected with industries pertaining to engineering, are to be entertained at the 21st annual dinner of the Engineering Society of the Faculty of Applied Science of the University of Toronto, to be held on Wednesday, Jan. 18th. The members of the Ontario Cabinet and of the University Board of Governors will also be guests of the society.

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Success Begets Confidence

The year which has just passed into history witnessed steady development and gratifying progress in all parts of the Dominion. Building returns are a pretty fair barometer of a country's progress, and these cannot be considered other than most satisfactory, particularly so when it is borne in mind that 1909 was by no means a "boom year." Returns from the more important cities and towns of Canada, published elsewhere in this issue, reflect healthy growth in all parts of the country. After all, these developments are only what, in a measure are to be expected, considering the particularly favorable circumstances in which we are placed. The progress recorded in all sections reflects the steady natural growth of the country and does not owe its existence to any unnatural inflation.

*

The record of 1909 is additionally satisfactory when it is remembered that the tendency in the opening stages of the year was one of considerable cautiousness. The period of depression had not been forgotten. The impression still remained, and the general tendency was to spy out the land before making any ventures. With the development of the year, however, and assurances of returning prosperity coming in thick and fast, combined with the prospect of an unusually good crop, greater confidence soon became manifest. This confidence was augmented much more rapidly upon the materialization of those prospects and the harvesting of a crop which provided the people of the West with about \$150 per capita.

*

The position we have now reached is, or should be, one of confidence. This is no small asset, and having attained it at the very outset, the year 1910 at once has a lead over 1909. It would require no far-sighted prophet to make a glowing prediction for the current

year. The ability to do so is about on a par with the amount of skill required to compute the addition of two and two. If we are lacking in any outstanding particular, it is in a proper appreciation of our opportunities. If there is one means by which we can make 1910 the best ever, it is by a practical demonstration of that confidence in our country which we should all feel. This confidence is not to be taken as including rash speculation and foolhardy ventures, but the sane and legitimate investment of available capital as occasion arises, and the setting apart and employment of a reasonable proportion for development work, to enable us to cope with the demands of the future.

*

1909 closed with a record of industrial progress of which the country might well be proud. Whether its achievements will be surpassed during 1910 rests largely with ourselves.

Railroad Expansion During 1909

The year 1909 was one of the best in the history of Canadian railroads. The story of progress may be read elsewhere in this issue. Too much importance cannot be placed upon what is accomplished each year by the railway companies. The figures for 1909 cannot be regarded other than most satisfactory. The greatest expansion was, as might be expected, west of the Great Lakes, where steel was laid on nearly 1 200 miles of new line. One of the most interesting works of the year was the completion of the Lethbridge viaduct, the construction of which was recently described and illustrated in this journal.

Signs of the Times

In this number will be found an article from a recent issue of the "London Statist," in which the editor of that conservative journal predicts prosperous times for Canada. Analyzing conditions carefully, the writer finds that the factors which ensure prosperity are the country's great resources of natural wealth, the availability of a practically unlimited amount of capital at low rates of interest, the ability and shrewdness of our legislators and the world's special need of new sources of food supplies. Another factor favorable to Canada is the extent to which the resources of the United States are developed, while the ability of the country, which is almost unique, to make free grants of fertile land, is also most significant.

*

Mr. Paish, the writer in question, knows of what he writes—and his knowledge was not obtained from emigration pamphlets. He has visited both eastern and western Canada and, unlike the general run of old country newspaper men, has received deeper and more valuable impressions than are to be obtained from a Pullman car.

What is the object of such articles as these if not to bring home to the people of the Old World a keener realization of the opportunities of the New? Whether we Canadians are alive to the signs of the times is the question. Whether we contribute our quota to helping the country and developing its resources is our responsibility.

It is not really worth while to take a job unless there is a fair profit in it. Certainly, it is better to lose new business than to lose money already made on old business.

1909 Building Statistics — 1910 Forecasts

Principal Cities and Towns of the Dominion make Good Showing—Great Hopes Held Out for the Coming Season

The accompanying returns furnish incontestable evidence of the country's progress. That was the main object in their compilation. While the list is not intended as a complete statement, figures are given from the principal centres of activity throughout the Dominion, and these will doubtless be found to serve the purpose.

With the exception of Halifax, N.S., in which city the conditions were somewhat unusual, as explained elsewhere, all the returns show a substantial increase over those of 1908. Of the eastern cities, Kingston and Ottawa record the greatest gains over the preceding year, the percentage of increase being 165 and 152 respectively. While it is only fair to make primary mention of these figures, Toronto's record of an increase of 54 per cent., over a total of nearly twelve millions for 1908, is easily the most significant feature of the eastern returns. By rather a strange coincidence, the city of Montreal also shows a gain of 54 per cent. The return of nearly fifteen million dollars for greater Montreal is eminently satisfactory, and augurs well for the future expansion of the Quebec metropolis. Adverting to Ontario, we find substantial gains at Berlin, 128 per cent.; Fort William, 90; London, 83; Brantford, 51, and Peterborough, 44. Welland has a showing which is worthy of note. Three-quarters of a million dollars expended in new buildings during one year is a record which many a larger town in the Dominion will covet.

To the West we naturally look for great things. Thinking at once of Winnipeg, Man., we find an increase over 1908 of 67 per cent. The proportion of this increase reflects in a fair measure the growth of the entire prairie section.

To Saskatoon, Sask., falls the honor of the star performance of the whole of Canada. In this progressive city the percentage of increase for 1909 over 1908 was no less than 720. The word phenomenal may well be applied in this case, but Saskatoon is well favored in many ways and is going ahead on its merits. With a continuation of the favorable conditions hitherto enjoyed, and with a materialization of present prospects, this enterprising little city should give another good account of itself at the end of 1910.

Another good record is that of Calgary, Alta., where an increase of 189 per cent. was made. Here the figures jumped from \$837,100 to \$2,420,452. The greatest optimism prevails at Calgary and those competent to express an opinion declare that the prospects for 1910 are unparalleled in former years.

An increase of 56 per cent. at Regina, Sask., attests to most encouraging progress in that city. At Vancouver, B.C., the most optimistic predictions were fulfilled. A total of over seven million dollars, with an increase of more than one million dollars over the total for 1908, is highly satisfactory and is an indication of gratifying confidence in the future of the city. From Vancouver it is a near cry to Victoria, where an increase of 48 per cent. is recorded.

The average gain, computed from the returns submitted, is 59 per cent. This may safely be taken as a representative figure for the whole of Canada.

These figures cannot be other than eminently satis-

factory to those interested in development work throughout the Dominion. If the general tone of the forecasts submitted in connection with these reports can be taken as a criterion, the feeling in regard to 1910 is one of the most sanguine expectation. In the principal centres of activity, a great amount of work is in prospect, and with a reasonably early spring this should give the building industry a good impetus for a record year.

Town or City	No. permits 1908	No. permits 1909	Total Value 1908	Total Value 1909	Increase per cent. (approx.)
Toronto	3,921	5,056	\$11,795,436	\$18,154,047	54
Winnipeg, Man.	1,769	2,942	5,513,700	9,226,325	57
Montreal, Que.	1,807	2,431	5,062,326	7,783,621	46
Montreal Suburbs:					
Ville St. Louis				2,100,000	
Westmount				1,417,600	
Maisonneuve				1,200,500	
Outremont				918,500	
Verdun				722,000	
Notre Dame					
de Grace				345,000	
Ville St. Paul				248,300	
Delorimier				236,500	
(Greater Montreal)				14,972,021	
Vancouver, B.C.	1,697	2,050	5,950,898	7,258,565	22
Ottawa, Ont.	507	682	1,794,075	4,527,590	152
Fort William, Ont.	319	720	1,560,835	2,970,365	90
Calgary, Alta.	423	777	837,100	2,420,452	189
Edmonton, Alta.	689	863	2,549,847	2,118,386*	
Victoria, B.C.	570	573	1,130,740	1,673,420	48
Hamilton, Ont.	623	730	1,331,182	1,547,425	16
Saskatoon, Sask.	72	275	115,625	947,905	720
London, Ont.	234	684	464,180	850,134	83
Regina, Sask.	253	278	476,656	744,479	56
Welland, Ont.				703,600	
Moose Jaw, Sask.				675,440	
Halifax, N.S.	637	548	838,725	630,380	25†
Kingston, Ont.	396	482	170,600	452,695	165
Brantford, Ont.	306	307	289,855	438,885	51
Windsor, Ont.	166	176	297,780	421,385	42
Brandon, Man.	134	173	291,864	346,200	19
Peterborough, Ont.	245	228	238,963	343,489	44
Berlin, Ont.	40	112	121,350	276,550	128
St. Thomas, Ont.	140	139	236,000	260,000	10
Medicine Hat, Alta.	88	108	138,072	228,168	66
Moncton, N.B.		91		200,000	
Portage la					
Prairie, Man.			120,000	195,000	63
St. Andrews, N.B.	9	8	65,000	176,000	171
Sydney, N.S.	40	90	67,015	159,270	138
Fredericton, N.B.		20		96,000	
Sydney Mines, N.S.				100,000	
Niagara Falls, Ont.	20	27	60,000	80,000	33
Collingwood, Ont.	60	59	84,275	78,175	7
Lindsay, Ont.	13	24	22,000	38,000	73

*To end of November †Decrease

Toronto, Ont. — The total of over \$18,000,000 for building operations during 1909 is exceptionally gratifying and is an indubitable tribute to the faith that is placed in the future of the city. Last year's total exceeds that of the preceding 12 months by nearly six and one-half million dollars. A considerable portion of the large amount was contributed by buildings of a very substantial order. Great preparations have been made

on all sides for future extension and activity. The state of business and the outlook are most satisfactory. With a continuation of present conditions and a reasonable amount of confidence, the present year should witness even greater advances.

Mr. P. L. Fraser, secretary of the Toronto Builders' Exchange, interviewed by the "Contract Record," summed up the situation and outlook in the following terms: "Expectations of a record year in the building line are based on a strong, and what looks like a permanent, resumption of the business activities which marked the seasons preceding the panic of two years ago. The erection of new buildings depends on an increase in population and an extension of business — manufacturing, wholesale and retail. The present year promises a fulfilment of both of these conditions.

"In December, the Toronto Customs House reported a considerable increase over the business of the same month last year, which was the largest in the history of the city. This indicates that the wholesale and retail business is expanding rapidly, while the bank clearing house records are mounting up month after month. In fact, Toronto is quickly overtaking Montreal in a commercial way. The entrance into the city of the Canadian Northern Railway opens up a new and important territory, tributary to Toronto, which will be supplied from this centre. An index to the down town building is contained in the number of properties which have changed hands during the past two months. Seldom, if ever, has there been such activity in down town real estate circles, and the erection of many large office buildings will be the result.

"There seems to be little doubt that the movement towards establishing Canadian branches of American factories will be a marked feature of the coming year. Already a number of the largest manufacturers in the United States have arranged to build factories in Toronto during the coming summer. What has worked out so advantageously in the case of over two hundred who have already come, will, no doubt, encourage many others in the near future.

"The enlargement of the city through the annexation of new districts means the erection of new fire halls, schools and other public works.

"Last summer, several districts were laid out in building lots, and in most cases were sold to individuals who intend to build this season. Already a number of other residential districts have been marked out for sale during the coming spring. The readiness with which these lots are selling indicates a considerable activity in house building. In fact, there is every prospect of very extensive building. It is up to the supply men, especially the brick manufacturers, to be in readiness to meet the demand for materials when operations begin in the spring."

Winnipeg, Man. — 1909 was a good year in Winnipeg if the value of buildings for which permits were granted is a criterion. The total cannot be regarded otherwise than as a remarkable showing in view of the fact that the city, and the West in general, was just recovering from the period of depression which had affected the entire world.

The remarkable feature of this satisfactory aggregate is that it was swelled by no structure costing anything like a million dollars. The McArthur Building, costing between \$400,000 and \$500,000, was the biggest item in the list. The commercial buildings were largely of the convenient, compact type, thoroughly constructed and equipped and ranging in price from \$40,000 to \$150,000. These buildings are scattered in representative fashion over the principal business districts. The houses

erected were very numerous, some districts having practically been built up during the year.

A comparison of the building figures in each year since 1899 is as follows:

Year.	Permits	Buildings	Cost
1900	530	658	\$1,441,803
1901	630	820	1,708,357
1902	822	973	2,408,125
1903	1,227	1,365	5,680,400
1904	1,768	2,208	9,651,750
1905	3,349	4,060	10,840,150
1906	3,487	4,204	12,625,950
1907	2,433	2,827	6,300,960
1908	1,544	1,760	5,513,700
1909	2,497	2,942	9,226,325

The following statement shows the building figures by months for 1909:

	Permits	Buildings	Cost
January	37	47	\$ 50,300
February	70	97	158,500
March	107	208	801,200
April	262	279	1,064,200
May	361	424	1,291,800
June	418	490	2,042,850
July	257	299	982,700
August	270	322	1,134,750
September	280	321	872,950
October	215	255	531,850
November	133	162	291,800
December	37	38	103,425
Totals	2,497	2,942	\$9,226,325

The building operations of last year were induced by no boom or extraneous excitement. They were the result of real demand or conservative investment. The prospects of 1910 were never so bright. With the big building enterprises already under way and with others mooted, it is predicted in some quarters that the total for next year will reach \$13,000,000.

The permits issued on Jan. 1st amounted to \$64,000. This is nearly \$14,000 in excess of the figures for the whole of January, 1909. The building department has plenty of evidence to indicate that the season of 1910 is to be a record one. Mr. Rodgers, the city building inspector, has before him for approval a pile of plans for new structures which represents more buildings than have ever been considered at this time in any previous year. One of these calls for the erection of a \$300,000 apartment house.

Montreal, Que. — Building statistics supplied by Mr. A. Decarie, of the building inspector's department, show a decided advance on the record of last year, and make a near approach to the big year of 1907. It was known all the summer that the record was going on all the time. The three building months — April, May and June, and during these months the total was over a million a month, which was invested in new buildings. It should be remembered that these are the estimates of the architects' plans, which are always under the actual costs. Though the three months referred to were the busiest in the building trade, the succeeding months were by no means idle ones in that respect. The only month which fell under the half million mark from July to November was the last named month, when \$425,830 was invested. December, for obvious reasons, is not a good month to build in. The record shows but \$139,530. The general result of the year is highly satisfactory, and what is perhaps more significant, the an

thorities are most sanguine about the developments of 1910.

The following forecast is made by the Montreal office of the "Contract Record": "From almost every architect's office in the metropolis comes the report that work is proceeding apace on plans for structures to be built during the present year. To mention any of the contemplated erections would be repeating a list that has appeared in these columns before. That Montreal's building returns will be greater at the close of 1910 than ever before in the history of the city, is the natural conclusion of those who have made a study of the subject. With the opening of the new year the town of St. Louis became part and parcel of the city, thereby adding a new ward, whose additional figures alone will greatly swell the volume of the total, but aside from this impetus, there is every reason to believe from the recent outlook that Montreal's figures will be well above the average of other years."

Westmount, Que. — The statement of the year's building shows an appreciable increase over the figures for 1908. Previous years also show a steady increase—1903, \$282,700; 1904, \$350,000; 1905, \$800,850; 1906, \$763,600; and 1907, \$893,600. The past year's total was made up of the following: Stables erected \$17,500; alterations in buildings, \$22,900; flats, \$31,000; terraces, \$185,000; semi-detached residences, \$837,050; detached residences, \$316,500; store tenements, \$8,100.

Vancouver, B.C. — The total value for building operations in this city during 1909 exceeded by a million dollars the figures for 1908, which constituted the previous record. Investors are beginning to realize the exceptional advantages offered by Vancouver, and phenomenal developments may be expected during the next few years. Mr. S. H. Jarrett, building inspector, writes: "There is every indication that 1910 will be far ahead of the year just closed. Vancouver should pass the nine-million mark."

Ottawa, Ont. — Mr. R. Fotheringham, building inspector, in furnishing us with the statement of building operations for that city, states that it is rather early to make a forecast for 1910. Doubtless he thinks that a satisfactory augury may be made from the figures, which certainly reflect development of an enterprising and hopeful kind.

Fort William, Ont. — Mr. S. Macnamara, building inspector, writes that the outlook for all kinds of building in this city this year is excellent. In all departments of industrial activity during 1909 the city made a good showing. A big item in the 1909 total is the G.T.P. elevator, which has just been completed at a cost of nearly \$1,000,000. This elevator has a storage capacity of 3½ million bushels, and is the first unit of what will ultimately be the largest elevator plant in the world. In 1909 more than double the number of residences were erected than in 1908. In this connection rental agencies report that the demand is still far in excess of the supply and that it is growing even more rapidly. If present plans are carried out, numerous industrial plants will be constructed at Fort William during 1910. A large wire nail and rolling mill plant is in prospect, and it is regarded as practically certain that the Northern Pyrites Company will build a large ore dock.

Calgary, Alta.—Mr. Richard Harrison, building inspector, indites four significant words in regard to the prospects for the current year: "Excellent. Never looked better." Following is a list of some of the principal buildings recently completed or now building: City Hall,

\$200,000; library, \$70,000; Hull Block (reinforced concrete), \$180,000; International Harvester, \$80,000; Conrad Rohls business block, \$40,000; Samis Block, \$55,000; three fire stations, \$18,000; Dick Block, \$35,000; McLaughlin Carriage Company, \$35,000; Mackie Block, \$45,000; Young Women's Christian Association, \$50,000; Calgary Paint & Glass Company, \$40,000; elevator (Globe), \$150,000; Lineham Block, \$55,000; Brackman Ker Milling Company (grain tanks), \$20,000; Calgary Wine & Spirit Company, \$20,000; Calgary Saddlery, \$20,000; Riverside Planing Mills, \$180,000; Salvation Army Barracks, \$18,000; Finlay apartment house, \$20,000; proposed additions to Holy Cross Hospital, \$80,000. Fifteen warehouses were erected at a cost of \$278,640, and 617 private residences, at a cost of \$1,033,350.

Edmonton, Alta. — Although the statement of 1909 operations for this city is not particularly striking, those who are best able to judge are more than satisfied with the developments of the city, and a bright forecast is made for 1910. J. D. MacKinnon, inspector of buildings, states that already \$1,500,000 is contemplated in expenditure on new buildings during the current year.

London, Ont. — Mr. A. E. Nutter, city clerk, writes as follows: "If present indications are realized, 1910 will show a bigger improvement over 1909 than 1909 made over 1908. A feature of the permits issued during 1909 was that a large number of them were issued for improvements and additions to house property, the percentage of large building and public buildings being comparatively small."

Regina, Sask. — The City Engineer, Mr. Angus Smith, writes us as follows: "To the amount shown in the statement are not added the figures for the Government buildings which are being erected immediately on the city limits, in value, as per contract, \$1,125,000. The prospects for 1910 are good in the building line. Many parcels of inside property have changed hands lately, and these are taken up for the purpose of building; further, many residences will be built during the coming season."

Welland, Ont. — Mr. Geo. Ross, town engineer, provides us with a classification of the building operations carried out during 1909 in this progressive town. The items are as follows: Schools, \$22,000; public buildings, \$71,000; Government works, \$60,000; municipal works, \$51,800; business places, \$35,000; railways, \$19,000; industrial, \$242,000; residences, etc., \$202,800; total \$703,000. The year 1909 was the second best building year Welland ever had and a very optimistic forecast is made for the current year. The largest item on the list for 1909 is the Page-Hersey Tube Works, which cost \$150,000.

Moose Jaw, Sask. — 1909 witnessed remarkable activity in building circles at Moose Jaw, where during the past four years two million dollars have been spent in new buildings. Last year, 30 new business houses, from wholesale warehouses to small stores, were erected, and over 100 new dwellings. In the same period the C.P.R. made important extensions at a cost of over \$50,000. This railroad has made plans for further extension this year. Rapid strides are expected to be made during 1910. All things considered, Moose Jaw may be regarded as one of the liveliest western cities of the year just closed.

Halifax, N.S. — The value of building work during the year 1909 was somewhat behind the total for 1908. This is accounted for by the fact that a great portion of the work for which permits were issued in 1908 was

carried out last year. For instance, construction work on All Saints' Cathedral was only started in 1908, a greater portion of the work being carried out in 1909. This building still remains to be completed. The fall season was a particularly good one for building operations last year. Considerable work was done on residential building, some houses only have been started in October and November. According to present indications 1910 will rank with the busiest years in the history of the city.

Brandon Man. — Referring to the 1909 permits, figures for which are provided in statement, Mr. B. E. Speakman, city engineer, informs us that in addition to this total, about \$150,000 was expended in civic improvements. Mr. Speakman is enthusiastic over the outlook for 1910. Many important improvements are projected, among which may be mentioned the erection of a large hotel and a new depot by the C.N.R., additions to the C.P.R. depot, and the construction of 14 miles of new mains by the gas company.

St. Thomas, Ont. — Mr. J. P. Freek, building inspector, states that the prospects for 1910 in his city are very bright. Last year the city installed a septic tank system for the treatment of sewage at a cost of \$40,000. Another work worthy of mention was a subway under the M.C.R. tracks at a cost of \$65,000. Considerable improvements were also made in the way of new sidewalks, street pavements and sewers. Petitions have been submitted for some three miles of brick and Westrumite pavement.

Medicine Hat, Alta. — Mr. J. Baker, secretary-treasurer, is very optimistic about the prospects for 1910. He looks for the building permits of this year to double those of 1909.

Fredericton, N.B. — Mr. J. W. McCready, city clerk, informs us that the total given for 1909 does not include all the building operations of the year, as a good number of cottages and small residences were built around the outskirts of the city for which no permits were taken out. Of these the city authorities have as yet no record. "Speaking generally," writes Mr. McCready, "the new dwellings erected in 1909 exceeded both in number and value the same class in 1908, and for 1910 the outlook is even better than for some years past. Several applications are now before the city council for street extensions, in order to accommodate the expansion of the city and provide room for new homes. Plans and estimates are also being made for a new school building and it is understood that the erection of two factories for the manufacture of short lumber and other wood articles is under consideration."

St. Andrews, N.B. — This town has a good showing for 1909 and would appear to have prosperous times ahead. The figures for the past year include \$85,000 for a large annex to the Algonquin hotel, to be completed early in 1910 at a total estimated cost of \$85,000, and a power house costing \$20,000. Other noteworthy items for 1909 were the C.P.R. wharf, costing \$20,000, and the Government wharf, costing \$16,000.

Sydney Mines, N.S. — Every branch of business prospered during 1909 and the town made splendid progress. In the building line everything was brisk. The items for the year included a new brick school, costing \$25,000, and the rebuilding of St. Mary's Hall at a cost of \$10,000. Over 50 modern residences were erected, while several mercantile blocks were enlarged and improved. The chief civic undertaking was another section of the sewer system, the work done last year.

together with what was finished in 1908, bringing the total mileage at present up to $6\frac{1}{2}$, and involving an expenditure of approximately \$75,000. The year was the most successful in the history of the town's two big industries, the collieries and the steel plant of the Nova Scotia Steel Company. The output of coal at the collieries reached the record figures of 810,000 tons, as compared with 680,772 tons last year, while the production of steel was 68,000 tons, and iron, 58,000 tons. During the year, the company paid out tin wages \$1,715,378.82, as against \$1,431,000 last year. The prospects for still greater business for the coming year are very bright.

Niagara Falls, Ont. — Mr. J. O. Gardner, city clerk, is looking for big things during 1910. In regard to the statement for 1909, he states that the figures are compiled from the most reliable information that can be obtained. No official building record has yet been started.

Collingwood, Ont. — Mr. J. H. Duncan, town clerk, looks for continued improvement during the current year. He states that finishing touches will be put on a number of buildings in the spring and that by the end of 1910 appreciable progress will have been made in the town.

Lindsay, Ont. — Mr. F. Knowlson, town clerk, writes: "It is generally believed that 1910 will be a good year for the town of Lindsay. Many improvements are contemplated and building will probably increase."

Woodstock, Ont. — Mr. John Morrison, city clerk, writes us as follows: "Our city has not adopted the system of requiring building permits. Building operations were not very extensive last year. The principal ones were the knitting factory, costing about \$20,000, and the Tobin Arms factory, costing \$12,000. A number of new houses were built and additions and repairs made to others. The coming year's prospects are good. Two new schools will be erected at a cost of \$30,000, and several new buildings are contemplated."

Maritime Provinces Generally — In all the industrial centres of the maritime provinces extensive development plans are being made for the current year. In Cape Breton alone it is estimated that five million dollars will be expended in development work during 1910. The past year's business in general was very satisfactory. Building operations have been particularly active at Sackville, N.S., where important extensions to manufacturing plants and the general growth of the town are an evidence of its progressiveness and rising importance. At Woodstock, N.B., steady progress was made during 1909. The new Broadway public school was built at a cost of some \$30,000, the new court house completed and a report submitted by the council on the question of permanent improvements which are to be considered this season. Progressiveness is the keynote to the situation at Sussex, N.B., whose mayor, Mr. MacLean, writes, "We are advance agents of optimism. No calamity howlers are wanted here."

Charlottetown P.E.I. — The volume of business here during 1909 was fully up to the previous year. Among the building operations were many improvements to the railway system, these including a new freight shed and roundhouse and equipment of railway works.

St. George, N.B. — A building boom is looked for this year. Last season one or two inquiries were received from capitalists seeking locations for manufacturing purposes and it is hoped that these will materialize during 1910.

An Active Year in Railroad Construction

Work of Last Season Promises Well for 1910—Enterprise of Leading Companies an Important Element in the Development of the Country

It is estimated that during 1909, 4,327 miles of line were constructed, placed under contract, or were in course of construction. In the previous year the new mileage totalled 514 miles. The present year also promises to be a good one for work on Canadian railways. Already the Grand Trunk Pacific has begun awarding contracts, the latest being for constructing 100 miles of single track west of Edmonton, Alta., to Prince Rupert. This is an extension of the main line and is only one of the several extensions and branch lines the Grand Trunk Pacific is planning for 1910. The Canadian Pacific Railway has also completed surveys for a number of branch lines, some of which at least will be put under construction this year. In Alberta there are two independent lines, which are worthy of attention, inasmuch as it is more than probable that they will begin active construction work this year. One of these is the Alberta & Great Waterways Railway, which projects a 350-mile line from Edmonton, Alta., to Fort McMurray. It is said on good authority that contracts for 150 miles of this line are to be let in the near future. The other Alberta line is the Alberta Central Railway. Surveys for the first 70 miles have been completed and the construction contract for this section has already been awarded, although the name of the contractor has not been made public.

What the C. N. R. Accomplished

1909 was a busy year with the Canadian Northern. This company completed 482 miles in five provinces and graded 398 miles ready for steel the coming spring.

Eastern Canada—The year was notable in eastern Canada. The C.N.R. Sudbury-Port Arthur line was extended 30 miles beyond Sellwood, so as to give better access to the Gowganda silver land.

Ottawa was connected with the Canadian Northern Quebec line by 58 miles of railway to Hawkesbury, constructed under the charter of the Canadian Northern, being on the south side of the Ottawa river. This piece of land is, however, being operated by the Canadian Northern Quebec Railway, of which there were completed and put into operation the 78 mile cut-off from Garneau to Quebec.

There were also completed 11 miles from St. Jacques to Rawdon. The completion of 89 miles in Quebec is the largest addition made to the mileage of Quebec during the last ten years.

The year witnessed the commencement of the second Canadian Northern Ontario line out of Toronto, the 100 miles of the Toronto-Ottawa line being now in the contractor's hands. This line is to form part of the Canadian Northern connection between Montreal, Ottawa and Buffalo, and will, it is expected, be ready for operation early next fall.

Western Canada—The 305 miles of track that were laid in the prairie provinces are distributed over seven branches, and grading has been finished on seven others, the most notable of which are the lines (1) from Prince Albert to Shellbrook, to be extended later to North Battleford and to Crooked Lake, 100 miles northwest of Prince Albert; (2) the branch from North Battleford to Jackfish lake and Turtle river, north of the Saskatchewan; and the line from Vegreville southward, which

will this year reach Calgary, joining the Saskatoon-Calgary line about 80 miles northwest of the city.

Twenty-two miles of grading on the Edmonton to Athabasca Landing line were completed in 1909. In south-eastern Saskatchewan 90 miles of steel were laid westerly from Maryfield, near the Manitoba boundary, and 75 additional miles have been graded, making 165 miles of the line which is to be extended to Lethbridge.

In Manitoba the Rossburn branch has been carried from near Russel for 50 miles, whence it will be carried to the main line near Buchanan. Seventy miles have already been completed from Hallboro, and through Rapid City to the Saskatchewan boundary. The St. Rose du Lac district, south-east of Lake Dauphin, now has a 15-mile branch, and in southern Manitoba ten miles have been graded in the Turtle Mountain district. Between Lake Manitoba and Lake Winnipeg, the Oak Point branch has 36 miles ready for steel.

The construction programme for 1910 has not been completed. The line from Saskatoon to Calgary will, no doubt, be finished, and also the Vegreville to Calgary line, which will be joined at Camrose with the extension from Edmonton. The guarantees of the Saskatchewan and Calgary Governments, voted last winter provide for several hundred miles in addition to those already undertaken.

Western Canada Generally

The statistics for 1909 with reference to new steel laid in the West by the railway companies is as follows:

Canadian Pacific—

Mileage at the beginning of 1909	5,693
New steel in 1909	404
Mileage at the beginning of 1910	6,097

Canadian Northern—

Mileage at the beginning of 1909	3,250
New steel laid in 1909	250
Mileage at the beginning of 1910	3,500

Grand Trunk Pacific—

Mileage at the beginning of 1909	982
New steel laid in 1909	403
Mileage at the beginning of 1910	1,385

Great Northern—

Mileage at the beginning of 1910	490
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Total mileage in the provinces at the beginning of 1909	10,415
Total new steel laid in 1909	1,057
Total mileage in the provinces at the beginning of 1910	11,472

The railways of western Canada added 10 per cent. to their total mileage in 1909. Compared with the growth of population or the increase in the area under crop in the western provinces, this increase is of a satisfactory character.

Fully as large an addition to the mileage will be made during the current year, all the building companies having extensive building plans under consideration. The amount of survey and engineering work was never greater than in 1909. Lines have been run in many districts in all the provinces. Surveys have been made where railways will not be built in many years.

but at least a thousand miles of grading will be done in 1910 on the work done by the engineers in 1909.

G. T. P. Construction

During the year 1909 about 700 additional miles were placed under construction. During 1908, approximately 2,900 miles was under construction, comprising the continuous main line from Moncton, N.B., westerly to Edmonton, Alta. So that at this date there is partially completed and under way 8,600 miles.

Concerning Construction Equipment

The construction equipment used in executing any large civil engineering undertaking is subject to such extremely hard usage that it cannot be designed according to the usual rules for the determination of the size of parts of machinery. The tremendous shocks to which apparatus of this sort is often exposed, the lack of skilled attention paid to its wearing parts in most cases, its imperfect protection against dirt and rain, all combine to make its service a peculiarly onerous one, says the "Engineering Record." In addition, there is the fact that on any large piece of construction, experience has shown it to be advisable, in many cases, to work the equipment to the maximum, getting everything out of it that is possible and disregarding its possible scrap value at the end of the work. For example, anything that delays the operation of a steam shovel, not only holds back the work of the men in the pit, but may tie up a number of miles of track, keep a train or two standing idle, and leave a gang of men on a dump without anything to do. In the same way, drills that do not stand up to their work entail a loss to the contractor employing them which is far greater than the mere wages of the drill runners while the repairs are being made. The charges of blast holes which do not explode when fired are a source of danger as well as delay that has caused contractors a great deal of trouble.

These things are mentioned because it is not at all improbable that a good many manufacturers of construction equipment, who are desirous of turning out only the best apparatus, are not in touch with the service conditions of their machinery after it is delivered and do not really know what improvements should be made in it. A few companies have recently been making remarkable strides in a business way, in spite of the slack times in the construction field, because they have had inspectors visiting places where their equipment was in service and noting the troubles that have arisen in connection with it. These inspectors have indicated in many cases, it is understood, details of design where improvement of one sort or another could be made, and have thus enabled the manufacturers to better their machinery before complaints were made. Moreover, the good will of contractors has been gained by this evident desire of the manufacturers to do everything in their power to have the equipment they furnish give satisfaction. It is particularly desirable, where machinery of unusual size or character is sold, to have it watched carefully, and the failure to do this is likely to result in considerable adverse criticism, much of which is doubtless unwarranted because it is based on lack of familiarity with the proper way of handling it, which nobody has been on hand to teach.

The resignation of Mr. McCullough, City Electrician of Vancouver, has been accepted, and the appointment offered to Mr. J. A. McCrossan, who held the post formerly. The salary is \$1,800 per annum, with a prospective increase to \$2,400.

Brick Production of the United States

The production of brick and tile in the United States for the year 1908 was 16 per cent. less than the production of 1907, but its value was \$108,062,703, which is considered a very satisfactory figure. The decrease noted is attributed chiefly to the rivalry with which concrete is pushing to the front as a building material. Every State and Territory of the Union contributed to the totals, but Ohio led all the rest, with an output of products valued at \$15,915,703 for the year.

Of all the clay manufactures for the year, the common brick leads in total value, the production reaching an estimated worth of \$44,765,614, or 43.13 per cent. of the total productions from clays. It required 7,811,046,000 of these common brick to foot up the total. For these brick the price at the kiln dropped from \$6 a thousand in 1907 to \$5.78 a thousand in 1908. Of the common brick, Illinois produced the largest number, her record being 1,119,221,000, which sold at the kiln at \$4.32 a thousand.

Those two varieties of clay products which showed increases in 1908 were vitrified brick, for paving purposes, and the common drain tile of the country. The vitrified paving brick produced showed an increase of 101,877,000, with a decrease in value from \$11.02 to \$10.90 per thousand. At \$9.86 per thousand, Ohio led in this production, with a value of \$8,282,335, one-third of the product of the entire country. Drain tile increased in production almost 80 per cent., its value for the year being \$8,661,476.

Building Walls of Mesh Reinforced Clay

Building walls of mesh-reinforced clay is advocated by W. Puetz, of Hamburg, Germany. He has worked out a complete practical system of construction on this basis. The reinforcement comprises inner and outer sheets of wire fabric, and horizontal bedding sheets whose vertical spacing should not exceed the thickness of the wall. The preferred arrangement is to use sheets wide enough to form the two bedding sheets and also the outer faces of such a block of wall, and bend them into a hollow rectangle. In case of walls for heavy loads, a layer of cement mortar is placed between successive courses of wall. Window openings, etc., are framed in cement mortar, placed so as to dovetail with the courses of clay work. Wall plates, floors, roof framing and partition framing are of timber studing, but partitions are preferably filled with clay tamped between sheets of metal fabric nailed on each side of the studding. The exterior wall surfaces are covered with a coating of neat cement mortar as soon as finished, and the outside of this coating may be further plastered or dressed as desired. The inside wall surfaces are not plastered until after the walls have dried out fairly well: they are coated with plaster on neat cement mortar. The clay to be used in the wall construction should be used fairly dry, i.e., just moist enough to be capable of being tamped into a solid mass. It is said that it will usually be necessary to stack freshly excavated clay for a few days, under cover, to let it drain and dry out sufficiently. The government last year built a two-family dwelling of this system near Munster, and after its completion a stable of the same construction was built on the premises. The total cost of both buildings is given as \$2,000.

At Montreal, Que., during 1909, the total estimated loss by fire was \$500,000.

Canada will have Long Period of Prosperity

Undeveloped Natural Resources and Plenty of Capital Obtainable for Development Purposes Primary Factors Making for Progress

Forecast of Mr. George Paish, Editor of the London Statist

I have visited both western and eastern Canada and am convinced that this country has entered upon a long period of prosperity. From time to time there will doubtless be checks to the prosperity, but these will always come to states which make rapid progress and the reactions are necessary to prevent inflation. But there is not likely to be even a check to the expansion for several years.

The primary factor making for progress is the possession by Canada of great undeveloped resources* of natural wealth—agricultural, mineral, forestal and piscatorial. The greatest of these natural resources is the vast tracts of undeveloped and virgin lands that are merely waiting for farmers to produce a supply of foodstuffs sufficient to support a great population.

The second factor making for growth is the willingness of Great Britain to find all the capital that Canada can profitably employ, and to supply it at a low rate of interest in comparison with the rates of interest usually required from young countries. Every man of business is aware of the advantage to a country of a banker in a position to supply capital freely for development purposes and the special advantage of possessing a banker who will supply capital in practically unlimited quantities at a lower rate of interest than he charges in other countries. This is the situation to-day: British investors are supplying capital freely for permanent investment in Canada at preferential rates of interest. Hence no difficulty is likely to arise in securing the capital required to develop and to market Canada's natural wealth.

A third factor of great import is the ability and far-sightedness of Canada's statesmen. They recognize that the essential thing to be worked for is to open up the country and to admit population to the natural wealth. All the energies of the statesmen of the entire country, Dominion and provincial, are at the moment directed to the extension of railways. This is the platform upon which the ministries have been returned to office, and it is this policy they are pledged to carry out. Everything possible is being done to encourage and to stimulate railway construction both in prairie districts and between the prairies and the seacoast, east, west and north.

A fourth factor of great moment and weight is the world's special need of new sources of food supplies at the present time and the high prices that are now current for food of all descriptions. This condition of affairs is mainly the result of the great expenditures of capital from the South African and the Russo-Japanese wars, an expenditure which prevented for about seven years the normal rate of capital outlay for the purpose of developing the food supplies of the new countries. Inasmuch as Canada is one of the most promising fields of food production, the shortage in the world's food supplies and the high prices of foodstuffs are having and must continue to have a great influence in stimulating the rapid settlement of the new agricultural districts.

A fifth factor exceptionally favorable to Canada is the extent to which the resources of the United States are developed. Canada's slow progress in the past has mainly resulted from the existence of the Great Lakes and a stretch of country of several miles in extent,

consisting mainly of rock and water, which effectually cut off the farming districts of eastern Canada from those of the western States. As agricultural development proceeded west, this geographical obstacle forced the pioneer farmers of Canada into the United States. When railway extensions and railway economies made it possible and profitable to raise agricultural produce in Illinois and in the western States, the pioneer farmers of Canada sold their holdings in their own country and moved into the new districts of the United States. Further, when the Dakotas were opened up to cultivation large numbers of Canadian farmers sold their developed properties at good prices to take up virgin lands. Had topographical conditions in Canada been similar to those of the United States, these farmers would have remained in their own country and would have proceeded west as railway science advanced and it became possible to raise foodstuffs for export at an increasing distance from the seaboard. Illinois, Iowa and the Dakotas are now highly cultivated and farmers desiring land at low prices have to go still further west. In these circumstances large numbers of the old Canadian farmers who moved west from eastern Canada into the United States are returning to Canada to dwell in Manitoba, Saskatchewan and Alberta. Furthermore, considerable numbers of American farmers are also coming into western Canada. These pioneer farmers are a great acquisition to the new country. In the first place, they have skill and experience in breaking up the land, and in making it fruitful; and secondly, having sold at good prices the lands they had previously made productive, they have secured large profits and they are bringing a large amount of capital, consisting of farming machinery, cattle, furniture and cash into the new country.

Another factor of no small moment making for rapid development is the fact that the world's unappropriated lands are fast becoming exhausted and that Canada is one of the few countries which can still make gratis grants of fertile land to anyone who will carry out the simple conditions attached to the grant.

Lastly, the time is favorable for Canada to obtain the large numbers of workmen needed for railway construction, for extensive building operations, for distribution and for industries.

In brief, every essential to progress is apparently at the service of Canada—natural wealth, a practically unlimited amount of capital at low rates of interest, free markets and good prices for produce, a good supply of skilled farmers and of unskilled labor, together with statesmen exerting all their influence and power to attract capital and labor and to develop the natural resources of the country.

One of the great influences which prevented the development of Canada in the past has long ceased to operate. The long winters, the coldness and the liability to frost even during summer months have entirely lost their terrors. Experience has shown that the large number of hours of sunshine pressed into a few months, more than make up for the shortness of the season, and that there is ample time to sow and to harvest the crops. Further, liability to damage from frost and drought is diminishing as cultivation extends. The

recognition that the drawbacks to farming in western Canada have been greatly exaggerated is likely to cause the number of incoming farmers to grow steadily greater from year to year. In brief, from whatever point of view the outlook is regarded, the future of Canada appears to be assured.

Reservoir and Filtration Costs and Methods

In the annual report of the Chief of Army Engineers, United States Army for 1909, an appendix by Major Jay J. Morrow on the Washington, D.C. aqueduct and filtration plans possesses some value for engineers.

The Dalecarlia Reservoir was dredged and the cost per cubic yard is stated to have been \$0.118, for a total of 110,590 cubic yards. Reference is made in several places to the purchase of a dredge, but it is not stated in the report whether the cost of the dredge is included in the price of 11.8 cents. The original estimate was that 134,000 cubic yards required to be removed, but a great many loose rocks were found scattered through the silt, and this prevented the removal of the material to as great a depth as was expected when the estimate was made.

In July, 1907, work was commenced on the riprapping of the slopes of the Dalecarlia reservoir, and it was completed in November, 1908. The total cost was \$18,000. A quarry was opened on Government land near the southeast end of the reservoir, and all work was done by hired labor. The width of the paved slope is 18 feet, and the length 11,116 feet, making a total of 22,232 square yards. The rock quarried and placed on the slope amounted to 6,040 cubic yards. It is a matter for regret that unit costs were not given. The cost of quarrying and laying was \$3 per cubic yard, and the thickness (from the figures given) must have been about 10 inches. Gillette's "Hand Book of Cost Data," page 242, gives the cost of slope walls as low as \$1.75 to \$2 per cubic yard in place for good "second class" work, 16 inches thick, to as high as \$4.50 for a 6-inch sand papered job. Much depends on the cost of the stone delivered at the job.

The old masonry walls of a part of the reservoir were strengthened by means of concrete buttresses and wing walls. Leaks under the walls were cut off, by a concrete pavement in the well laid to or about the level of the sills of the entrances to reservoir, by-conduit and main conduit, after removing all deposits from the bottom of the well. A wooden sheet pile cofferdam, divided in sections small enough to permit of seepage to be removed by two diaphragm pumps, was constructed. The foundations were all carried down through the mud and loose rocks to a solid material consisting of a partially disintegrated soft rock similar to the Potomac gneiss, but not completely metamorphosed. This material was quite firm, when undisturbed, although it could be readily excavated by pick and shovel.

The amount of work done at the north connection and its cost are as follows:

	Labor.	Material
Excavation, 700 cubic yards	\$1,008.80	
Form lumber in cofferdam, 6,884 feet, B. M.	109.52	\$138.91
Concrete in walls and paving 300 cubic yards	443.82	516.88
Back filling, 400 cubic yards	200.00	
Totals	\$1,762.14	\$655.79
Grand Total		\$2,417.93

The unit costs are as follows: Excavation mud and rock, \$1.44 per cubic yard; forming cost, \$16 per M B M

for labor and \$20 per M B M for material, concrete cost, \$1.47 per cubic yard for labor and \$1.72 per cubic yard for material, the total for concrete being \$3.19 per cubic yard, the cost of cement, sand and stone and rate of wages omitted. Cost of supervision and superintendence not stated, nor rent, cost depreciation or wear and tear on machinery and tools. Backfilling was 50 cents per cubic yard for labor.

It cost \$3.66 per million gallons for the operation of the District of Columbia filtration plant, the average amount being 61.47 million gallons per day. Sometime during the 90's Major T. W. Symonds' estimate was \$2.62 per million gallons based on 40 million gallons per day, neglecting depreciation and interest on cost of plant. This estimate was made before the plant was constructed, but the difference in actual cost of operation and the estimate, especially with 50 per cent. greater output, is remarkable. A table shows the total costs for labor and materials to be as follows per million gallons: 1905-6, \$2.14; 1906-7, \$3.07; 1907-8, \$3.13; 1908-9, \$3.66, a steady increase. Office and laboratory labor costs have risen from 45 cents in 1905-6 to 72 cents in 1908-9, and cost of materials used in office and laboratory from 4 cents to 10 cents. Pumping station labor costs have risen from 45 cents in 1905-6 to 61 cents in 1908-9, while costs of material connected with pumping station have risen from 59 cents in 1905-6 to 69 cents in 1908-9. Labor in filtering operations has risen from 49 cents in 1905-6 to 75 cents in 1908-9, and material costs in the filtering operations were 2 cents in 1905-6, 28 cents in 1906-7, 11 cents in 1907-8, and 23 cents in 1908-9. Care of grounds, etc., has risen from a labor cost in 1906-7 of 7 cents to 22 cents in 1908-9, with material costs of 2 cents in 1906-7 and 18 cents in 1908-9. Main office expenses for the four years were respectively 9 cents, 4 cents, 9 cents and 13 cents, with no expense for materials the two first years, the costs being 1 cent for 1907-8 and 2 cents for 1908-9.

The costs given are costs per million gallons. In 1905-6 the average amount of water filtered per day was 66.07 million gallons, while the average for 1907-8 was 64.91 million gallons. The population of the city has increased and the decrease shown in amount of water filtered may be ascribed to reduction in waste of water. This has been due to a system developed of careful inspection and installation of meters. The average per capita consumption in 1907 was 203 gallons; in 1908, 192 gallons, and in 1909, 179 gallons. The average consumption of all water, filtered and unfiltered, has been reduced from 66.9 million gallons per day in 1907 to 61.47 million gallons in 1909. It looks as if some system of careful inspection of labor wastes would pay. The leaks seem to be in the main office, park labor on grounds and filtering operations. The increased pumping costs are readily explained by another table showing that the coal used in 1905-6 cost \$3.34 per ton and had a duty of 62.8 per 100 pounds of coal consumed, the coal used in 1908-9 costing \$3.47 per ton with a duty of 57.7 per 100 pounds of coal consumed. This means a slight increase in cost of material and a larger percentage cost in labor.

Experiments made to determine rates of filtration were made with rates varying from one to one hundred million gallons per acre per day. Results seem to indicate a rate somewhere near 10 million gallons per acre per day, above which the filters cannot be operated economically and can not be depended upon to furnish a satisfactory output at all times. With higher rates there is also danger of subsurface dragging leading to deterioration of filtering material. High rates are not quite so

efficient at lower rates on bacterial and turbidity ratings, but there is practically no difference in the percentage of samples showing bacillus coli.

During the fiscal year ended July, 1909, the bacteria have been reduced from an average of 389 per cubic centimeter in the park reservoir to an average of 21 in the filtered water reservoir. The average turbidity has been similarly reduced from 22 to 1 part per million. The actual number of bacteria in the city water varied from 160 to 2 per cubic centimeter, while the number in the river water ran from 90,000 to 38. The actual average reduction by months varied between 99.7 and 97 per cent. The report, known as Appendix D D D, contains a number of tables interesting to men making a study of water filtration and consumption.

Report on Hudson's Bay Railway

The report of the engineers who surveyed the alternative routes of the proposed Hudson's Bay Railroad, has been laid before Parliament. The investigation of the engineers leads them to conclusions strongly in favor of the Port Nelson route as compared with the Fort Churchill. To connect Churchill with the Pas, the nearest railroad point at present to Hudson's Bay, would require the construction of 477 miles of line, while only 410 would have to be built to connect the Pas with Nelson. The Nelson route lies through better country, more adaptable to settlement, and the line could be built with better grades and more cheaply to the mile.

The total cost for a line with eighty-pound rails, stations, engine houses, water tanks, yards, two 4,000,000-bushel elevators, and harbor improvements, exclusive of lighthouses and buoys, is estimated at \$19,108,672 to Fort Churchill, and \$16,426,340 to Nelson, a difference of \$2,682,332 in favor of the Nelson route. Nelson harbor is described as more commodious and more easily approached than Fort Churchill, and could be more economically equipped, the cost of developing facilities at Fort Churchill being estimated at \$6,750,000, and for Nelson the estimate is a little over \$5,000,000. On the Churchill route a line was found with four-tenths of one per cent. grade against northbound, and six-tenths of one per cent. against southbound traffic. On the Nelson route a line was located with a maximum of four-tenths of one per cent., or practically level both ways. The examination of Nelson harbor was not thorough, but a channel with a depth of 26 feet at all tides was located. The harbor proper would be from ten to twelve miles inside the mouth of this channel.

The annual meeting of the Toronto branch of the Canadian Society of Civil Engineers was held last week, when the following officers were elected for 1910: Chairman, Mr. A. W. Campbell, Deputy Minister of Public Works, Ontario; Secretary-Treasurer, Mr. Peter Gillespie, lecturer in applied mechanics, Toronto University. Councillors: Mr. T. S. Scott, assistant city engineer; Mr. T. C. Irving, Jr.; Mr. O. W. Smith, Mr. N. H. McLeod, and Mr. A. W. Connor. Mr. Cecil B. Smith presided at the meeting. Prior to the meeting an enjoyable dinner was held in the St. Charles restaurant.

Upon his recent visit to Toronto, Sir Wilfrid Laurier was waited upon by a deputation of architects, the object being to urge the adoption by the Government of the plans recommended by the Ontario Association, for the addition to the Government buildings at Ottawa. Nothing definite was stated by Sir Wilfrid.

Trade News from Montreal

Favorable Weather and Bright Prospects Enliven Usual Winter Dulness — Items of General Interest

Montreal Office of the "Contract Record."

January 10th, 1910.

The opening days of the new year brought to Montreal its first taste of real winter weather, the thermometer registering in the neighborhood of 20 degrees below zero. Up to that time the moderately mild weather and light snowfalls had made the work of contractors engaged on exterior construction comparatively easy. Fortunately the cold snap did not continue and once again moderate weather conditions prevail. On the whole this district has been favored with exceptional weather for winter operations.

To say that building prospects for 1910 are bright is putting it mildly. Every day more is learned concerning projects which the different large corporations have under consideration for construction during the present season. The latest reports reveal the fact that the different railway companies will be extensively connected with construction operations, and will erect office buildings, railway stations, construct tunnels, etc. This year will probably see the entrance of the Canadian Northern Railway, and it should prove an important factor in the building world in Montreal.

Around St. James street, if the present plans of the various companies are carried out, should centre a scene of activity, and when one considers the number of old fashioned one and two-storey structures on this important thoroughfare, this is not to be wondered at. In time this section of the city will be built up with magnificent office buildings, and from the present outlook a number will be erected this season.

New Subway for Park Avenue

If the Railway Commission pass favorably upon the plans submitted by the council of the town of St. Louis just before its annexation to Montreal, the new ward of the city will have its third subway.

A few years ago work was completed on a tunnel on St. Denis street, the first for that section of the city. Contractor Duquette is now working on the new St. Lawrence subway, and the present plans are for another similar one on Park avenue. It is expected that this work will be carried through at the expense of the city of Montreal.

Montreal's Ice Palace

The Parks and Ferries Committee of the city council granted the Montreal Carnival Committee permission to erect an ice palace on Fletcher's Field between Rachel and Mary Ann streets, and the work of constructing it has been commenced by the contractors, Messrs. Corriveau & Brunett.

Designs for this structure were invited by the committee and tenders were taken. Those submitted by Architect Theo. Daoust were finally adopted, as the tender by Messrs. Corriveau & Brunett upon his plans was the most satisfactory. The estimated cost of the ice palace is \$6,300.

New Cars for the Grand Trunk Pacific

The management of the Grand Trunk Pacific Railway Company recently placed an order with the Canada Car Company, of Montreal, for 700 box, 200 refrigerator, 200 stock, and 300 flat cars. This company delivered to the Grand Trunk Pacific Company between October 1st and November 30th, 512 box and 45 stock cars, while

in the same period the Pressed Steel Car Company delivered 23 steel coal and 4 buffet cars from their Point St. Charles works.

Western Order for Montreal

The order for steel rails and other supplies required for the construction of the Alberta & Great Waterways Railway, which is being built between Edmonton and Fort McMurray, is being placed in Montreal.

New Construction Company

The St. James Construction Company was recently incorporated under Dominion charter with a capital of \$125,000, to carry on the business of general contractors and builders. The following Montreal men are connected with the new enterprise: Messrs. C. A. Duclos, K.C.; W. L. Bond, J. J. Meager and J. E. Conlen.

Personal Mention

Contractor Lalonde this week commenced the erection of the public bath at the corner of St. Dominique and Maguire streets.

Mr. G. J. Bury, general manager of the western lines of the Canadian Pacific Railway, was in Montreal on a business visit during the past week.

Mr. M. A. Fuller, of the Canadian Rand Company, Limited, has been transferred from Montreal to the Sherbrooke, Que., offices of the company.

Mr. C. H. Caban, K.C., president of the Canada Cement Company, Limited, has once more resumed his duties after an extended absence due to illness.

Messrs. F. F. Cavanagh and C. E. Booth recently opened offices in the Coristine Building, and will carry on the business of civil engineers and mining brokers.

Mr. M. J. Butler, Deputy Minister of Railways and Canals, was in Montreal recently and attended the meeting of the Intercolonial Railway Board of Management.

Mr. F. W. Peters, Winnipeg assistant to the second vice-president of the C.P.R., who was in Montreal recently, speaks in glowing terms of the general western outlook for 1910.

Mr. W. S. Painter, architect for the Canadian Pacific Railway, left on Saturday, Jan. 8th, for a business trip to the West, and will be absent two weeks. Amongst other things, the contract for the erection of additions to the Empress Hotel at Victoria will be settled during this trip.

Mr. H. P. Beck, general superintendent of construction for Messrs. D. G. Loomis & Sons, on the new Jacobs' Buildings, Montreal, was recently presented with a handsome dressing case by the workmen employed on this construction. Mr. W. L. Caniff, the general foreman, was at the same time presented with a gold watch.

The annual meeting of the Canadian Society of Civil Engineers will be held in the Dorchester street rooms on Jan. 25, 26 and 27. The prospects are exceedingly bright for a full gathering of the society's members from all over Canada, and considerable interest is being manifested in the election of officers for the ensuing year, which will be carried through during the session.

Mr. H. S. Holt, president of the Montreal Light, Heat & Power Company; Mr. F. W. Thompson, managing director of the Ogilvie Flour Mills Company, and Mr. Thomas J. Drummond, president of the Lake Superior Corporation, of Montreal, are interested in the formation of the Superior Rolling Mills Company, who will erect a \$300,000 wire and nail factory at Fort William, Ont.

From the Federal Capital

Correspondence of the Contract Record

Ottawa, Ont., Jan. 10, 1910. The holiday season and the winter have not very materially affected building operations here up to date. While there are not so many residences in course of erection at the present time as in the summer, yet it is astonishing how building operations in this respect have continued. With regard to the large contracts being carried on, there is no apparent cessation. The Chateau Laurier, the Central Station and annex, the Cushing Building and other large buildings are going on apace.

In speaking to manufacturers of the various building materials, we are told that the demand is almost equal to that of summer, with the exception of cement material. The changes in building material of any are very slight. Pressed bricks are quoted at \$18 and \$20 for red and buff; plastic and rustic at \$10.50 and \$16.50 respectively. Common bricks are worth \$7, \$6 and \$12 for soft, arch and face, crushed stone, \$1.25, double screened, \$1.75, and 2-inch \$1.25, lime, 33 cents and 35 cents per cwt. There appear to be no recent changes in prices of lumber, although it is just possible that a rise may take place in hardwood flooring consequent upon the stiffening prices for the hardwoods.

Ottawa has had a banner year in building operations, the total value reaching the \$4,000,000 mark. From indications which may be regarded with some confidence, it is anticipated that 1910 will at least be just as good.

The city is proceeding to complete the police substation and the fire station, which is part of the new grand stand erected last summer. The work is being done by day labor, under the superintendence of the architect, Mr. W. E. Noffke.

The Ottawa Builders' Exchange will hold their annual meeting on Thursday evening, the 27th inst. Agenda: Election of officers for ensuing year, receiving of annual reports, etc. During the past year they have been endeavoring to frame a "Uniform Contract Form." This is now in printed form, distributed among the members for their consideration. The annual banquet of the Exchange will take place early in February next.

The annual convention of the Canadian National Association of Builders will be held in London, Ont., on the 8th, 9th and 10th of February next. Matters of special interest to builders will be discussed. Several of the delegates will read papers upon building construction, materials, and other interesting subjects.

To prepare rusty ironwork for painting it may be saturated repeatedly with benzine applied with a paint brush, and well scrubbed with a wire brush between the applications, finishing with benzine, which must be allowed to evaporate before the work receives two coats of genuine red lead mixed with boiled linseed oil. A little varnish added to the third coat of paint, which will be of the desired color, will make it durable and form a protection against weather.

The death occurred recently at St. Boniface, Man., of Mr. Michel Cyr, a retired building contractor who went to Winnipeg from Montreal in 1882, and built several of the best structures in the city. The late Mr. Cyr was a personal friend of Sir Wilfrid Laurier. He was eighty years of age.

Remodelling an Old System of Heating

Description of Unique and Interesting Work—Present Day Requirements compared with those of Former Times—Utilizing Old Material

BY THOMAS BARWICK.

It is the intention of the writer in this article to illustrate what can be done, with economy, in the remodelling of an old system of heating, utilizing old material, although it may have been in use for many years. The article will also serve to illustrate the difference between the present requirements in heating and those of thirty or forty years ago. The plant changed over was originally placed in the building about forty years ago, and was of a fair size at that time, but the lower pressure used at the present time called for an additional amount of surface and a more economical use of fuel.

In most of the rooms the old apparatus would provide 70 degrees in zero weather, when the plant was operated at 25 to 40 pounds pressure, but many of the rooms were too cold, owing to exposure. The building stands alone on an elevation where the winds sweep around it, and these conditions had to be considered. The section done at this time was the north end, and was supplied by a 4-foot by 16-foot horizontal tubular boiler. This old boiler was in use up to the time of changing, and the plant owed but little to the owners, as far as its life can be considered, it being unusual to expect a plant's depreciation to be less than 5 per cent. However, this plant was in use, with a depreciation of only about $2\frac{1}{2}$ per cent., and as the repairs made were done in a very meagre manner, there could not be much hope for a longer life of the plant.

Some 18 years ago an addition was made to the building, which was considered on a much broader plan, as far as the heating requirements were concerned, and this portion of the plant was in excellent condition at the time of the change and of ample proportion, so that it was used with but slight addition and but one or two changes, and can be safely expected to last for another decade. At the time of making the addition a second boiler was installed, which was 5 feet by 16 feet.

The old plant was a gravity system, but owing to the varying pressures used for domestic service, the plant was operated with the condensation discharging into the sewer. This meant a waste of fuel. The cramped position of the boilers left them in such a way that they could not be re-tubed on account of the small space in which they had been placed. It was decided to build a new boiler house and use the old 5-foot by 16-foot boiler, which was found in fair condition, with the exception of two tubes, which required renewing. Another consideration was the noise and dust transmitted through the building, and the problem came as to the best situation without expense. The chimney was located in the courtyard, and for economy could be used in connection with the new boiler house. A new boiler house was therefore erected beside the stack.

The new boiler house was located at a grade considerably above the sub-basement level, therefore the pumps were placed in the sub-basement, and while not as convenient as if placed in the boiler room, they have been found very handy in operation. In changing over the plant it was necessary to keep the apparatus in the building in operation at all times, and therefore a short description of what was done will serve to guide others

in similar cases. The old 4-foot boiler on inspection showed that all of the tubes were in pretty good order, but the shell was burned on the underside in some places. It was set with a brick course over the top of the shell above the lugs. A couple of bricks were dislodged, which showed that the shell was badly rusted out. It was therefore ordered discarded. The 5-foot boiler, placed at a later date, was found to be in fair condition, with the exception of a slight leak in two tubes at the rear, which did not appear to be so bad that it could not be used, as the extreme cold weather was not expected before a new boiler could be placed in the boiler house. As the "unexpected" sometimes happens, we did not remove the old 4-foot boiler at once, although we disconnected it, and the "unexpected" did happen at a most inopportune time. We had a bad leak which could not be stopped readily in the blow-off connection of the 5-foot boiler, and therefore we made a hurried connection to the old 4-foot boiler to tide over the situation, trusting to good fortune for the short period. After repairs, a short period of very cold weather came upon us, and we used the old 4-foot boiler at a very low pressure to take care of part of the heating, making temporary connections. Some of the features of the plant are not new, but novel in the arrangement, as described further on.

In remodelling the plant some consideration had to be used, owing to the small amount of money available; therefore, while it is not always wise to utilize old-fashioned appliances, if they will perform the work as economically as new it is advisable to use them. In the repiping it was found that a number of the old rising lines were in very good condition, and as the pipe was of the best grade of old-fashioned wrought iron pipe, which we tested and inspected, we allowed it to be used over again for return pipes, and as it is a hard matter to detect present steel pipe from iron, the writer preferred it to the new, for such use. The piping work in the older section of the building was enlarged and subdivided so that sections could be repaired without closing down all parts of the apparatus, and also for the reason that part of the old and part of the new had to be in continuous use.

In the new arrangement the condensation was to be returned to a receiving basin and then pumped into the boilers. Provision had also to be made for installing a future lighting plant. The radiators in the building were of the old pattern, with the $\frac{3}{4}$ -inch supply connection and $1\frac{1}{4}$ -inch return connections, and therefore could be used by a slight rearrangement of bushing down the return, with eccentric bushings, and by enlarging the tappings of the supply. The return ends of the radiators were originally fitted with air-valves in one of the last pipes, but in many cases these valves had been discarded and plugged up, or miscellaneous styles of cocks and valves used. In some cases the pipes were cut off and short pipes without cocks used.

The rearrangements of the radiators were all marked on the plans, showing where they could be taken from and replaced in new position where new and larger radiators were desired. The radiators were rearranged for air valves by taking out the old air pipes and placing a new

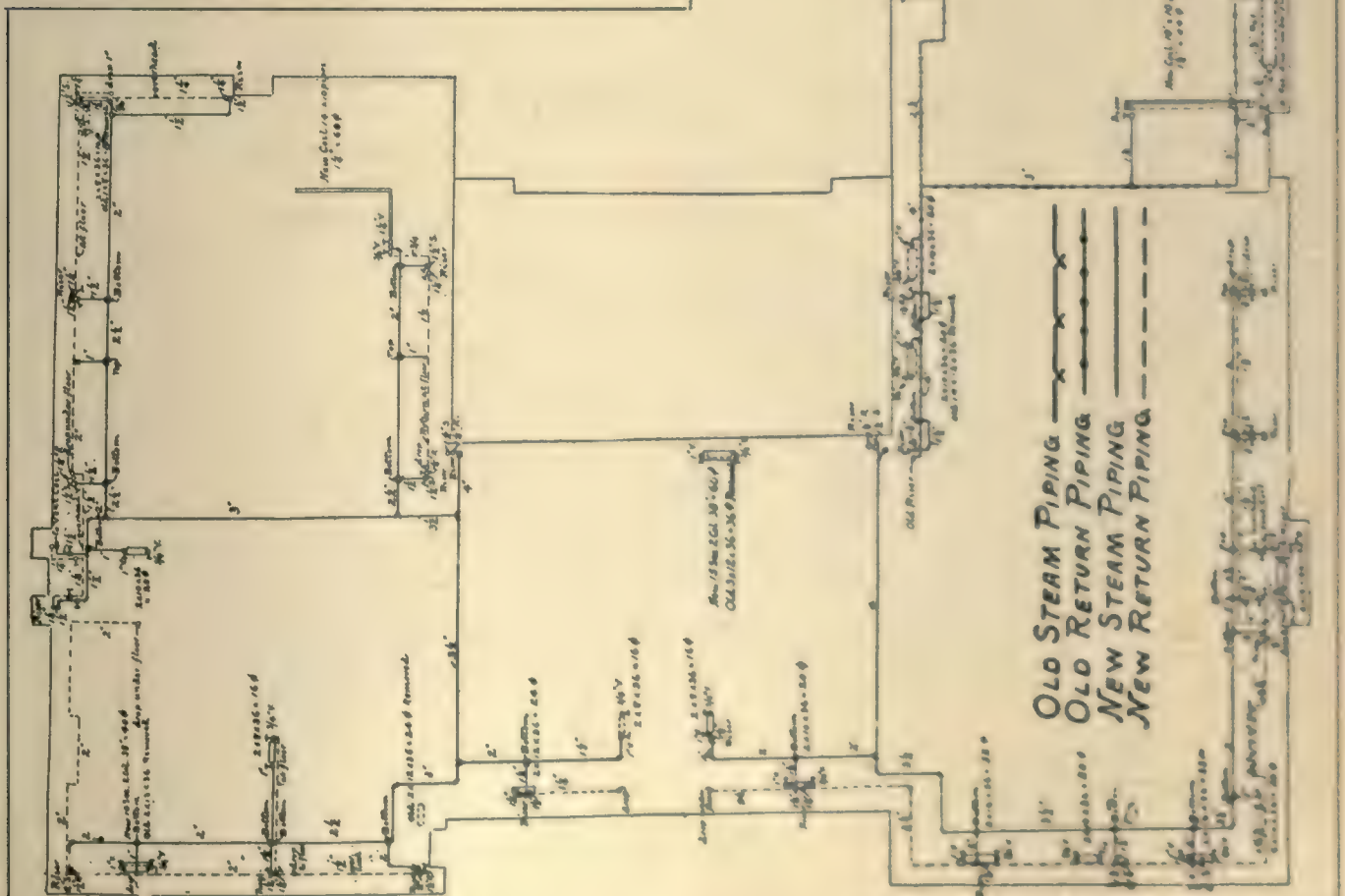
pipe with a straight shank $\frac{3}{4}$ -inch float air valve, so located that the top of the valve came just below the fretwork top of the radiator, to keep the same from disturbance by the occupant as far as practicable. For appearance in most of the rooms the no-hand valves were placed; only in such rooms as could be attended to by the caretakers were valves installed. This was made necessary owing to the class of patients confined in the building, which was nominally a poorhouse.

The new boiler installed was five feet in diameter and fifteen feet long, and was made with a dome, so that the re-used boiler would match up with it; as near as possible, the front head was fitted with a manhole below the tubes, and a hand hole in the rear, while the other boiler was fitted with hand holes. As the flue doors in the front of the oil boiler were small, it was necessary to have larger doors in the new front for the new boiler and to butt up at the centre with the old front. A separate set of anchors was inserted ready for the old front. In making the new front the same character was used in its construction, so that they both would look symmetrical. These fronts are made of $\frac{1}{2}$ -inch steel plate, with cast frames and doors, and make a very good appearance.

At the time of measuring up the re-used boiler it was set in brick work, which, with making allowances for walls, etc., seemed to be only 15 feet long, but when the brick work was removed, it appeared that the back combustion chamber was very shallow, and therefore it had to be reset with a smaller space at front and rear than we usually desire, although the measurements allow for a fair space at the rear to get at the tubes. The boiler has worked very nicely. The new boiler being set up and bricked in before we could disturb the old, made it convenient to clean up the one we wished to use, and make any repairs, which was done, and with the bad use, it was in very good condition.

In taking out the old 4-foot boiler, we found the shell

Plan of First Floor, showing old and new piping.



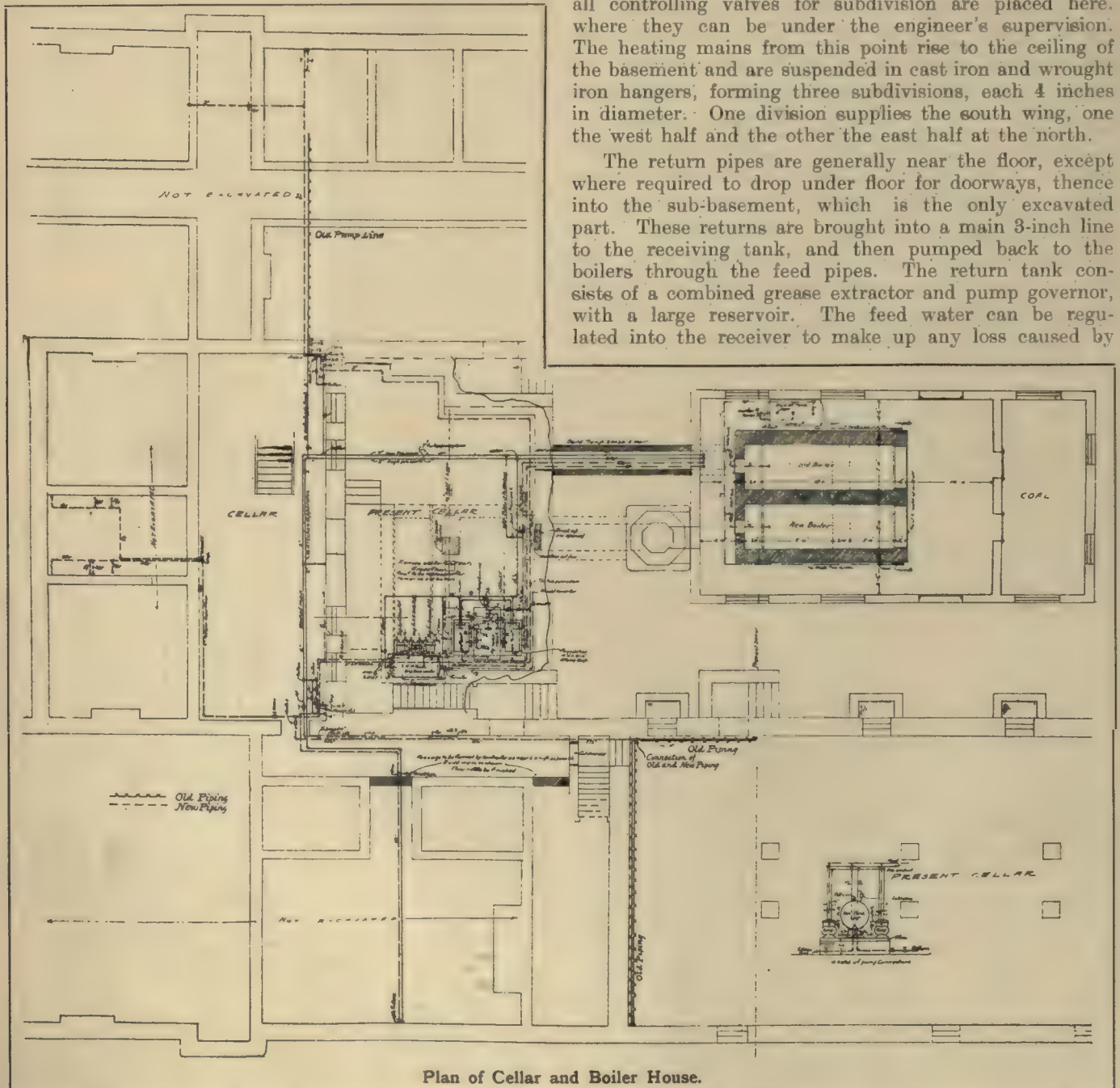
at the top, where the 4-inch course of brickwork had formed the covering in, had been eaten away by rust in such a way that flakes of large size could be peeled off, all over. Taking an ordinary hammer, and striking a sharp blow, the point went clear through and showed that the shell for a space of about a foot had rusted and flaked until it was less than one-eighth of an inch thick. In setting the new boiler and in resetting the one used over, a course of asbestos blocking was used, and the space between the wall and the shell at the safining in was packed with dry asbestos fibre, so that expansion would be provided for. In forming the bridge wall at the back of the grates, a long flat surface was formed instead of the usual level, giving a flat space 4 inches above the grate on the bridge wall to serve as a sheaf to push back the good coals, while the bottom clinker was removed.

The boilers, having a good length of tube, it was thought best to extend an iron flue from the front of the boilers, instead of extending a return flue above the shell, and this smoke pipe was made of $\frac{1}{8}$ -inch iron

fitted with hand damper at each boiler, with a main damper for operation by the automatic regulator. The blow-off from the boilers was connected into a 3 x 6 foot blow-off tank, which was allowed to overflow into the sewer which runs beneath the grade at this point, a vapor pipe being extended up through the boiler house roof.

The steam connections are connected into a 10-inch manifold, and from this manifold the different steam mains extend into a trench and thence into the sub-basement of the building. One of these pipes supplies the return pumps and another pump placed some distance from the building for water supply. Another pipe connects into the kitchen and the main heating supply. The pipes are valved near the manifold, and the heating main is by-passed and fitted with a reducing valve to bring the boiler pressure down to two pounds or as required. As these pipes drop into the sub-basement they are drained at suitable points with one-inch relief piping into the separate traps for the system. The sub-basement is only under a portion of the building, and all controlling valves for subdivision are placed here, where they can be under the engineer's supervision. The heating mains from this point rise to the ceiling of the basement and are suspended in cast iron and wrought iron hangers, forming three subdivisions, each 4 inches in diameter. One division supplies the south wing, one the west half and the other the east half at the north.

The return pipes are generally near the floor, except where required to drop under floor for doorways, thence into the sub-basement, which is the only excavated part. These returns are brought into a main 3-inch line to the receiving tank, and then pumped back to the boilers through the feed pipes. The return tank consists of a combined grease extractor and pump governor, with a large reservoir. The feed water can be regulated into the receiver to make up any loss caused by



exhaust or waste. The exhaust from the pumps is connected into the grease extractor section, and the steam is used in the heating system, a by-pass being formed with valves and back pressure valves to exhaust into the atmosphere. The exhaust pipe follows through the trench into boiler room, and above the boiler house roof into a condenser head.

The heating apparatus was used during last winter, with a circulation throughout the entire system of $1\frac{1}{2}$ pounds' pressure and at a test with a 25-mile wind and zero weather. There were no rooms having a temperature below 70 degrees, many being above this point. In general the heat is turned on from the boiler room at about 6 o'clock and shut off at 10, and again turned on about 1 o'clock for a short period, and again about 5 o'clock. The fires are usually run banked, and are usually closed unless very cold at 9 o'clock at night. The cooking appliances were all re-connected with new pipe and valves, and all piping around these fixtures was raised above the floor, the main supply and return running under the floor. The return pipe was connected with a trap and the condensation discharged into the receiver. A hot water tank was provided with a coil and was connected to the high pressure steam line to the pumps, and the return from the coil was run to a trap, the water of condensation being discharged into the receiving tank. The grease extractor was drained through a trap and discharged into the receiver. The grease waste and drips from pump cylinders and separate drain pipes from each system were discharged into a 2 x 5 foot drip tank, placed on the floor below the hot water tank. A steam siphon, provided in the drip tank, discharges the waste water into the sewer, which is about 8 feet above.

During the time that the general heating system is closed off it is desirable to have some rooms, used as sick rooms, heated, therefore the two risers at the centre of the north side were disconnected from the general heating and a separate heating pipe was run to supply these risers, as it would be likely to require these sick rooms at some time when heat was not on the heating main. A separate steam pipe from the pump line was run and fitted with a pressure regulating valve and stop valve, and the drip and returns were brought back separately to a trap, and the condensation discharged into the receiver. The pipes in the basement were left uncovered except in the storerooms, and they help to heat the rooms. All pipes in the boiler room and sub-basement are covered with 1-inch sectional asbestos covering canvas jacketed and banded. The tank and receiver are covered with $1\frac{1}{2}$ -inch asbestos plaster.

The above equipment was erected for about \$7,500, which, considering the inconvenience of making temporary makeshifts, and loss of time, owing to the occupancy of the building, is fair and allowed a reasonable profit to the contractor.—"Engineering Review."

Mr. W. E. Vanstone, president of the Vanstone Heat & Plumbing Company, of New Westminster, B.C., died last week at Wawanese, Man.

The Montreal branch of the Canadian Manufacturers' Association held a meeting last week to discuss the increases in the rates for workmen's accident liability in consequence of the going into force of the new Workmen's Compensation Act in the Province of Quebec. The increase will range all the way from forty to four hundred per cent. It is claimed there are many ambiguities in the act, and it is probable some step will be taken to approach the Government with a view to making some changes which are considered essential.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

1950. Steam and electric cranes, excavators, steam winches, windlasses, etc.—A London firm manufacturing steam and electric cranes, excavators, steam winches, windlasses, etc., desires to open up business in Canada.

1952. Agency—The London agency of a French firm manufacturing cast iron pipes inquires for the names of Canadian firms open to take up their representation in the Dominion.

1991. Stoneware pipes, glazed sinks, etc.—A firm in the Midlands of England manufacturing stoneware pipes, glazed sinks, roof tiles, fire bricks and glazed bricks, desires to open up business with Canada.

1992. Agents—A Staffordshire firm manufacturing floor tiles, glazed tiles, roof tiles, blue bricks, terra cotta, mosaic, etc., and glazed faience, wishes to appoint Canadian agents.

1995. Heating and ventilating specialties—A London firm manufacturing heating and ventilating specialties is anxious to appoint an energetic and reliable firm in Canada as representatives.

Remuneration of the Architect

The American Institute of Architects is taking definite action approving the long-discussed plan to advance the minimum charge for their professional services from five to six per cent. The following official explanation for this action is given:

"While the remuneration of the architect has not advanced during the past 50 years, the cost of production, office expenses and draughtsmen's salaries have nearly doubled; proper equipment requires a longer preparation, a more thorough education; and the responsibility of the architect has been enormously increased by the requirements of the modern structure, with its engineering, mechanical and electrical equipment."

The argument, simplified, is that the architect's services are worth more than they were a score or two score years ago. It would seem that this is almost a self-evident proposition. This age is distinctively one of specialization, as has often been remarked. The lawyer, the doctor, and the trained specialist in every line commands a higher stipend for the particular service which he is able to perform. The claim cannot be made that the architect has not progressed in skill and peculiar attainment in the same degree as men in the other professions. His service is more valuable to his client, and the cost of its performance is greater.

Mr. C. M. Camiff has been elected president of the Engineers' Club of Toronto.

Mr. H. M. Scott, of Hoed & Scott, architects, Fort William, Ont., left last week for London, Eng., to spend the winter at his former home.

A meeting of the council of the Royal Architectural Institute of Canada will be held in the rooms of the Royal Institute, No. 5 Beaver Hall Square, Montreal, on Tuesday, 18th January, at 2.30 p.m., to consider the nomination of an assistant secretary, the opening of a ballot for the election of members, the consideration of applications for membership and the transaction of any other business that may arise. Mr. Alcide Chausse is honorary secretary.

Estimating by a Reliable Uniform System

The Third of a Series of Practical Articles Designed to Illustrate the Advantages of Up-to-date Figuring—Lather and Plaster Work

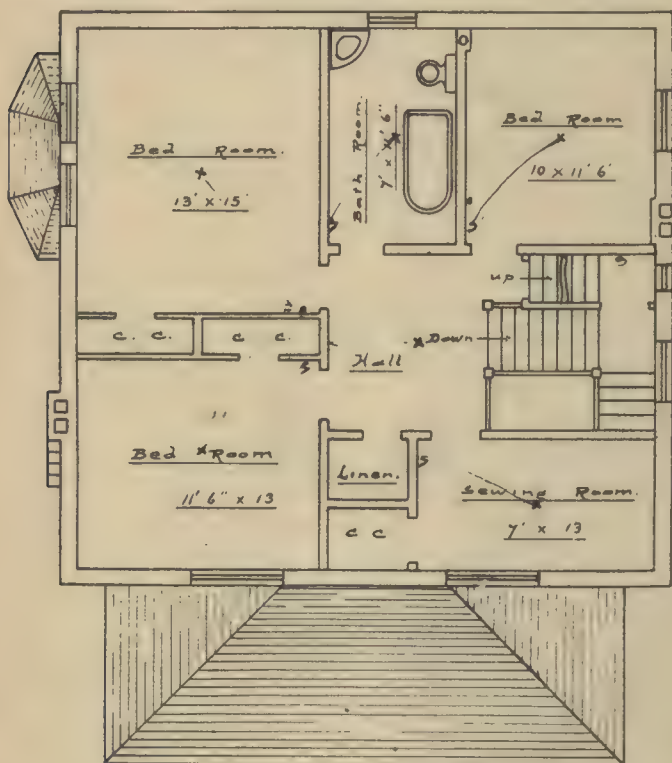
Specially Contributed by W. M. BROWN, C. E.

Lather Work—In measuring lather work of this house we begin with the ceilings. First, describe the thickness and quality of lath, also the manner in which it is put on and nails used. Then take the inside measurement within the walls, the length by the breadth, and multiply the same by 3, then give the contents in superficial yards, and price. There are no deductions made at partitions, unless they are 9 inches thick or more. All openings to be deducted. Where there are any cut-

10 feet, the height, and add length of cutting, 14 feet 2 inches by 6 inches, to quantity. Where there is a double cutting, multiply the length by 1 foot.

Plaster Work—Give the number of coats and finish of plaster in connection with measurement. In measuring the plaster work begin with the apartments of second floor and proceed downwards. Measure each apartment separately, taking the ceiling length by breadth, and walls double of same by height. When all apartments on this floor are measured, take same in floor below, and then ceiling and walls of basement. Thereafter measure ceilings and walls of stairs, landings, entrance hall and vestibule. Where mitres occur on cornices, mouldings or enrichments, charge same at price for each. Where there are any arrises (sharp angles on plaster), or relieved beads (extra work on plaster relieving timber beads) or forming mouldings on plaster or cement, the same to be charged by lineal foot for extra labor. Deductions from plaster to be made at all openings, and any extra work at same to be charged separately. The measurement of all surface plaster to be net, and where circular work, to be charged separately, and described as such. Cornices, enrichments and mouldings to be described and charged separately. Centre pieces to be mentioned separately, stating diameter. Conical, elliptical, pyramidal or any specialized class of work to be minutely described, and charged separately.

Advantage of Accuracy in this System—It is a prevalent custom in this country in measuring plaster work to allow half of the opening only to be deducted, to make up for the extra labor entailed in working around the opening. This may be all very well for a small opening, but when it comes to a very large one, then the contractor gets a greater benefit than he is entitled to on this occasion. The most equitable method is to deduct the opening net, and charge any extra labor entailed. All angular forms of plaster work to be measured net, and the beads and mouldings at same charged extra and described. It is strict attention to the formulated rules as to particulars regulating deductions, as well as extras, in connection with this system, that gives the most accurate and reliable results.



Second Floor Plan.

tings at angles, an allowance of 6 inches by the length is added to the quantity. In measuring the walls for lath, the inside length and breadth to be doubled, and then multiplied by the heights of ceilings, taking from the top of floor joist to bottom of joist of floor above in each case. All openings to be deducted. Where cuttings occur at angles an allowance of 6 inches to be charged, and multiplied by length. Circular lath work to be measured and charged separately. Conical, elliptical, pyramidal, or any specialized class of work to be minutely described and charged separately.

Some Points in this System—According to some methods, where angles occur, in large dimensions, the extreme length is taken by the height, and calculated in full to make up for space wanting at angle. In this case, the quantity of lathing done would be charged 30 x 10 feet, the extreme size. But this would be too much to give as an equivalent for lath wanting and extra cutting at angle. According to new system, the net size is taken, which is the average of 30 feet and 20 feet by

The Builders' Exchange at London, Ont., have secured excellent quarters over the Bank of Nova Scotia. The new quarters have been tastefully decorated and are well equipped for the requirements of the members. Preparations are being made to entertain the convention of the Canadian National Association of Builders on Feb. 8th. The annual meeting of this Exchange will be held on the 13th inst.

What is believed to be a record breaking piece of slate rock was removed recently from the Highland quarry, at Slatedale, Pa. It was pure, first class slate 18 feet long, 8½ feet wide and 5½ feet thick, and practically every inch was worked into marketable product, with no waste to speak of.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Chilliwack, B.C.

The mayor and city engineer, R. A. Henderson, have been taking levels and formulating a scheme for draining the town of surface waters.

Edmonton, Alta.

J. Galt, consulting engineer, has reported in favor of a project to instal a gravity system water supply.

Kildonan, Man.

A bylaw has been passed to raise \$10,000 for current expenditure, mainly for gravel roads.

Moose Jaw, Sask.

P. M. Lauder, C.E., of the department of interior, Ottawa, has been examining into the feasibility of a water power on Moose Jaw river, to supply this city.

New Liskeard, Ont.

The bylaw for the borrowing of \$28,000 for the macadamizing of Whitewood avenue and Armstrong street, was defeated.

Ottawa, Ont.

The Board of Trade here has asked the government to at once proceed with the Georgian Bay canal if financial conditions permit, or allow work to be done as private enterprise under strictest safeguards.

The Carleton Good Roads bylaw has been ratified by the provincial government, and preparations will be made for the improvement of the roads in Carleton county.

New Westminster, B.C.

The Richmond water agreement, whereby this city agrees to supply the neighboring municipality with water has been signed. For \$125,000 the city of New Westminster agrees to connect the reservoir at Queen's Park, by a 24-inch steel pipe with the city's waterworks system at Coquitlam lake, and to lay a 12-inch steel pipe from the reservoir to a point near the westerly end of Lulu island, whence the water will be conveyed to the different parts of the municipality of Richmond. The city will keep the pipes in good repair for twenty years. Work will probably be started immediately.

Regina, Sask.

The following will be constructed: trunk sewer, \$363,000; pavements and sidewalks, \$13,300.

St. John, N.B.

The general committee of the council have asked authority to call for tenders for the permanent paving as recommended by the board of works. City Engineer, Murdoch. Noted in issue of January 5th.

Vancouver, B.C.

A deputation, consisting of City Engineer Clement, Ald. McSpadden and others, waited on the Hon. F. C. Carter-Cotton and Attorney General Bowser to request them to use their influence with the provincial government to have the latter construct a

large sewer along Nanaimo street, at the city boundary, to Burrard inlet.

Railroads, Bridges and Wharves

Burks Falls, Ont.

The Board of Trade have been influential in having a petition forwarded to the provincial government for a new steel bridge on Ontario street.

Edmonton, Alta.

The sub-structure for the Wolf Creek bridge, it is expected, will be ready for the steel early in the spring. Chas. May, contractor.

Tenders are to be shortly called for the new C. P. R. high level bridge. Noted in issue of January 5th.

Messrs. Phalen and Shirley, of Omaha, Neb., who have the 80-mile contract on the G. T. P. west of the McLeod river, will start hauling in supplies at once.

Fort William, Ont.

The bylaw to raise \$12,000 to improve McVicar street subway, has been passed.

The Fort William Coal Dock Company will extend their docks this spring. Cost \$100,000.

Kingston, Ont.

Messrs. E. H. Fitzhugh, vice-president of the G. T. R., and H. E. Wittenburger, general superintendent, have been here from Montreal on an official visit. As to the Kingston, Smith's Falls & Ottawa line that is to be built shortly, Mr. Fitzhugh stated that Kingston would be a terminal point for that road.

London, Ont.

It is stated that the G. T. R. yards here will soon be enlarged.

Moose Jaw, Sask.

The Carter-Halls-Aldinger Company, the contractors for the pile work of the new bridge, on Sixth avenue, have begun operations.

Nelson, B.C.

Work is being commenced on the new C. P. R. car repair shop being built to replace the one destroyed by fire. Dimensions 200 by 40 feet. Estimated cost, \$3,500.

Prince Rupert, B.C.

It is reported that the G. T. P. will build another wharf at least 1,000 feet long during the coming summer. J. H. Bacon, harbor engineer.

Quebec, Que.

The Cleveland Bridge & Engineering Company, of Darlington, Eng., have been here, it is reported, looking over the site of the big bridge, with the intention of putting in a tender for the work. The Cleveland Bridge Company is one of the foremost concerns in England and has carried out a large number of big engineering works in England, India, Africa and other parts of the world.

Regina, Sask.

It is stated that the subway to be constructed will cost \$50,000.

Sydney, N.S.

The Department of Public Works have sent an engineer to report upon the damage done at Lunenburg Bay and other points. It is probable that, as a result of his report, provision will be made for permanent repairs.

Stratford, Ont.

The reports of the Stratford Bridge & Iron Works Company for extension of time for finishing steel work of new Waterloo street bridge has been granted.

St. Catharines, Ont.

It is stated that a company is being formed with a view to erect a high level bridge over the old canal at Yates street to a point leading toward the C. F. R. depot. Ald. W. H. Merritt is reported to be interested.

Victoria, B.C.

Mr. Marpole, general executive assistant of the C. F. R., is quoted as having stated that as soon as they could secure a location in the reserve on Vancouver island being cleared, they would remove their machine shops from Wellington here.

Wm. Mackenzie, D. D. Mann and other C. N. R. officials, have left for the East after completing the terms of the contract with the government for the construction of a line through British Columbia. It is understood that the matter of the regulation of the freight and passenger rates stands over, and is likely to be left to the railway commission.

Vancouver, B.C.

City Engineer Clement has received notice that the Great Northern has given orders to its engineers to prepare plans for permanent steel bridges over the railway cuts across Park and Victoria drives.

AWARDED.

Adamsville, Que.

Tenders were opened on January 3rd by Mr. E. Vamer, town engineer, for the construction of a bridge over the eastern branch of the Yamaska river, and were as follows: Laurentian Construction & Engineering Company, Limited, \$9,400; Phoenix Bridge & Iron Works, Limited, \$9,700; MacKinnon, Holmes & Company, Limited, of Sturhess, Que., \$9,875; the Structural Steel Company, Limited, \$11,000. The contract was awarded to the Laurentian Construction & Engineering Company, who will proceed with the work at once. The contract calls for the completion of the bridge by the 31st of August, 1916.

Saskatoon, Sask.

Strickland Bros. got the contract to erect a foot bridge attachment to the C. N. R. bridge for \$2,800.

Winnipeg, Man.

It is reported that the C. N. R. has awarded the contract for the Foxboro railway subway to T. Kelly at \$40,000.

Owing to a mistake in estimating, J. Cunn & Son, the successful tenderers for additions to Louise street bridge, were obliged to withdraw. It is reported that their tender has been cancelled and the contract

awarded to W. Newman, the next lowest, for something over \$17,000. Noted in last issue.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

Among the big contracts reported for the coming season are a large wing addition to the Brandon college, and a new convent costing about \$50,000.

Brantford, Ont.

Wellington Street Church intend renovating and improving their building. Plans have been practically completed, and tenders will shortly be called.

Beresford, B.C.

Tenders addressed to F. C. Gamble, public works engineer, will be received until January 25th for the erection and completion of a one-room frame schoolhouse at this place. Plans, etc., at office of the government agent at Kamloops, and at the Department of Public Works, Victoria.

Cranbrook, B.C.

As the Fernie Construction Company were found to be not adhering to the provisions of their contract, the school board has taken over the building of the new school, and will complete construction by day labor.

Calgary, Alta.

The Council of Calgary, Alta., is considering submitting a bylaw to raise \$105,000 to erect a new city hall. They also recommend that a lot to the rear of the city hall be purchased for \$10,000.

Clayoquot, B.C.

Tenders addressed to F. C. Gamble, public works engineer, will be received until January 25th for the erection and completion of a one-room frame schoolhouse at this place. Plans, etc., at offices of government agent at Alberni; John Price, secretary, school board, this place, and at the Department of Public Works, Victoria.

Eastview, Ont.

During the summer holidays the present school house will be removed and a new four roomed brick building erected at a cost of from \$10,000 to \$12,000. Mr. T. F. Elmitt is interested.

Grande Coulee, Sask.

A four room brick school is to be erected here.

Guelph, Ont.

The Board of Directors of the General Hospital have decided upon the erection of an isolation hospital. The new buildings will have accommodation for twenty-five patients and will be on a site adjoining the general hospital.

Hull, Que.

St. Jean Baptiste Roman Catholic school was destroyed by fire recently. Total estimated loss, \$30,000.

Hamilton, Ont.

The Salvation Army has taken out a permit for the alterations to 94 Merrick street, their Industrial Home, for \$4,000.

A deputation from the hospital governors waited upon the Board of Control to ask for \$25,000 for the erection of an addition to the nurses' home.

In the plans outlined by Erskine Presbyterian congregation for the year is one for a new Sunday school building, to be an addition to the present one.

Kenora, Ont.

Tenders addressed to H. F. McNaughten, secretary, Public Works Department, Parliament Buildings, Toronto, will be received until February 1st for the completion of the Court House here. See advertisement in this issue.

London, Ont.

City Architect Nutter has been asked to prepare plans at once for the Colborne street school.

A proposition is before the council to tear down the market house on the square, part of the space now occupied by it to be reserved for the erection of a registry office.

Meaford, Ont.

The bylaw for the borrowing of \$32,000 for the erection of a new public school was defeated.

Montreal, Que.

The Protestant Board of School Commissioners have purchased a school building site in St. Gabriel ward in Point St. Charles. Chas. D. Binmore, secretary.

Mr. A. F. Dunlop, architect, Lindsay Building, is preparing plans for an extension to the Earl Grey school building and will call for tenders in the course of two or three weeks. The capacity of the present school building will be doubled.

New Westminter, B.C.

The council will advertise for new tenders for the city incinerator. S. W. Blackman, city engineer.

Nelson, B.C.

D. Guthrie, chief of the fire brigade, has recommended a new central fire hall, and also the purchasing of another 500 feet of hose.

Ottawa, Ont.

It may be necessary to call for new plans for the fire station, a technicality having arisen, which renders the present accepted plans of Weeks & Keefer unsuitable. N. H. H. Lett, secretary, Board of Control. Noted in issue of December 22nd.

The Ottawa Methodist Social Union has plans for the erection of two new churches in the coming year, one on the Glebe and the other in Ottawa South. Noted in issue of December 1st.

The city council has appointed a committee to go into the question of the method and cost of providing public lavatories in various parts of the city.

At a meeting of the congregation of Bank Street Presbyterian Church, the trustees were authorized to sell the present property for \$125,000, which will be applied to the building of a new church on the corner of O'Connor and Cooper streets. Rev. J. H. Turnbull, pastor.

The congregation of Bell Street Methodist Church will soon be asked to decide on the erection of a new edifice. Estimated expenditure, \$30,000. The architecture and construction will be similar to Erskine Avenue Presbyterian Church. Plans and specifications are almost completed.

Prince Rupert, B.C.

The provincial grant to the projected general hospital will be increased in the estimates for the forthcoming session of the legislature from \$5,000 to \$7,500.

Revelstoke, B.C.

It is stated that the provincial government has promised to erect a new court house this year at a cost of approximately \$100,000, and to consider establishing a land registry office.

Stratford, Ont.

The amended plans for the new addition to hospital are awaiting consideration.

St. John, N.B.

Tenders addressed to F. Neil Brodie, architect, 42 Princess street, will be received until January 20th for carpentry, mason work, painting and glazing, and heating and plumbing in connection with alterations to the premises on Market Square, City, belonging to Messrs. J. Morris Robinson & Sons, bankers.

Toronto, Ont.

Superintendent Bishop has been asked to prepare plans for the new Technical school on College street, of which the estimated cost is \$500,000.

At a congregational meeting of Bonar Presbyterian church, the building committee recommended that the new church be commenced early in the spring. The plans call for a church to seat 1,000. The cost is estimated at \$40,000. Rev. A. MacGillivray, Pastor.

The congregation of Chester Presbyterian church have secured a site for a new church and school building on Broadview avenue. They hope to start the new church in the near future.

Measurements for a planned extension to the wing occupied by the Court of Appeal, Osgoode Hall, have been taken. The plan has not yet been submitted to the Cabinet. F. R. Heakes, architect, Public Works Department.

The Separate School Board passed a bylaw to raise \$75,000 for the erection of school buildings and paying off mortgages.

The City Architect has issued a permit to the York Club for proposed alterations to the late Gooderham residence at the corner of Bloor and St. George streets, which is to be transferred into a club house. The alterations will cost \$10,000.

Vancouver, B.C.

At the annual meeting of the Strathcona Institute, the president, J. Beveridge, mentioned in his address the prospect of a new building within the year. D. Rorison guaranteed \$10,000 on the condition that another \$40,000 was raised.

Victoria, B.C.

The congregation of Grace English Lutheran church have secured a building site at the corner of Blanchard and Queen.

The trustees of the Calvary Baptist Church have purchased the northeast corner of Pandora and Quadra streets as a building site.

Welland, Ont.

It is reported that the councils of Pelham and Thorold townships are looking favorably upon the project for a joint rural isolation hospital.

Winnipeg, Man.

The Children's Hospital Board have purchased a building site in the North End.

The Sparling Methodist Church is to be enlarged and improved in the spring.

A proposition has been submitted to the city council, asking that a bylaw be submitted asking the ratepayers to endorse the raising of \$350,000 for hospital extensions and improvements, with the alternative of devoting the sum to municipalizing the present General Hospital.

Plans for improvements to the grounds and club house of the Country Club have been prepared and passed upon by the board of governors. Estimated expenditure \$30,000. Final decision awaits a special meeting of the shareholders on the 18th inst.

Yorkton, Sask.

The town council have decided to increase the fire hall accommodation.

AWARDED.**Regina, Sask.**

The Emmanuel Anglican College has secured a site on the south side of the university buildings for the erection of a college. Brown & Company, the university architects, were awarded the contracts for the plans. A \$50,000 building is to be erected in the spring.

St. Albert, Alta.

Poirier Bros. have been awarded the contract to build the new school house.

Toronto, Ont.

Mr. Samuel Young, Hazelton avenue, has been awarded the contract for the remodeling of the Toronto General Post Office on Adelaide street. A new wing will be added on the east and the present structure considerably improved. The work will cost \$46,000, and will be started early in the spring.

Residences**Brandon, Man.**

Henry Gillespie will erect a \$5,000 residence and has taken out a permit.

Bathurst, N.B.

Two houses belonging to the Nepisquit Lumber Company were destroyed by fire on the 12th inst. Estimated loss, \$2,000.

Lethbridge, Alta.

E. I. Gold is erecting a \$3,000 residence.

Ottawa, Ont.

It is reported that the Vacuum Cleanser Company is seeking to locate a Canadian branch here.

It is stated that the building at 113-115 Sparks street, now occupied by the firm of A. Rosenthal & Sons, Limited, has been sold to Messrs. G. and M. Orme, piano dealers, 139 Sparks street. The former have plans for a large building on the site of the stores from 101 to 107 Sparks street. Estimated expenditure, \$100,000. Construction will probably commence on the 1st of May.

Regina, Sask.

D. J. McKay, of the McKay Construction Company, has purchased for an American syndicate, 150 feet opposite Victoria park, where an apartment block costing \$150,000 will be erected as soon as spring opens.

Vancouver, B.C.

The Church Committee of St. John the Divine, Central Park, have plans prepared for a new clergy house.

Richard T. Perry has just completed plans for two six-roomed bungalows to be erected at South Vancouver. The contract has been let to Domoney & Abbot. The same architect has let the contracts for an eight-roomed bungalow to be erected at Cedar Cottage, to Orenden & Braithwaite.

A. C. Hope, architect, is calling for tenders on the alteration and addition to a house for C. A. Fraser.

Winnipeg, Man.

Plans are being prepared by W. W. Blair, architect, for the large apartment house south of the Carnegie library to be erected by G. H. Walton, real estate agent. Dimensions, 200 by 150 feet. Estimated cost, \$320,000.

AWARDED.**Toronto, Ont.**

J. Berridge & Company have been awarded the contract for all trades excepting

those of plastering and painting, required for a large residence for Mr. Bertram on the west side of Rusholme Hill road, at \$7,000. Architects, Chapman & Mettrifin.

J. Berridge & Company have been awarded the contract for all trades required in the erection of additions to apartments at southwest corner of Gloucester and Church streets.

Business Buildings and Industrial Plants**Amherstburg, Ont.**

The Anglo-American hotel was destroyed by fire on the 10th inst. Estimated total loss \$20,000.

Augustin, Que.

A. Beaumont's sawmill, near this town, was destroyed by fire on the 9th inst. at a loss of about \$6,000.

Brandon, Man.

McDiarmid & Clark are to erect a large sash and door factory in the spring.

It is said that Townsley & Son, Minneapolis, have secured a site here for a factory building.

The store of A. D. Rankin & Company is to be enlarged and refitted extensively. Work starts January 31st.

Brockville, Ont.

The building recently erected on the Gossitt Company's premises, used as a paint shop and storeroom, was destroyed by fire on the 13th inst. Total estimated loss, \$6,000.

Edmonton, Alta.

Plans are being prepared for an eight-storey Chamber of Commerce building.

Emerson, Man.

The Northern Elevator's storage elevator was destroyed by fire. Loss estimated at \$30,000.

Fort William, Ont.

It is reported that Mr. F. C. Becker has stated the intention of the company is to electrify the works at the mine and to build a crusher here. Mayor Peltier is reported to have stated that a new proposition will be presented to the Pyrites company and the idea of locating the company headquarters here has not by any means been abandoned.

Lethbridge, Alta.

W. Oliver will build a five storey business block in the spring.

The Western Farmers' Milling Company will erect several elevators in Alberta.

The A. Macdonald Company, wholesale grocers, has decided to erect a building for a branch establishment here. A site has been secured 50 by 120 feet and the structure will be of four storeys and cost about \$25,000.

London, Ont.

The Watt Manufacturing Company, of Ridgeway, Ont., are negotiating with a view to locating here.

Montreal, Que.

The Diamond Flint Glass Works were damaged on the 16th inst. to the extent of about \$30,000.

It is stated that the Rea Company have purchased the Academy of Music, of which at the end of the present lease in April next, they will take possession.

Moose Jaw, Sask.

The Grey-Campbell Company will erect extensive warehouses and offices here next spring.

The Moose Jaw Grocery Company and the Elsom Apartment block have construction and basements ready for spring building.

The Imperial Oil Company, of Winnipeg, Man., has made the purchase of six lots, and as soon as weather permits will begin the construction of a large warehouse, and other buildings. The site is west of Saskatchewan Flour Mills. Estimated cost of main building, \$10,000; of other buildings, \$15,000. W. Yoo, local manager.

New Westminster, B.C.

The Alberta British Columbia Elevator & Wharf Company is quoted as having stated that having been promised aid from the Alberta government, they would erect a large grain elevator here, probably before next summer. E. H. Heaps, of Vancouver, is interested.

A manufacturing site in the east end of Supperton on the Great Northern train has been secured on a short option by the Western Canada Envelope & Stationery Company, of Vancouver. If the plans of the company go through it is understood that construction will be started in the spring.

It is reported that the northeast corner of Musgrove and Rileau streets, now owned by Hugh Carson, Limited, has been bought by the George Matthews Company. Plans, although not definite, are thought to embrace a brick block for their retail trade.

It is reported that the Peter Whalen property on the southeast corner of Rileau street and King Edward avenue, has been purchased by the Hugh Carson, Limited, as a site for the company's new factory, which it is stated will be six storeys in height. Work will be started at once.

Tenders addressed to G. J. Desmarais, deputy minister of Marine and Fisheries, Ottawa, will be received until February 8th for the construction of a wooden wharf at Cape Sable Lightstation, Shelburne County, N.S. Plans, etc., at that department and at its agency, Halifax, N.S., and at the post offices, Barrington, Shelburne and Yarmouth.

Peterborough, Ont.

It is reported that plans are being prepared for extensive additions to the buildings of the Canadian General Electric Company here.

Quebec, Que.

The office of "La Vigne" was damaged by fire to the extent of about \$2,000 on the 16th inst. Mr. Urie Barthe, editor.

Regina, Sask.

Armstrong, Smyth & Dowsell, hardware merchants, plan to erect a three-storey brick block.

A site has been purchased from J. B. Shaw for a large office building to go up in the spring.

F. M. Crapper will have two buildings erected. One is to be a large business block, and the other a two-storey brick structure.

Saskatoon, Sask.

Plans for the John Deere Plow Company's building are nearly completed. Construction will begin March 1st.

It is stated that as a result of the amalgamation of the interests of the Saskatchewan Milling & Elevator Company and the Wil-

son Leslie Company, this city, are to have a big new flour mill, which will be one of the largest in Western Canada. Tenders have been called for machinery and building, and the work will commence at once. Besides the mill proper, there will be a big elevator in connection. The company has already a line of elevators, which will be extensively added to.

Sturgeon Falls, Ont.

The Windsor Hotel, the Cockburn block, post office and other buildings were destroyed by fire on the 9th inst. Total estimated loss \$25,000.

Strathmore, Alta.

It is stated that those interested in oil plants in Winnipeg are planning to locate a 10,000 gallon storage house here.

Stratford, Ont.

The Imperial Rattan Company, it is stated, will remove here from Walkerville.

St. Boniface, Man.

The stock yards plans will entail a total expenditure by the company, the town and the railways, of over one million dollars.

The Western Canada Flour Mills are planning extensive additions and improvements to their big flour mills there. Estimated expenditure \$250,000. A. Kelly, president; S. A. McGaw, general manager.

Souris, Man.

The C. P. R. has purchased four hundred acres adjoining this town, presumably for a shop site to serve the southwestern lines which converge here.

Toronto, Ont.

The Standard Sanitary Company have obtained a permit for the erection of a factory at the corner of Lansdowne and Royce avenues at \$12,500.

Tenders will be received by Darling & Pearson, architects, 2 Leader Lane, until January 31st, for all the various trades required in the erection of a branch building for the Canadian Bank of Commerce at the corner of Bloor and Dufferin streets. Plans and specifications at the office of the above mentioned.

It is reported that a strong and influential syndicate, headed by John W. Gates, the Chicago millionaire, and prominent German financiers, has been formed for the purpose of erecting in the vicinity of Toronto a modern smelting plant. Plans for the proposed plant are now being prepared in Ottawa.

Vancouver, B.C.

The Royal Bank of Canada are having improvements made to their building on the corner of Hastings and Homer streets.

A building of ten storeys and 50 by 100 feet, plans for which are now being prepared, is to be built at the eastern end of Woods hotel. It is estimated that the cost will be \$200,000 and over. Mr. Houghton, architect.

John Considine, owner of the Orpheum circuit, has secured options on property in the centre of the city, where he intends to erect a \$50,000 theatre.

The contractors are to commence work on the addition to the premises of Kelly, Douglas & Company, during the course of the month. Estimated expenditure, \$80,000. Mr. R. Kelly is interested.

Victoria, B.C.

Adkinson & Dill, contractors for Times building, require tenders for excavation, cut stone, electric work, sheet metal and roof, lumber, cement, sand, gravel and iron work. For particulars apply to H. S. Griffiths, architect.

A permit for a \$30,000 building of brick and concrete to be erected on the lot just south of the Merchants Bank building on Douglas street has been taken out by A. C. McCallum. J. L. Skene has the contract. The building will be constructed of brick and concrete and will be fireproof.

The Bank of Montreal, it is stated, have bought the lot on Government street, adjoining their own premises. It is assumed that the purchase has been made with a view to future enlargement of building when the need occurs.

Wynyard, Sask.

Bjornson & Brickson's general store was destroyed by fire recently. Total estimated loss, \$12,000.

Watrous, Sask.

The Massey-Harris Company are to erect a \$20,000 distributing warehouse on First avenue in the spring.

J. Cummings, real estate agent, has sold three lots on Second avenue, as a site for a general store, with a 75 foot frontage.

Winnipeg, Man.

Options have been secured on the block bounded by Graham and St. Mary's avenues and Donald and Hargrave streets, through Oldfield, Kirby & Gardner, who, it is supposed are acting for the T. Eaton Company.

It is reported that the Trust & Loan Company have purchased an additional 33 feet just east of the Dominion theatre, making their frontage now 100 feet. No definite plans have been stated re the building to be erected, but it is understood that it will be of fireproof and of large dimensions.

On March 1st contractors will take possession of the old Canada Permanent building on the southeast corner of Main and Portage, and begin tearing it down to prepare for the erection of the magnificent new Bank of Montreal building. Noted in issue of December 22nd.

The factory of the McDonald Tent Company, on Logan avenue, was destroyed by fire on the 11th inst. Total estimated loss \$15,000.

A business block is projected for the corner of Portage avenue and Home street.

The Radium Oil & Chemical Works will put up a factory next spring. D. M. Bruce is manager.

The Paulin Chambers Company will have a six storey building put up, 60 by 120 feet. F. R. Evans, architect.

The W. B. Sterling & Company will rebuild their six storey warehouses. Tenders will be called soon.

The Frost & Wood and Cockshutt Plow Company, having combined, will erect a number of warehouses in the West next spring.

Extensive work in connection with additions and improvements to C. P. R. hotels have been outlined by Hayter Reed, superintendent of the company's hotels, who is on a tour of inspection in the West. According to plans now being prepared the capacity of the Hotel Vancouver will be doubled. Important alterations and additions to the company's hotels at Lake Louise, Glacier, Sicamous and Banff are in prospect.

Tenders for supply of 129 feet of 26-inch 8-ply elevator belting delivered at the City Quarry, Stony Mountain, will be received until January 28th. M. Peterson, Secretary, Board of Control.

Yorkton, Sask.

The wholesale fruit warehouse occupied by Wilton Bros., was destroyed by fire recently. Estimated loss to building, \$5,000.

AWARDED

Fort Erie, Ont.

Clarkson & Sons, contractors, Toronto, have secured the contract to erect the casino building, in connection with the hotel at the Beach, which will be built of reinforced concrete and steel, at a cost of about \$50,000.

Montreal, Que.

Mr. H. C. Stone, architect, 80 St. Francois Xavier street, has awarded the contract for the artificial stone work on the Beardmore building, to the Roman Stone Company, of Toronto.

Sault Ste. Marie, Ont.

General manager Franz, of the Lake Superior Corporation, has awarded the contract for the construction of coke ovens to the Kopper Coke Oven Company, of Joliet, Ill., and construction is to commence immediately. Price was not stated, but it is thought to be \$2,000,000.

Power Plants, Electricity and Telephones

Cranbrook, B.C.

The Kootenay Telephones, Limited, this place, is considering the advisability of building a line to Grande Prairie.

Calgary, Alta.

City Engineer Child, in a recent report to the commissioners, pointed out the advisability of establishing a new power plant without delay, and suggests a site in Victoria Park as suitable.

Edmonton, Alta.

Plans have been prepared by Superintendent Taylor, for a new car barn to hold 100 cars. Only half of the building will be erected this year.

Fort William, Ont.

The following bylaws were carried: \$21,600 to extend telephone system; \$14,000 to extend electric system; \$137,000 to further extend steel railway; \$6,000 to purchase Bell Telephone.

London, Ont.

New tenders will be invited for the electrical equipment required at the power station. The former specifications are said to have contained too many alternative propositions. The machinery required includes transformers, motor generator set, voltage regulators, switchboards, lightning protectors, instruments, arc and incandescent street lighting system. E. J. Sifton, chief electrical engineer. Noted in issue of December 8th.

Melville, Sask.

The citizens of Melville have passed the electric light bylaw which gives Messrs. Cushing and Weira franchise, but not an exclusive one, to erect an electric light and power plant. Work will be commenced at as early a date as possible, and the plant has to be in operation by July 1st, 1910. Estimated expenditure, \$30,000.

Midland, Ont.

Tenders are being invited for hydraulic and electrical equipment by W. Finlayson, secretary of the Simcoe Railway & Power Company, Limited. For further particulars, see advertisement in this issue.

New Westminster, B.C.

It is stated that work on the new station will commence in February. This will require an expenditure from \$60,000 to \$70,000.

Ottawa, Ont.

The Arnprior & Pontiac Electric Railway Company is stated to be organized

for the purpose of building an electric railway from Campbell's Bay, Que., via Chats Falls and Graham's Bay, near Ottawa, Ont., to High Falls, 75 miles. Arthur H. Brice, Ottawa, Chief Engineer.

The plans for the development of power at the Long Sault Rapids in the St. Lawrence, at Cornwall, Ont., are now before the chief engineers of the three departments of the Dominion Government having oversight in the matter, the departments of canals, marine and public works. Elaborate plans and drawings, in detail, have been filed and they show three distinct dam proposals, each with a different elevation. The engineers will advise the government in respect to them, and the government will then decide which plan will be followed. Four power houses, three on the American side of the river and one on the Canadian side, are shown, and, roughly speaking, about 125,000 horse power is proposed at the outset. This may be largely increased. The plans will also go before the International Waterways Commission for approval.

Prince Albert, Sask.

It is reported that the provincial government will spend about \$20,000 on the telephone plant. The wires in the business section will be put underground, and if a suitable site can be procured, a new building will be erected.

The farmers in the Colleston district, north of here, have decided upon a rural telephone system, work on which will be started early in the spring. George Reid, who is in charge of the system, can be addressed at Collaston, P. O., Prince Albert, Sask.

Revelstoke, B.C.

The city council have decided to enter into a five-year contract to supply the C. P. R. with power from the 1st of May at \$2.25 per kilowatt hour for from 75 to 150 horse power. A new power plant is being installed by the municipality.

The plans of the B. C. Electric Company now call for the sub-station, which was to have been built at Sardis, to be erected here of cement concrete, four storeys in height. In addition to this a building will be erected for the chief of the power house. Estimated expenditure, \$80,000. Superintendent, Mr. Purvis.

Winnipeg, Man.

The plans for the new North End Telephone Exchange are under way. Work will not be started until spring.

AWARDED.

Calgary, Alta.

Walter Fyshe Company, of Montreal, Que., have been awarded the contract for the general work in connection with the plant to be erected by the Calgary Power and Transmission Company. Construction will start in the spring.

It is reported that the General Electric Manufacturing Company of Sweden is supplying the Calgary Power & Transmission Company, with four 750-kilowatt water-cooled, step-down transformers. Smith, Kerry & Chace, of Toronto, Ont., are the consulting engineers.

New Westminster, B.C.

T. R. Nickerson & Company has been awarded the contract for building five sub-stations for the British Columbia Electric Railway Company in connection with its line between New Westminster and Chilliwack. The price is \$225,000, and work will start at once.

Victoria, B.C.

The B. C. Electric Railway Company, Limited, called some time ago for com-

petitive plans for a new building for their head offices there, and fourteen architects submitted plans and drawings. Of this number those filed by Mr. Griffiths have been awarded first place by the judges, and the first prize of \$500 has been given him.

Winnipeg, Man.

Contracts in connection with the power house right of way from Point du Bois to the city's power house have been awarded as follows: Wire fencing and gates to the Canadian Steel & Wire Company at \$3,348; posts to Weatherby & Ekland at \$2,298.

Miscellaneous

Brandon, Man.

The following are some of the items being considered by the Council: To consider the advisability of establishing a street railway in the city; of furnishing light for street and domestic use; of needed improvement to the city hall and opera house and the improvement of the heating system; of paving Rosser avenue and other thoroughfares.

Manitou, Man.

Tenders will be received until February 1st for \$15,500 5 per cent. 20 year local improvement debentures. Geo. T. Armstrong, clerk.

Montreal, Que.

Tenders addressed to D. Seath, secretary-treasurer, Harbor Commissioners, of Montreal, will be received until January 26th for steel hull and boiler for boom dipper dredge. Plans, etc., upon application to F. W. Cowie, chief engineer.

Recent building permits include: D. Murray, 75 Pathenais street, house containing three dwellings, \$4,500; A. Lusignan, 365 Plessis street, house containing five dwellings, \$3,500; F. L. Desaulniers, 1373 Pathenais street, house containing five dwellings, \$4,000; L. P. Damphousse, 216 Dufferin, house containing five dwellings, \$4,000; F. X. Craig, 387 Mt. Royal avenue, store and dwelling, \$5,000; Dubec & Chateauvert, 1125 Delormiere avenue, house containing three dwellings, \$4,000.

Ottawa, Ont.

The Department of Railways and Canals are calling for tenders for supply of cement required for the construction, etc., of the canals of the Dominion of Canada. Further particulars in advertisement in this issue.

Sorel, Que.

Tenders addressed to G. J. Desbarats, deputy minister of Marine and Fisheries, Ottawa, Ont., will be received until January 29th for supplying 75,000 cubic feet of round white pine timber, and also for supplying 12,500 cubic feet of round spruce timber, to be delivered at the government shipyard here. Specifications obtained from the Purchasing and Contract Agent, Marine and Fisheries Department, Ottawa.

Toronto, Ont.

It is reported that a firm of British contractors have communicated with Mayor Geary with regard to a project to widen and deepen the Welland canal. It has been referred to the Special Committee for the improvement of navigation on the St. Lawrence and Great Lakes.

Recent building permits include: Holt, Renfrew Company, alterations to store, corner of Yonge and Adelaide, \$27,000; G. H. Maynard, two storey brick store and dwelling, corner Lucas and Roncesvalles, \$4,000; K. Gladman, five detached two storey roughcast dwellings, brick fronts, corner Pape and Strathcona, \$7,000; W. Cayea,

pair semi-detached two storey brick dwellings, Howard Park, \$4,000; E. C. Fenn, pair semi-detached two storey brick dwellings, Glendale, \$10,000; W. Balmer two and a half storey brick dwelling, Stuyvesant, \$2,400; W. J. Leach two and a half storey brick dwelling, Geoffrey street, \$4,500; E. & N. Bryson, two storey brick store and dwelling, Bloor street, \$10,000; Henry E. Crawford, two storey brick dwelling, Winona, \$2,700; J. McCullough, one and a half storey brick dwelling, Altonville avenue, \$2,500; W. H. Maughan, two storey brick dwelling, near Roncesvalles, west Marian, \$2,500; T. F. Black, two and a half storey brick dwelling, Margueretta street, \$2,500; G. Jackson, Jr., two and a half storey brick dwelling, Dufferin, \$2,500.

Vancouver, B.C.

A building permit for an eight storey steel frame structure has been taken out by Miss R. Leitch Spencer, costing \$80,000. Other permits granted recently include: J. Brown, 2427 Grandville street, \$1,000; British Columbia Electric Railway Company, extension to its plant at the foot of Bernard street preparatory to the installation of its new steam auxiliary plant, \$6,000; Capt. A. Cooper, 1390 Fourteenth avenue west, \$3,500; Arthurdent Sash & Door Company, 2051 Tenth avenue west, \$1,000; W. L. Carley, 1746 Tenth avenue west, \$2,000; J. Russell, 1729 Grant street, \$4,000; A. J. Coles, 1924 Second avenue east, \$2,000; N. J. McArthur, 2295 Seventh avenue west, \$2,500; G. Tyson, 2014 Kaefer street, \$2,000; G. H. Eaton, 234 Fifteenth avenue west, \$2,300; Stevenson & Doctor, 430 Lakewood drive, \$3,000; S. Irwin, 474 Fife tenth avenue west, \$3,000; B. G. Mattress Company, frame factory, 315 Front street, \$8,000; D. A. Acorn, frame dwelling, 2504 York street, \$3,500; W. G. Hetherington, dwelling, 2735 2747 Alder street, \$11,000; F. Graham, three dwellings, Semlin drive, \$3,200; J. Brown, frame shop, 2427 Grandville street, \$3,000; A. J. Coles, dwelling, Second avenue, \$2,000.

Victoria, B.C.

Building permits have been issued recently to Henry Young & Company for alterations to premises on Government street to cost \$3,000; Iain Hyslop for a dwelling on Dunelm street of six rooms, \$21,000; and to Alex. McCrimmon for a house on Vining street, to cost \$2,500.

AWARDED.

Ashcroft, B.C.

Alex. Watson has received the contract for the construction of a high-powered and shallow-draught sternwheeler to be used next summer in the interior waterways of British Columbia, to operate between Skeena Creek and Port George for the British Columbia Express Company. Estimated cost \$40,000. It is probable that a second steamer will shortly be contracted. There is, too, talk of another steamer to be constructed here for service on the Skeena river.

The B. C. Gazette gives notice of the incorporation of the following companies: B. C. Ornamental Iron & Fence Company, Limited, capital \$10,000; Paterson Contracting Company, Limited, capital \$25,000; Port Alberni Contracting Company, Limited, capital \$10,000; Lusk's Sawmill Company, Limited, capital \$5,000; Kerschner Lumber Company, Limited, capital \$5,000; Fraser River Brick & Tile Company, Limited, capital \$50,000; Warwick Shingle Company, Limited, capital \$10,000; World Building, Limited, incorporated in United States, for nish, etc., with warehouse, capital \$20,000; Vancouver Gypsum Company, Limited, capital \$100,000.

Tenders and For Sale Department



Proposals

Tenders are wanted for approximately 8,000 k.w. of 13,000 Volt Transformers.

For information apply at once to ELECTRICAL DEPARTMENT, City Hall, Toronto, Canada. 5



Department of Railways and Canals

Dominion Canals

Notice to Dealers in Cement

Sealed tenders endorsed "Tender for Cement" will be received by the undersigned, up to 16 o'clock on FRIDAY, THE 28TH OF JANUARY, 1910, for the supply of some 140,000 barrels of Cement, more or less, required for the construction and maintenance of the various canals of the Dominion and to be delivered in such quantities, at such places and at such times as may be directed.

Dealers in cement may tender for the total quantity required, or for such portions thereof as may suit their convenience.

Specifications, forms of tender and full information can be obtained at the Department of Railways and Canals, Ottawa, on and after this date.

The Department does not bind itself to accept the lowest or any tender.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 12th January, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 4

The Simcoe Railway and Power Company, Limited, Midland, Ontario

Tenders for Hydraulic and Electrical Equipment

Sealed tenders endorsed "Tender for Hydraulic Equipment," or for other respective sections, will be received by the Secretary of the Simcoe Railway and Power Company, Limited, at the Head Office, Midland, Ontario, until February, 1st., 1910 for the following:—

For Generating Station at Big Chute, Severn River.
Hydraulic Equipment
Penstocks
Electrical Equipment

For 27 Mile Transmission Line
Wire
Insulators
Crossing Towers

For Receiving Station at Midland
Electrical Equipment

Specifications for the above may be seen at the office of the Secretary, Midland, Ontario, or at the office of Engineers, C. H. & P. H. Mitchell, Traders Bank Building Toronto, Ontario. No tender necessarily accepted.

W. FINLAYSON,
Secretary.

Midland, January 6th, 1910. 4



To Contractors

Tenders addressed to Mr. H. F. McNaughten, Secretary, Public Works Department, Parliament Buildings, Toronto, will be received at this Department until NOON OF TUESDAY, FEBRUARY 1st, for the completion of the Court-House in Kenora.

Contractors tendering are required to inspect the building, all the cement work having been done last year, and some of the stone work. A quantity of the materials is also on the ground ready for use, including stone and lumber. Contractors to allow for these in their tenders.

Plans, specifications and detail drawings can be seen at this department, and at the office of the Sheriff, Kenora.

Each tender must be accompanied by an accepted bank cheque, payable to the order of the Hon. J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tender, and the bona fide signatures and addresses of two sureties, or the name of a Guarantee Company approved by the Department, prepared to give a bond for the due fulfillment of the contract. Cheques will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance. The Department will not be bound to accept the lowest or any tender.

J. O. REAUME,
Minister of Public Works.

Department of Public Works, Ontario,
Toronto, January 12th, 1910.

Newspapers publishing this advertisement without authority will not be paid for it. 3

Situations Wanted

ARCHITECTURAL ENGINEER—Graduate C.E., wants detailing, checking, designing. Consultations, structural or bridges, 12 years American practice; thoroughly competent; best references. Box 893. CONTRACT RECORD, Toronto, Canada. 3

Situations Vacant

WANTED — Architectural Draughtsman, middle-aged, capable of supervising construction, state experience, salary expected, etc., Position to be filled at once. W. W. LA CHANCE, Architect, Saskatoon, Sask. 4

New Companies

Redington Rock Drill Company, Limited, St. Catharines, Ont., incorporated, capital \$100,000. Incorporators: R. W. Leonard, civil engineer, J. J. Mackan, accountant, and H. H. Collier, all of St. Catharines.

St. James Construction Company, Limited, Montreal, Que., incorporated, capital, \$125,000. Incorporators: C. A. Duclos, K.C., Westmount; W. L. Bond, J. J. Meagher, advocates, both of Montreal, Que.

Lafrance Improved Pipe Joints Company Limited, Montreal, Que., incorporated, capital \$50,000. Incorporators: J. Lafrance, plumbing contractor, A. Chagnon, general contractor, and L. D. Latour, real estate agent, all of Montreal.

Blair Engineering Company of Canada, Limited, Montreal, Que., incorporated, capital \$100,000. Incorporators, W. Johnson, merchant, A. LaRocque, civil engineer, both of Montreal, Que.

Eastern Electric & Development Company, Limited, Sackville, N.B., incorporated,

ed, capital \$250,000. Incorporators: C. W. Fawcett, stove manufacturer and C. Pickard, both of Sackville, and W. I. Snook, electrician, of Truro, N.S.

Blair Engineering Company of Canada, Limited, incorporated, capital \$100,000. Incorporators, W. Johnson, merchant, A. LaRocque, civil engineer, both of Montreal.

Eastern Electric & Development Company, Limited, Sackville, N.B., incorporated, capital \$250,000. Incorporators, C. Pickard and C. W. Fawcett, both of Sackville; M. G. Siddall, Port Elgin, N.B., and W. I. Snook, Truro, N.S.

New French Concrete Pavement

A recent French invention in paving consists of imbedding in concrete fine iron shavings, or iron excelsior. The metallic shavings ordinarily come in sheets or masses, which can be broken apart with difficulty owing to the intertwining of the filaments, and which are somewhat elastic. In constructing paving blocks a mold is filled with these iron shavings and the interstices filled with cement grout sufficiently fluid to penetrate the entire mass. The blocks thus formed are said to possess great strength and resistance to abrasion, and also (what seems less credible) elasticity under blows or jarring. Tests made of such blocks are said to have shown a resistance to compression of about 150,000 pounds per square inch, and a tensile strength four times that of neat cement. One advantage claimed for this paving is that joints may be almost eliminated, thus doing away with the points where greatest destruction generally occurs. Nothing is said of the opinion which would probably be entertained of this pavement by a contractor who might be required to cut a trench through it. The cost of construction is said to be the same as that of ordinary macadam; but this would depend largely upon the cost of the iron shavings.

F. F. Taylor, plumber, St. Paul, Que., is stated to have assigned.

M. Guenette, lumber merchant, Montreal, Que., is stated to have assigned.

Geo. Wright, lumber merchant, Odessa, Sask., is stated to have assigned.

Alexis Gagnon, contractor, Montreal, it is stated, has been asked to assign.

The Austin Lumber Company, Cap. St. Ignace, Quebec, is stated to be in liquidation.

The Pioneer Lumber & Implement Company, Limited, Moose Jaw, Sask., have sold out to F. J. Grobb.

The wooden pipe required for the new water works system at Vernon, B.C., was manufactured by the Dominion Wood Pipe Company, of New Westminster, B.C. This material stood the remarkable test of a 360-foot head being turned on full to a 100-foot head pipe.

The Manitoba Gazette gives notice of the incorporation of the Wood-Vallance, Limited, Winnipeg, Man., to acquire the business of Geo. G. Wood & Company. Directors include W. Vallance, G. Vallance, wholesale hardware merchants; W. A. Wood, wholesale hardware merchant, Hamilton, Ont.; D. Wood, merchant, Winnipeg.

Contract Record

ESTABLISHED 1886

In which is incorporated

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Engineering, Public Works, Tenders, Advance
Information and Municipal Progress

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Vol. 24 Toronto January 19, 1910 No. 3

Impressions from the Architects' Convention

The Ontario Association of Architects is to be congratulated upon the success which attended its 22nd annual convention held last week in Toronto. This event not only brought together some of the most earnest workers in the profession throughout the province, but also worked for an improved understanding between those engaged in the practice of architecture and those working in the allied fields of building and engineering. The harmonious relations established in this manner are, we venture to think, one of the most gratifying developments of such conventions as these. There is always a danger of confining one's efforts within too limited a sphere. A man may work conscientiously by himself and with application develop ideas and accomplish results of no mean order; but in most cases he will find guidance in the experience of others and certain advantages to be obtained by consulting with those who have a personal interest in his welfare. And as it is with the individual, so with the community. From the very nature of things the architect has much in common with the engineer, and these, in turn, with the builder and contractor.

*

Apropos of these reflections, it is noteworthy that the proposal now under consideration in Toronto to provide through the medium of a club a means for the more general co-operation of the various branches, is receiving the support of those most qualified to judge of its worth. In the course of his remarks at the annual banquet of the Association, Mr. A. W. Campbell, Deputy Minister of Public Works, came out strongly in favor of a movement instituted with the object of bringing technically trained men into closer fellowship, while Mr. C. M. Canniff, president of the Engineers'

Club of Toronto, referred to the commingling of architects and engineers in the Toronto quarters and traced a mutual disposition to "give and take" to this source. The connection between unity and strength has long been established. Isolation tends to the development of warped ideas, lack of appreciation of others and a general misunderstanding between those in whose best interests there should be a mutual desire to co-operate.

*

It has been rather unkindly observed that the subject of obtaining greater facilities for architectural education is of a perennial nature. The Ontario architects, however, are to be commended for their work in this connection, and there is every indication that before many moons the profession will be rewarded for its persistent efforts. It would seem that the time is opportune for united action with a view to interesting the Provincial Government, university authorities and the public in this question. The plans of the Ontario Association are well considered and it is possible that a movement of this kind will develop in the near future. There is every ground for hoping that before very long Toronto University, at least, will be able to offer an architectural course that will be a credit to the profession in general, and in particular to those who are giving their time and effort to the cause.

*

President Dinnis, of the Toronto Builders' Exchange, made some good points in his speech at the banquet but revived a somewhat tired subject when he touched upon the advisability of architects signing their work. The best recommendation that we have heard is that only important Government buildings, and structures of national importance, should bear a small tablet with the name of the designer. The greatest discrimination would be necessary, for it would savor too much of advertising methods if all sorts and conditions of buildings were labelled with the names and business addresses of their architects. Moreover, in some cases it might result in their obtaining fewer commissions. After all, a man is known by his works, and in most cases, if these are meritorious, he will make his reputation any way. In all probability Sir Christopher Wren did not give the matter a thought in connection with St. Paul's Cathedral. And he is not forgotten.

In proportion to its population, Canada is building more miles of railways than the United States. Canada's entire railroad mileage is now 283,000, which is one mile to every 300 inhabitants, as compared with one mile for each 381 inhabitants in the United States. In 1867, in all Canada there were just 2,278 miles of railroad track. There were constructed in 1909, and are under construction or contract nearly twice as many miles of track as there were in Canada in 1868, or 4,327 miles.

A proposition has been made to amalgamate the City Engineer's and City Architect's departments at Toronto. Both City Engineer Rust and City Architect McCallum are opposed to this suggestion. The City Engineer says he cannot see any advantage to be gained by amalgamation. Instead of cutting down the number of civic departments, he suggests that another one, an electrical department, be created, with an independent head. The City Architect says one objection to the proposed amalgamation is that the draughtsmen in one department do not understand the work of the draughtsmen in the other.

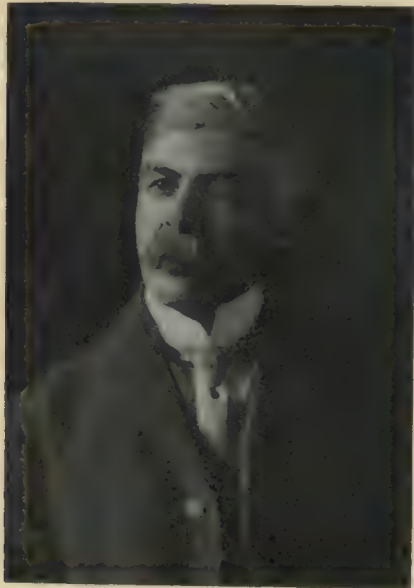
The New President of the Engineers' Club of Toronto

Mr. C. M. Canniff, who was recently elected president of the Engineers' Club of Toronto, is the eleventh to hold this position and is one of the oldest members of the institution. He was born at Belleville, Ont., on October 5th, 1866. In the following year the family moved to Toronto.

Mr. Canniff is one of the earlier graduates of the School of Practical Science—now merged in the Faculty of Applied Science of the University of Toronto—having completed his course in civil engineering in 1888. He is, in fact, the first S.P.S. man to sit in the president's chair. This may be taken as one more evidence of the influence of the institution with which Dean Galbraith and Dr. Ellis have so long been identified.

Mr. Canniff's first position was as assistant to the late Alan Macdougall, C.E., who was prominent in the organization of the Canadian Society of Civil Engineers. Later, he accompanied Mr. Macdougall to the City Hall, upon that gentleman's appointment as Assistant City Engineer for Toronto.

Upon the institution of the City Surveyor's office in 1899, Mr. Canniff succeeded to the position of chief assistant under the late Major Villiers Sankey, O.L.S., remaining until 1898, when he resigned to accept a post as engineer for the Expanded Metal & Fireproofing Company of Toronto, then just formed. Since that date he has been continuously identified with reinforced con-



Mr. C. M. Canniff, the 11th President of the Engineers' Club of Toronto.

crete construction. In 1908 he was appointed chief engineer of his company, the position he now holds.

With J. H. Chewett, B.A.Sc., C.E., in 1897, Mr. Canniff collaborated in the authorship of the "Pocket Manual of Mining," which was well received.

The incoming president has long held among his fellow-members the reputation of a humorist. Screened behind the familiar signature of "E. C. Easy, C.E.," at various social club functions, he has contributed several witty papers upon technical subjects—which even the press could appreciate.

Mr. Canniff is a member of the Canadian Society of Civil Engineers, and a life member of the Engineering Society of the University of Toronto.

Another Hobby for "Good Roads" Campbell

The accompanying photograph is a good likeness of Mr. A. W. Campbell, Deputy Minister of Public Works for Ontario, who was elected chairman of the Toronto branch of the Canadian Society of Civil Engineers at the recent annual meeting of that body. Mr. Campbell's executive ability and the special hobby which he has made of good roads, have rendered him one of the most notable figures in the Provincial Government service. He was educated in the Collegiate Institute of Wardeville and St. Thomas. In 1886 he was licensed as a surveyor and engineer. From this date until 1891 he was engaged in the general practice of his profession at St. Thomas, Ont. In the latter year he was ap-



Mr. A. W. Campbell, the new Chairman of the Toronto Branch of the Canadian Society of Civil Engineers.

pointed city engineer of St. Thomas, remaining at this post for a period of five years.

It would appear that the real discovery of "Good Roads Campbell" was made in 1896, for it was in this year that he was appointed Commissioner of Highways for the Ontario Government. Needless to say he fulfilled the duties of this office with distinction. In 1902 he was appointed Deputy Minister of Public Works for Ontario, the position he now holds. Mr. Campbell is popular, and his popularity is not confined within the precincts of the Parliament Buildings. He is intensely practical and businesslike, but at all times courteous and affable. He has a striking personality which no biographical sketch could describe. To get any adequate idea of the force of character of "Good Roads" Campbell, one must have some connection with his work and then talk with him about it.

The Ontario members of the Canadian Manufacturers' Association connected with industries pertaining to engineering are to be entertained at the 21st annual dinner of the Engineering Society at the Faculty of Applied Science of the University of Toronto, to be held on Wednesday, Jan. 18, in Convocation Hall Annex. It is interesting to note the growth of the Engineering Society since its organization. Prof. H. E. T. Haultain, C.E., was its first student president. It had then a membership of 36. Mr. W. D. Black, '09, the present president, reports an enrolment of over 600 members.

Programme for the Annual Convention of the Can. Soc. C. E.

The annual meeting for the election of officers and members of council for the year 1910, and for the transaction of business, will be held in the City Hall and in the Russell House, Ottawa, as follows :

Tuesday, 25th January

10 a.m.—Meeting in the council chamber, City Hall, for the nomination of scrutineers, receiving the report of council, reception and discussion of reports of committees, and general business of the society.

12 a.m.—His Worship, the Mayor, will welcome the society to Ottawa.

1.30 p.m.—Complimentary luncheon by the members of the Ottawa branch in the dining room of the Russell House.

3 p.m.—Continuation of business meeting for the discussion of reports, etc. It is expected that Sir Sandford Fleming and Mr. T. C. Keefer, C.M.G., past president of the society, will address this meeting.

8 p.m.—Meeting in the dining room of the Russell House. Address by the retiring president, Mr. G. A. Mountain, and other addresses.

Wednesday, 26th January

Members are invited to visit the following works and places of interest under the guidance of members of the Ottawa branch of the society. The several parties will leave the Russell House at 10 a.m. and in the afternoon at 2.30 p.m.; Ottawa Electric Power House; Mr. J. R. Booth's mills; E. B. Eddy Company mills; city waterworks; Chaudiere dam; Dominion Archives; Royal Mint; Observatory; Edinburgh mills.

8 p.m.—Members' dinner, Russell House dining room.

Thursday, 27th January

10 a.m.—Meeting in the City Hall, reception of reports of scrutineers and general business. If necessary an afternoon meeting will be held commencing at 3 p.m.

3 p.m.—(Or immediately on adjournment of the afternoon meeting of the society). Meeting of the newly elected council.

Tickets for the dinner (price \$3) may be obtained from the secretary of the Ottawa branch, Mr. S. J. Chapleau.

The annual meeting button will be honored in all parts of the Parliament Buildings, and will secure free transportation on the Ottawa Street Railway lines.

The members of the Ottawa branch who will act as guides on Wednesday will wear buttons numbered from 1 to 10 inclusive.

By the kindness of the Grand Trunk, Canadian Pacific, Intercolonial and other railways in the Eastern Passenger Association, members and their families who have paid full one way first-class fare going to the meeting in Ottawa will be returned free on presentation of a certificate signed by the ticket agent from whom the ticket has been procured at the point of commencement of the journey. The certificate is to be signed in Ottawa by the secretary of the society, and vided by a special agent of the Passenger Association who will be in attendance at the office of the secretary from 3 to 5 p.m. on Wednesday, Jan. 26th, and from 10 a.m. to 1 p.m. on Thursday, Jan. 27th. A fee of 25 cents will be charged by the Passenger Association in each case. Going tickets and standard convention certificates will be issued from 21st to 28th January inclusive, and properly validated certificates will be honored at Ottawa for the return journey up to and including 1st February.

C. H. McLeod, Secretary.

Hints on Sewer Construction in Freezing Weather

C. Chase, city engineer of Clinton, Ia., gives the following instructions to his assistants on municipal sewer work to be carried out in cold weather :

Use warm water and heated sand or gravel.

Use one pail of salt to each barrel of water in all mortar on pipe and brick sewers.

Use less water than ordinarily, and mix all mortars as dry as they can be effectively used.

Plaster only in the middle of the day and see that frost is out of the brick, and if not, take it out with water or steam jet; otherwise plaster will not stick.

Cover all joints in pipe work or masonry as fast as laid with dry earth or other material to protect from frost.

On a concrete sewer, for the bottoms use salt in water, heated gravel and only a small amount of water on cold days and tramp in place, and finish with top coat. Put such work in between hours of 10 a.m. to 12 noon, if possible.

As soon as laid, protect from weather by covering with manure or straw and placing canvas or tarpaulin over this; or when steam can be used, excellent results can be obtained by covering with tarpaulin about 18 inches above the works and turning in a small amount of steam. Do not turn on steam too strong, but just enough to keep warm. Empty bags over straw are also a help if tarpaulin is not handy.

Be sure all ice and dirt are removed before placing side walls on bottom or arch on walls, otherwise there will be no bond.

Keep stoves or salamanders going on inside of all concrete sewers.

Cold makes cement set slowly, and freezing and thawing of water in concrete before final set will ruin it.

It is much cheaper to thaw out ground with fire or steam than to pick frost.

Watch frozen banks for caving when frost goes out. It will drop all at once.

In back filling frozen ground allow 20 per cent. more shrinkage than when dry. (This does not apply to rock.)

Cover all work as fast as laid with unfrozen earth, if possible.

Back fill and clean up as close to work as possible before excavating materials freeze.

Tests for Sedimentation Tanks

Mr. A. F. McLachlin, city analyst of St. Thomas, Ont., acting under instructions from City Engineer Bell, has made the first test of the amount of purification secured by the use of the sedimentation tanks, lately built, and the result shows 82 per cent. less organic nitrogen in the effluent as it goes into the creek, compared to its entering the tanks. Other tests are to be made as to the percentage of solid matter taken out by the process, also as to whether the whole of the putrescible nitrogenous matter is removed. It is the intention of the city engineer to have continuous tests made, so as to determine the necessary time that the sewage shall be held in the tanks to give the best results. Sewage varies so much in different cities that it is only by analyzing the effluent that the best results can be determined.

The new Carnegie library building at Vancouver is practically completed.

22nd Annual Meeting of Ontario Architects

Successful Convention at Toronto—Gratifying Progress During 1909 — 23rd Annual Meeting to be Held Next September

The 22nd annual convention of the Ontario Association of Architects was held at the Association rooms, 98 King street west, Toronto, on Jan. 11th and 12th. The meeting was attended by a representative gathering. Those who signed the register were as follows: Percy E. Nobbs, Montreal; Geo. W. Gouinlock, Toronto; Wm. R. Gregg, Toronto; H. E. Moore, Toronto; Henry Sproatt, Toronto; Murray A. White, Toronto; T. Kennedy, Barrie; J. Francis Brown, Toronto; Geo. Angus, Toronto; E. L. Horwood, Ottawa; H. B. Gordon, Toronto; Edmund Burke, Toronto; C. H. Wright, Toronto; A. H. Gregg, Toronto; F. F. Saunders, Toronto; John Gemmell, Toronto; A. E. Nicholson, St. Catharines; W. L. Symons, Toronto; F. S. Baker, Toronto; W. F. Sparling, Toronto.

Tuesday, January 11th.

A meeting of council was held at one o'clock in the afternoon. The convention proper commenced at two o'clock. The president, Mr. Geo. W. Gouinlock, in his address dealt at some length with the general prosperity in the building line throughout the Province of Ontario during 1909. Reference was also made to the success of the exhibit of architectural drawings at the last National Exhibition, and to the fact that arrangements have been made for a loan exhibit next September from the Royal Institute of British Architects. Mr. Gouinlock's address will be found elsewhere in this report.

The report for 1909, submitted by the registrar, Mr. W. R. Gregg, contains the following items of interest:—

Membership—The membership of the Association is 97, of which 3 are honorary members, 49 regular members in Toronto, and 35 regular members in other places.

Council—The council has had nine meetings during the year, with an average attendance of six members.

Students—Examinations were held in April, and supplemental in October, and 17 students came up, of which five passed the first, five passed the second, and one, Mr. W. D. Chown, passed the final examination, thus becoming a member of the association.

Six students, whose standing was satisfactory in all subjects except strength of materials, in the final examination, will be allowed a supplemental examination in this subject in April, 1910.

Guild Fund—No award has been made this year from the Guild Prize Fund, which now consists of \$400 debenture and saving account balance of \$77.88.

R.I.B.A. Examinations—Messrs. W. A. Langton and J. Francis Brown represented this association in the colonial examinations of the R.I.B.A., which took place in Toronto in November. F. S. Baker, F.R.I.B.A., is the secretary for these examinations for Canada.

Reports of both the registrar and treasurer were duly confirmed. The latter showed a balance in hand of \$773.97. The receipts and expenditure during 1909 were about equal, so that the Association remains on practically the same financial basis.

Reports of the standing committees and chapters were duly read and confirmed.

The educational committee reported regular classes on Monday and Wednesday evenings under the direction of Mr. Thomas Taylor. The present enrolment is 26. The committee entered a recommendation that at the

earliest possible date the standard of entrance be raised to that of University matriculation.

After the report of the committee on affiliation with the R.I.A.C. had been received, it was moved and carried that the present special committee be reappointed for one year to carry on its work. The council of the association was authorized to take action upon the results achieved by this committee.

The reports submitted by the Ottawa and Toronto chapters indicated good progress during the past year.

In the course of the business proceedings of the day, the following resolution was passed: "The Association



Mr. A. Frank Wickson, Toronto, the New President of the Association.

shall meet at such time and place as shall be decided upon by the members at the council meeting." Considerable discussion arose in connection with this decision. A by-law of the Association provided that the annual meeting should be held upon the first Tuesday after the 10th of January, and several of the members took exception to the new ruling on the ground that it was unconstitutional. A committee was appointed to report the following day upon the advisability of holding the next convention in September at the time of the exhibition of architectural drawings. The proceedings of the first day closed with a paper entitled, "The Architectural Profession from the Outside," by Mr. I. S. Macdonald.

Annual Banquet

The annual banquet, which was held at the National Club on the evening of Tuesday, Jan. 11, was not only an interesting and enjoyable function but an event of great importance in the proceedings of the convention, since it brought into fellowship with the architects those from other spheres of activity whose co-operation is at all times to be cultivated. Those present included:

G. W. Gouinlock, A. W. Campbell, C. H. Acton Bond, John Ewan, Professor Galbraith, W. R. Gregg,

H. B. Gordon, Professor C. H. C. Wright, Professor Nobbs, John A. Pearson, Arthur Dinnis, John M. Lyle, J. P. Hynes, F. R. Heakes (Prov. Govt. Archt.), W. L. Symons, A. H. Gregg, J. Gillies, E. Burke, C. M. Canniff, John Gemmell, Thos. Henry, Laurence Munro, J. A. Mackenzie, A. E. Nicholson, A. E. Watson, H. E. Moore, H. Sproatt, E. L. Horwood, Jules Wegman, J. C. Horwood, A. J. Stringer, Gordon West, L. Vauducier, and F. F. Saunders.

The toast to the King was proposed in fitting terms by the chairman, President Gouinlock, and responded to with much enthusiasm.

"Our Legislators" was proposed by Mr. W. Symons and replied to by Mr. A. W. Campbell ("Good Roads" Campbell), Deputy Minister of Public Works. Mr. Campbell expressed himself strongly in favor of the formation of an association that would bring the various parts into closer communion: the architects who designed the structures, the surveyors who laid out the streets, the engineers who planned municipal improvements, the landscape architect and all others of technical training concerned in the erection and making of a city. The speaker dealt at some length with the work of each and showed how essential it was to have some medium for bringing them all together. These different branches should work hand in hand. Mr. Campbell was of the opinion that the proposed Engineers' Club was a move in the right direction.

The toast, "Kindred Societies," was proposed by Mr. H. E. Moore and responded to by Messrs. C. M. Canniff, president of the Engineers' Club of Toronto; John Ewan, president of the Guild of Civic Art, and C. H. Acton Bond, president of the Toronto Society of Architects.

Mr. C. M. Canniff referred to the original notice sent out in February, 1899, calling a meeting at the School of Practical Science, and from which meeting the club sprang into existence. This notice had been sent to "engineers, architects and surveyors." However successful the move to actually combine the three technical branches in one association, every one present was aware that since November, 1900, they had all been occupying the present King street quarters in perfect amity.

Results of this happy commingling had been that each body credited the other with an earnest desire to raise the level of its profession, and because by the nature of their work they were so closely related. There had always been a mutual disposition to give and take.

Meeting each other under the same roof, also, had served the agreeable purpose of permitting personal acquaintanceship, and the ordinary engineer "who didn't know an architrave from a lean-to, or a dado from a dodo," had found out that an architect was something else than a man who had at his finger ends all the big utilities and little vanities that go to make a house or a building fit to live in. The engineer had learned to know that the architect, like himself, was a human being, and to fully appreciate his personal as well as his professional worth. Mr. Canniff concluded with expressions of good-will and fraternal feeling.

The aims of the Guild of Civic Art furnished the chief point of interest in the remarks of Mr. John A. Ewan. It was hoped to educate the people of Toronto to the knowledge that the city could yet be made far more beautiful without any necessarily heavy expenditure. The speech was enlivened by touches of characteristic humor and was particularly well received.

Mr. Acton Bond expressed in appropriate terms the good feeling felt for the Association by the Toronto Society.

"Our Guests" was proposed by Professor C. H. C.

Wright, Toronto University, and responded to by Professor Nobbs, of McGill University, Dean Galbraith, of the Faculty of Applied Science; Messrs. John Lyle, E. L. Horwood, of Ottawa, and Arthur Dinnis, president of the Toronto Builders' Exchange.

After touching briefly upon the subject of architectural education, Prof. Nobbs spoke of the need for educating the public in regard to the architect and his work. The public must first be brought to regard architecture as being upon the same plane as the other professions. The first lessons to be learned were that architects must be treated properly and paid adequately. The speaker alluded to the strong position of the Quebec Association, which holds a charter empowering it to restrain anyone from practising without permission from the Association.

An interesting address was that given by Mr. John M. Lyle. The speaker referred to a recent speech of Sir Wilfrid Laurier, who advocated greater attention to the work of beautifying our cities. Mr. Lyle contended that Toronto was badly laid out, citing the approach to the City Hall as an outstanding example. The speaker thought that Sir Wilfrid Laurier might use



Professor C. H. C. Wright, of Toronto University
who was elected 1st Vice-President.

his influence to have the new cities of the Dominion planned by architects instead of engineers. The best cities of Europe and America had been laid out by the architectural profession, and this precedent should be followed by the Dominion. Mr. Lyle spoke in glowing terms of the useful work of Professor Wright at Toronto University.

The representative of the Ottawa chapter, Mr. Horwood, made a humorous speech which was well received. Mr. Horwood spoke of the work and progress of the Ottawa community.

Dean Galbraith, who was accorded an enthusiastic reception, referred to his long connection with the Association and expressed himself as being entirely in sympathy with its aims. The speaker declared that conventions such as this were particularly useful as a means of rubbing down the acerbities that are bound to arise in all spheres of endeavor. The Dean said that he considered the annual banquet about the most important item of the convention. One could read about the business end of the work in the papers but one could not so obtain the pleasure that was to be derived at such a function as this. The speaker concluded by

complimenting Prof. Nobbs upon his excellent work at McGill University.

Mr. A. Dinnis, president of the Toronto Builders' Exchange, said that he did not altogether share the general impression that architects are inclined to hold aloof from the builders. He hoped for a happier and better intercourse in the future between the two interests. They had much in common, and much might be accomplished if they met together to discuss subjects of mutual concern, such as the form of contracts, taking of tenders, and so on. Referring to the Builders' Exchange, Mr. Dinnis emphatically denied that the primary object of this institution was to afford its members facilities for meeting together to arrange prices. Probably the best work of the Exchange had been accomplished in checking the unreasonable demands of labor. At present, strong opposition was being made to the Lien Act and Workmen's Compensation Act. Under these measures both the contractor and owner would be called upon to bear the most onerous burdens and risks. Mr. Dinnis expressed himself as being in favor of having tablets on the most important buildings, bearing the names of their designers, and adduced several arguments and precedents in favor of this end.

Wednesday January 12th.

There was a good attendance on the second day, when a decision was reached affecting several matters of interest.

At the morning session, which was devoted to the business of the convention, it was decided to hold the next annual meeting in September, at a date to be decided later by the council of the Association. The statistical and business year will end on July 31st.

Considerable discussion developed in connection with the following motion: "Resolved that the council of 1910 be instructed to procure, if possible, from the Ontario Legislature, amendments to the Act respecting the Profession of Architects, eliminating the title 'Registered Architect,' and substituting for it 'Member of the Ontario Association of Architects,' and eliminating the title 'Registrar,' and substituting for it 'Secretary.'"

At first this resolution was passed, but owing to the feeling of the Ottawa chapter it was subsequently re-opened. The arrangement reached finally was that the council should take a plebiscite of the members of the Association throughout the province.

Mr. Sproatt presented a report compiled by three members each of the Association and of the Toronto Society of Architects, in which it was recommended that the University be asked to provide better facilities for architectural education. A curriculum was suggested. This report was adopted in practically the form submitted and the committee empowered to continue its work.

A recommendation was passed that members of the Association receive only students who have attained the matriculation standard.

An interesting discussion ensued in connection with the subject of education. The general feeling of the convention was with Prof. Nobbs, of McGill University, who contended that a graduate of the Faculty of Architecture should not be turned loose upon the public upon the expiration of his course, but be compelled to serve two or three years in an architect's office.

The next item on the agenda was an exceptionally interesting paper, entitled "Architectural Education in Canada," read by Prof. Nobbs. This paper will be published in the next issue of the "Contract Record." Afterwards, an interesting paper, entitled, "Architec-

ture and its Relation to Art," was read by Mr. John M. Lyle, Toronto. (See another column).

The election of new members of council resulted in favor of Mr. A. E. Nicholson, St. Catharines, Ont.; Mr. Jules F. Wegman and Professor C. H. C. Wright, Toronto. The other members of the council are Messrs. H. Sproatt, J. F. Brown, M. A. White, J. A. Ewart, G. Helliwell and A. Frank Wickson. The new council at once held a meeting and elected the following officers: President, Mr. A. Frank Wickson; First Vice-President, Professor C. H. C. Wright; Second Vice-President, Mr. Henry Sproatt; Treasurer, Mr. Grant Helliwell.

General regret was expressed when the registrar, Mr. W. R. Gregg, who has rendered most efficient service in this capacity for ten years, announced his resignation to the council. At the time of going to press no election had been made.

PRESIDENT'S ADDRESS

By Mr. Geo. W. Gounlock, at the opening session on Tuesday January 10th.

It is my privilege to voice the welcome which the council and Toronto members of the Ontario Association of Architects cordially extend to the members generally at this, the 22nd annual convention of the Association.

These meetings give us almost the only opportunities we are accorded of coming into personal relations with any but our local members, and the yearly communion with our professional brethren from other cities and localities must tend to widen our horizon, broaden our sympathies, and deepen our appreciation of, and desire for, the less material but to speak.

We may congratulate ourselves upon the unusually prosperous year in building operations which has just closed (the most successful in the history of architecture in Ontario), and we can look, I believe, with cheerful confidence to a continuance of that prosperity during the present year, and, we hope, for many successive years.

Our country is developing with astounding rapidity its material resources, is extending its manufacturing and commercial interests day by day—but, best of all, an intelligent appreciation of, and desire for, the less material but none the less essential, facets of our complex civilization is steadily growing, the beautiful, the graceful, the true—and while buildings are demanded that shall fit defined uses of unending variety, it is required with more and more insistence that they shall also adorn the localities in which they are erected—that while a building shall be built to last, it shall also be the poet's definition of durability, "a thing of beauty."

But while we of the present generation of architects may be justly proud in our modest way, of our own efforts in the noble art we profess, we are not unmindful of the limitation which circumstances have placed upon our powers, and we have sufficient disinterested regard for the profession to desire the removal of some, at least, of these disabilities from the path of our successors.

In various ways we have endeavored to afford our students means of improving their knowledge and of broadening their outlook, by holding classes of instruction in planning, designing and construction, offering prizes and conducting examinations.

Last year an exhibit of architectural drawings and designs was held at the Canadian National Exhibition, which proved distinctly interesting and educative. Arrangements have been made for a loan exhibit from the Royal Institute of British Architects at the Canadian National Exhibition in September of this year. The large room in the Applied Arts Building will be used exclusively for this exhibit, which we hope will include numerous examples from our Canadian architects. On this account the council decided to have no

exhibit at this convention. We hope to have each year some exhibit of the kind at the Canadian National Exhibition, which cannot fail to have a distinctly educative effect upon all of us, but especially upon the more impressionable minds of the students.

The question of higher education for our students has been very earnestly discussed among us, and the Ontario Government has been asked to assist us in establishing a certain standard to which it shall be necessary for persons to attain before entering upon the study of architecture as a profession. The safety of the public demands trustworthy and scientific building construction in all its varied ramifications. Its requirements and moral fall-being necessitate well planned and tastefully designed buildings. But the profession should further ask a degree of culture and general knowledge, a sense of honor, a regard for ethics that would seem to be best secured by a university education.

To attain this we should require that the student should enter an architectural course at a university before obtaining admittance to the office of any member of this association.

It is to be regretted that up to the present the University of Toronto has been unable to see its way to establishing a chair of architecture, for such a chair, combined with a course in arts, would undoubtedly promote the best interests of our profession.

There is a joint committee of our Association and the Toronto Society of Architects, appointed to formulate a scheme for the higher education of architectural students, and you will no doubt receive a report from that committee during this meeting.

There have been various charges made with regard to the safety of Toronto Public School buildings, and while we have appreciated as a body of architects for some time the fact that Toronto school buildings, in the matter of architectural design, have been inferior to almost every other type or class of buildings it is customary to erect in Toronto, the question of safety of the school children is one which has never been widely discussed by us as an architectural body. We owe it to ourselves as well as the public at large to make an investigation into just what protection is really afforded the children in our schools, and a committee of our Association has been appointed with this object in view.

In October last we had the pleasure of granting the use of our rooms to the Royal Institute of Canada, in which to hold their second annual assembly, the Toronto chapter of our Association inviting the assembly to lunch both days of their meeting. A committee of our Association was appointed to confer with the Royal Institute to discuss the subject of affiliating with the latter body. A report from that committee will be submitted to you during this meeting.

I am proud to say that our Association is progressing splendidly and will eventually, I am sure, succeed in attaining its main object, that is, the elevation of the profession to the plane which it properly deserves, by the educating of the student and the awakening of public interest.

I regret that the members of our Association in the cities of Hamilton and London have not yet formed local chapters, for I feel certain such chapters do promote the best of good feeling and fellowship among their members, as well as strengthen the Association as a whole.

I feel that the past year has developed an excellent spirit among the members of our profession, no doubt due greatly to the social intercourse we enjoy through the local chapter.

In conclusion, gentlemen, I must thank you again for the honor you did me in electing me your president for the past year. The members of the council have been very assiduous in their attention to the duties devolving upon them, and have given fully of their time and thought to the Association's welfare.

ARCHITECTURE AND ITS RELATION TO ART

Read by Mr. John M. Lyle, on Wednesday, January 12th

The title of this paper is somewhat misleading, for architecture is a fine art—the greatest of all, a combination of many arts.

The first question that naturally arises in one's mind is, What is architecture? There are many definitions to be found in the different text books available, but none of them quite explain the complex combination that is called to mind by the word "architecture." "Architecture is the art of expressing in concrete form the structural needs and decorative ideals of man."

The late M. Paul Blondel, one of France's most distinguished architects, in speaking of architecture described her as a jealous mistress, who yielded her favors but rarely, and then only after the most earnest and persistent endeavors on the part of her devotees—the architects.

As I am addressing a meeting of architects, it occurred to me that it might be more profitable to us all, if we were to consider not only architecture as an art—a study necessarily in the abstract—but architecture, the art, which concerns us in our daily practice.

In Canada, we find a deplorable ignorance as to what architecture is; a deplorable lack of consideration for the architect; a deplorable lack of taste. In short, we have to contend with the ideals of a new country, absorbed in the development of its industrial resources, and not at yet ready to listen to the importuning of Venus.

It is our duty as architects to educate public opinion to a better understanding of what architecture really is. We ought to have a chair of architecture in every university in Canada, where architecture could be studied as a fine art.

We ought to urge upon the Government the necessity of having our new cities—and our old ones, too—planned and re-planned by architects and not by engineers. In my humble opinion, engineers have been the curse of Canadian and American city planning. Their laying out of our streets, avenues and squares has been stupid in the extreme, and without any consideration of the aesthetic side or of the practical. The plans of our cities are almost criminal in their stupidity, and, worst of all, is the fact that the engineers are still "on the job."

We ought to arrange lectures, illustrated with lantern slides, which would stimulate public interest in the study of architecture as a fine art. For instance, there are many men and women now taking an interest in furniture, and in decoration, as applied to the home. A series of lectures could be arranged covering the different styles of interior decoration. Once create an interest in the decorative side of architecture, and you have the kernel of a growth, that in its ramifications opens up unlimited possibilities.

We ought, by our example in the office, to inspire our draughtsmen, the contractors and our clients with the idea that there is more in architecture than the mere erection of a structure to shelter their heads, and to give them the necessary accommodation for their daily wants. Then the mason, the bricklayer, the carpenter, the plasterer, all should be encouraged to live up to the highest possible standard of excellence in their work.

I am quite aware that it is absolutely impossible in modern practice to obtain ideal conditions in the execution of work in Canada. On the other hand, it is certainly our duty, as architects, to raise the standard of execution by every legitimate means in our power. If I might be allowed to suggest one method of raising the standard along certain lines, it would be that the architect spend more time in studying his drawings, and also in making more complete 3/4-inch and full size details for the contractors' use. Contrasted with the best French and American practice, with which I am familiar, I might say that there is no comparison in the number of drawings and attention paid to studying

of details in the practice of these countries and that of Canada.

We might introduce "quantity surveying" into Canadian architectural life. We often find that there is the greatest variance in prices submitted by different contractors. Time and again we are obliged to accept the lowest tender, with the result that the contractor finds out, possibly, that he has made a mistake in his quantities; consequently he is forced either to accept a loss, or to skimp his work in order to come out even. Would it not be much better to have the English idea of quantity surveying adopted in this country? It seems to me that the introduction of this system would materially aid in uplifting architecture "as a fine art."

We ought to educate the public to the fact that it is necessary to have plenty of time for the erection of our buildings, and that speed is not the only consideration. Structures are run up here or "slapped" up at break-neck speed—the result being that woodwork is put on top of wet plaster, and everything is rushed forward pell-mell. How often we hear people say that the only way to get workmen out of a house is to move in! Would it not be well for the architects to explain to their clients the great necessity in building operations of making haste slowly? We certainly can do some missionary work along these lines to the decided advantage of architecture as a fine art.

Surely we architects have in Canada to-day great responsibilities and great opportunities. It rests very largely with ourselves what the architecture of the future in Canada is to be. Let us unite in trying to further the study of architecture as a fine art; let us by our efforts aim to uplift the architectural ideals of to-day. Surely such ambition is worthy of our united efforts from a purely patriotic point of view—aside entirely from any actual benefits that may accrue to us individually. It seems to me that at this stage of Canada's development we are, more or less, pioneers in our own particular field. In the past there have not been many trained architects in Canada. The unlimited wealth and the great buildings which are sure to be erected in the future ought to inspire us to more determined efforts to upbuild our profession, and to place Architecture where she belongs—at the head of all the arts.

Proportion of Rooms

Speaking on the subject of proportion of rooms, with reference to their sanitary features, a modern writer says: "For purposes of ventilation the height must bear some relation to the size. Adequate movement in the currents of air cannot be secured in a room unless the height be proportioned to the width and length. The minimum height must be fixed with reference to that which will allow the currents of air to circulate without being inconvenient to the occupants. Therefore, in proportion as the width and length of a room are increased so must the height be increased. On this account it is not advisable to make rooms much less than 10 feet high. With large rooms, as the height should be increased in proportion to the size, if the cubic space be the measure of the number of occupants, the area of floor space per occupant would diminish with the size of the room. As, therefore, the height of rooms is necessarily variable, it follows that it is rather the floor space which must be considered in allotting accommodation to the occupants of a room than the cubic space. In barracks, a floor space of from 50 to 60, and occasionally 80, square feet is allowed per occupant. These are for rooms occupied by day as well as for sleeping-rooms. In workhouses, for dormitories, a minimum floor space of 25 square feet has been admitted, provided the ventilation was carefully attended to. In nurseries and servants' rooms, from 50 to 60 square

feet are desirable per occupant—that is to say, a room 10 feet square, or 10 feet by 12 feet in area, should not contain more than two persons. In school rooms which are only occupied during parts of a day, and where the air can be changed between the periods of occupation, a less amount would suffice, and from 15 to 20 square feet are sufficient."

The Last Word in Elevators

The Parkin Elevator Company, Limited, of Hespeler, Ont., are to be congratulated upon the result of a test which was recently made in connection with one of their high speed direct connected electric passenger elevators installed in the new building of F. J. Castle Company, Limited, wholesale grocers, Ottawa. This test was made in the presence of Messrs. Chamberlin & Gardiner and their expert, one of the leading electricians of Ottawa. The various safety devices with which this installation is equipped were shown to be perfectly capable of providing adequate protection in case of accident. Automatic limit stops and slack cable devices worked with perfect satisfaction, as did also the speed governor and compression safety device. The car was brought to an easy and complete stop in about a six-foot drop, the current being disconnected and the winding gear stopped. Within a period of 90 seconds the safety was released, power connected and the car again in operation. Mr. L. B. Fradenburgh, one of the company's experts, was in charge of this installation. Mr. D. J. MacKenzie, secretary of the Builders' Exchange at Ottawa, is local agent for that city.

News and Notes

City Engineer Rusts reports that a profit of \$100,000 has been made during the past three years by laying pavements on the local improvement plan.

Prof. Haultain gave an interesting address last week before the Engineers' Club of Toronto, on "The Relationship of the Mining to the Civil Engineer." President Canniff was in the chair.

Mr. J. Chalmers, Provincial Government Engineer for Alberta, will read a paper entitled "Steel Railway and Highway Bridges of Alberta," before the Engineering Society of Edmonton on Jan. 20th.

The Ottawa Builders' Exchange held an enjoyable euchre contest and smoker in their rooms at 201 Sparks street last week. The attendance numbered about 40. Mr. H. Robillard and Mr. D. J. Driscoll were the prize winners.

The following officers were elected at the annual meeting of the Toronto branch of the Canadian Society of Civil Engineers: Chairman, Mr. A. W. Campbell, Deputy Minister of Public Works, Ontario; Secretary-Treasurer, Mr. Peter Gillespie, lecturer in applied science, Toronto University; Councillors, Mr. T. S. Scott, assistant city engineer, Mr. T. C. Irving, Jr., Mr. O. W. Smith, Mr. N. H. McLeod, and Mr. A. W. Connor.

Mr. M. J. Butler, Deputy Minister and Chief Engineer of the Department of Railways and Canals, has resigned in order to become general manager and 2nd vice-president of the Dominion Iron & Steel, and Dominion Coal Companies. It is understood that Mr. Butler's present salary of \$8,000 a year will be more than trebled in the new position. Mr. Butler's technical training as an engineer and his executive ability have enabled him to fulfil his various duties with distinctness, and the loss will be a serious one for the Government.

Methods and Cost of Concrete Sewer Work

Relative Merits of Monolithic and Concrete Pipe—Former generally cheaper, latter advantageous in special cases cited herein

By FRED R. CHARLES, City Engineer, Richmond, Ind.*

For the past three years we have been using concrete to a large extent in sewer work. Our experience includes the use of concrete pipe, non-reinforced and reinforced both with rods and bands, and with expanded metal, and of monolithic sewers, built in trenches of different natures, rock, earth, quick sand, running water, etc., and employing various methods of reinforcement, such as plain, twisted, and lug bars, expanded metal, and Kahn rib metal.

Our reason for adopting concrete so largely is the fact that vitrified pipe, of course, is not made in such large sizes, and the cost of the largest sizes made is almost prohibitive, and that sewer brick is expensive here, and bricklayers who can do sewer work are scarce and high-priced. We have excellent material for concrete right at hand, which costs 75 to 80 cents per cubic yard delivered on the ground, while cement costs \$1.25 to \$1.55 per barrel, so we are enabled to obtain excellent results much cheaper than with brick or vitrified pipe, after we get above 24 inches diameter. Below that size, vitrified pipe is preferable with us.

Our first concrete job was with reinforced concrete pipe, 36 inches, 30 inches, and 24 inches, in diameter, and reinforced according to the practice of the company at that time with longitudinal strips and circumferential bands of iron. It cost our contractor delivered, per lineal foot. 24 inches, \$1.10; 30 inches, \$1.90; 36 inches, \$2.30.

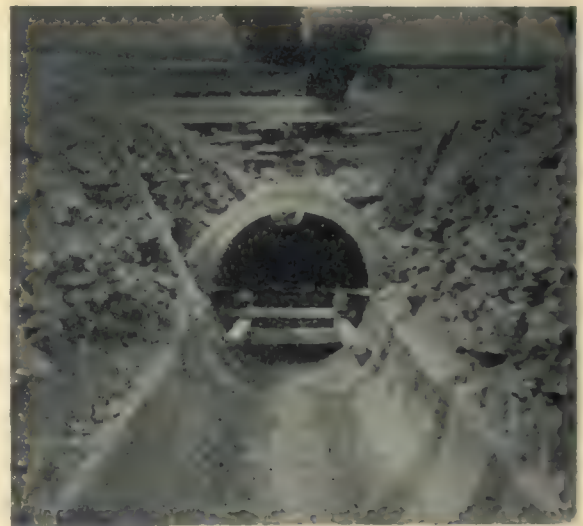
Right here I want to emphasize the fact, that in order to secure good results in sewer work, even more care than in other concrete work must be exercised in all the processes. Good aggregate material must be secured; good cement and enough of it must be used; mixing and placing well and thoroughly done, and all details carefully superintended. But this, our first job, still appears alright, although in a street with only 2 to 3 feet cover in places, and has sustained the passing and repassing of a street roller, weighing 18 tons, in macadamizing the roadwaay. Shell thickness of this pipe is for 24 inches diameter, $2\frac{1}{2}$ inches; 30 inches diameter, $3\frac{1}{2}$ inches; 36 inches diameter, 4 inches.

The next season we built several miles, employing both concrete pipe and monolithic construction, in sizes 54 inches, 48 inches, 42 inches, 36 inches, 30 inches, 24 inches, and 20 inches. The 20 inch pipe was not reinforced, and our experience was not satisfactory; however, in my opinion, owing largely to carelessness in making and seasoning, which was done in the heat of summer without affording protection from the sun, or sufficient sprinkling. But in that size I would prefer a vitrified pipe to a nonreinforced concrete.

Forty-two-inch was the largest size we used in concrete pipe. This was made according to the "Sheets" system, in which expanded metal is used for reinforcement; thickness of shell is $11\frac{1}{2}$ inches per foot diameter; 24-inch pipe made in $2\frac{1}{2}$ -foot, and larger sizes in 3 foot lengths. Pipe is made in a mold consisting of an outer steel casing and an inner collapsible shell.

The pipe rests on the end upon a pallet, and each end is formed by a shaping ring, so that it is notched or rabbeted through half the thickness of the shell, on the outside for one half the circumference. The pipes are laid so as to form a groove at the joint, coming on the interior for the lower half and on the interior of the upper half, whereby the mortar is always plastered downward in cementing the joint. For handling and placing in the trench a tripod or beam derrick is needed with a block and tackle or chain hoist, as the weight is considerable. Our average cost to lay these pipes, including plastering the joints, was for 42 inches, \$0.088; 30 inches, \$0.06; 24 inches, \$0.058 per lineal foot.

Our first monolithic work was on a sewer 48 inches in diameter, all in rock and about 18 feet deep. Being new in the business, the design was probably stronger than necessary. Thickness of shell is 6 inches, rein-



View of Monolithic Concrete Sewer.

forced with $\frac{1}{2}$ inch longitudinal and circumferential rods, the latter being in two portions, bent to the required radius, and long enough to give a good lap at the spring line. The trench was first shaped to the outside of the sewer, allowing proper thickness for the shell. Then the concrete for the flow line was laid, in a strip about 2 feet wide, between rails as in sidewalk work, the proper radius being given by a straight edge drawn over templates. In the side rail notches were cut the required distance apart to hold the reinforcing rings, to which latter the longitudinal rods were fastened by wiring.

We used plain rods, twisted rods and lug bars. Our experience showed that the lug bars were the best of the three, as they were easier maintained in position. But this method of reinforcement, although affording ample strength, was tedious to place and hard to keep placed, and after thoroughly trying it, a change was made to expanded metal, which speedily proved itself

much superior in these respects. This was made in two sheets, one 3 inches mesh, No. 10 standard for the lower half of the sewer, and the other 3-inch mesh, No. 10, plus 50 per cent., for the upper half, both bent to the required radius, and long enough to afford plenty of lap at the spring line. For this portion, collapsible semi-circular forms were used. The method of operation was as follows: The trench having been shaped as nearly as possible to fit the outside of the sewer barrel, the concrete flow line was placed, without using any side rails, and brought up to two inches below the grade line; then the sheet of expanded metal placed thereon, and the concrete brought up to the grade line, the proper shape and grade being given by cutting off with a straight edge, resting on heavy blocks, cut to the required radius and placed about 16 feet apart, or the length of a convenient straight edge. After the concrete had set sufficiently, usually the next day, the lower semicircular form was pulled ahead onto the next section of flow the spring line, and the walls of the trench forming the outside casing of the concrete. When this was set, the the form was pulled ahead onto the next section of flow line, and the upper forms placed; the sheet of reinforcing metal bent to the right radius, and put around the form, being kept two inches inside the concrete by a



Sections showing forms of reinforcement on solid bottoms.

piece of brick two inches thick, resting on the form. These forms were five feet long and were coupled ten together, making 50 feet in length. After the work had progressed enough so that things became systematized, the usual schedule for the day was as follows: (1) Releasing forms from the invert constructed the day before and placing them on the flow line laid the day before; (2) releasing arch forms and pulling ahead on to the invert; (3) concreting the arch; (4) concreting the invert in the section ahead; (5) concreting 50 feet of flow line ahead for the next day. On another sewer, 40 inches and 42 inches in diameter, full circle forms were employed. The full circle type possesses the advantage of being moved with fewer operations, and the concrete can be filled all round the circumference to the flow line at one time.

Another sewer, 54 inches in diameter, was built in horse-shoe shape, semi-circular arch, vertical sides and bottom slightly V shaped. It was in an open ditch or water course, so nearly all except the flow line was above ground, and outside forms were necessary, in concrete. First the bottom was laid as in sidewalks and the vertical sides, run up to the spring line with ordinary plank inner and outer forms, the expanded metal reinforcement having been bent and placed as before, with plenty of lap at the spring line. The arch was put on with a semi-circular form. On these monolithic jobs the average labor hours per lineal foot for the different operations for constructing the sewer, using "Blaw" forms and expanded metal, reinforcement is given in the following table. Knowing the wages paid labor per

hour and the price of materials, this will be some guide to the cost in other places:

	Labor hours per lin. ft.
Placing flow line	0.48
Setting invert forms	0.50
Concreting invert	0.44
Setting arch forms	0.33
Concreting arch	0.25

This past season we have just completed another system, using 54 inch, 48 inch, 42 inch and 36 inch concrete and vitrified pipe for smaller sizes. Profiting by our past experience, we made some changes in the design. It was considered that the thickness of the shell might safely be reduced, and that the bottom reinforcement was not necessary in trenches with solid foundation. Kahn rib metal was employed for reinforcing and gave good satisfaction. It is easier to handle than expanded metal, and owing to the shape and size of the spaces between the ribs, sufficient room is given to put in a stick or tamp to settle or jostle the concrete around the forms, which is very important in order to avoid air spaces and force the cement to the surface to make a smooth and tight job. For 54-inch sewer the sheet of metal is 10 feet long, 45 inches wide, No. 5 gauge, bent to the required radius at the mill. To hold the metal in proper position strips of wood were inserted between it and the form, and withdrawn as the concrete was deposited. Forms for this work were the "special centres," 6 feet long, and 6 sections were used, which make 35 feet of sewer, allowing for the necessary lap. These forms are especially well adapted to large sewer work, owing to the accessibility of all the parts, which renders them easy and inexpensive to handle. They are made of sheet steel with steel ribs on the inside at each end. These ribs are collapsed by especially made "collapsers"; forms then set in place, with the gauge wire, which gives the required circumference, on the outside of the forms, then the "collapsers" are released, permitting the ribs to spring out; then rods with turnbuckles inserted and turned until the gauge wire is tight. The time to move and set up the forms was naturally reduced with practice; at first it took about 13 labor hours, four men working 3 1/4 hours. Later, becoming more expert, they did it in 2 1/2 hours. This includes release of forms, moving to the section ahead, anchoring, and placing of reinforcement ready for concrete, providing for 35 feet of sewer. The ordinary programme for a day's work was as follows: (1) Releasing and setting up forms on the flow line prepared the preceding day, which, as shown above, took till about 9 o'clock; (2) concreting the circle, which was usually finished by noon or shortly after, when machine mixed; (3) concreting the flow line ahead for the next day's work, taking about half an hour. Both hand and machine mixing were tried. The former required seven men, excluding superintendence, and for 35 feet of 54-inch sewer about 50 labor hours sufficed. The mixing boards were right alongside the trench, and concrete shovelled directly to place. In machine mixing, although more men were required at one time, the total of labor hours was less, amounting to an average of 40, against 50 for the hand method, and also saving superintendence for that time. Ordinarily, 12 men composed the gang, including four or five wheelers, three or four shovellers, one to help dump wheel barrows, one to remove spacing sticks from reinforcement and retain it in position, and one to receive the concrete, tamp or jostle it to place, and spread it to approximate thickness over the arch, and lastly a finisher who scrapes down the high spots

and fills up the low ones, and finally smoothes over the surface with the back of a flat, square pointed shovel, thus filling all voids and giving a very good looking appearance. This man becomes very expert in gauging the proper thickness. For the lower half of the sewer the concrete should be very wet, so that it will flow freely around and under the forms; for the arch not so much water must be used; only enough to show quite perceptibly when concrete is tamped, as the concrete must have sufficient consistency to retain its position and not run off the arch; for the flow line the proper consistency is between the two. At first, house connections were provided for by building in ordinary vitrified slants or thimbles, but the flanges of these were frequently broken by falling rock and otherwise, so a change was made and an opening left in the concrete shell by means of a special form or core, devised by the inspector on the work. This comprised two circular blocks of hardwood, nailed together; one eight inches in diameter and two inches thick, the other six inches in diameter and three inches thick. Inserted in the concrete this left a good flange to receive the end of the 6-inch house connection pipe, and was extremely inexpensive, two of these blocks lasting for the whole season. The average cost of this work was as follows:

For 54-inch sewer, 5-inch shell, rib metal 10 feet:

	Per. lin. ft.
Cement, 0.347 bbl at \$1.25	\$0.434
Gravel at \$0.80	0.260
Rib metal	0.30
Forms (cost of)	0.125
Labor, 20 cents per hour	0.230

Total cost, exclusive of machine and superintendence \$1.349

For 48-inch sewer, 5-inch shell, rib metal 9 feet:

Cement, 0.29 bbl. at \$1.25	\$0.362
Gravel at \$0.80	0.170
Rib metal	0.25
Forms	0.115
Labor, 20 cents per hour	0.186

Total cost, exclusive of machine and superintendence \$1.083

For 42-inch sewer, 4-inch shell, rib metal 8 feet:

Cement, 0.20 bbl. at \$1.25	\$0.25
Gravel at \$0.80	0.118
Rib metal ..	0.24
Forms	0.115
Labor at 20 cents per hour	0.188

Total cost, exclusive of machine and superintendence \$0.911

All these different procedures have given an excellent opportunity of judging the relative merits of monolithic and concrete pipe. In ordinary cases the monolithic is undoubtedly the cheaper, and in workmanship and durability can be made first class. Probably it can be made more nearly water tight than the joints of the pipe. Tamping under the lower quarters of the pipe is necessary, but is difficult to do, and evidently can not be as solid as the monolithic with the concrete built right against the bank. Monolithic requires a less width of trench, as the cutting is made the exact dimension, while the pipe needs a ditch several inches wider, in order to enable the tamping to be done under and around it. On the other hand, the monolithic requires the laying of a subdrain tile to carry the water underneath the work. This was done on all our sewers. An ordinary 6-inch soft drain tile laid in the bottom of the trench carried the water away without any trouble, in most cases, and abundantly justified its cost. But when ex-

ceedingly treacherous soil is encountered or if it is necessary to do the backfilling immediately, the concrete pipe would be the more advantageous. Also the latter can be made on the bank or elsewhere in more favorable conditions and under better and more careful superintendence, whereby better work could be obtained. There is doubtless a field of usefulness for both methods, and the local conditions must determine the better.

Alderman Pocock of London, Ont.

The directors of the Forest City made a wise choice when they conferred aldermanic honors upon Mr. Henry Pocock, president and manager of the London Concrete Machinery Company, London, Ont. This gentleman has marked ability and a reputation for thoroughness, a particularly desirable quality in one concerned with civic administration; moreover, the experience gained in the tenure of such a responsible business charge as his is a valuable asset in the work of an alderman. Mr. Pocock is well posted in both the practical and theoretic-



Mr. Henry Pocock, President of the London Concrete Machinery Company, Limited, who was recently elected to serve on the aldermanic board at London, Ont.

cal ends of the business with which he is connected, which is expanding rapidly under his supervision. Of the new committees which have been formed, Mr. Pocock has been appointed to the Board of Works, Western Fair Board and Manufacturer's and Reception Committees.

At the annual meeting of the Montreal Builders' Exchange, held last week, the following officers were elected for the current year: President, J. N. Arcand (re-elected); Vice-President, James Ballantyne; Directors, carpenters, F. Pauze; general contractor, E. G. N. Cape, lumber and mill supplies, Wm. Rutherford; granite and marble, Jos. Brunet; reinforced concrete and cement, A. D. Church; master painters, W. T. Castle; master plumbers, J. W. Hughes; master roofers, Thos. Gilday; electrical supplies, E. W. Sayer; contractors' supplies, Alex. Bremner; stone and cement, T. A. Morrison.

Home of Excellence in Plate Glass Goods

Description of the Up-to-date Works of the Toronto Plate Glass Importing Company, Toronto, and Brief Outline of the Methods Employed Therein

In these days it is most essential for everyone engaged in building and allied work to keep closely in touch with the developments of the various industries connected with his field. It is a matter of primary importance for all concerned that each one should have more than a superficial acquaintance with the materials of construction and finish which he is called upon to specify or employ in his particular sphere. The architect especially will be well advised to avail himself of every opportunity to improve his knowledge in this regard. For, with the exception perhaps of the design itself, nothing is of greater importance to the client than a judicious selection of the best and most durable materials which are to be obtained at the lowest price consistent with good, reliable workmanship. Such thoughts as these are borne upon one with peculiar significance after a visit to such an industry as that conducted by the Toronto Plate Glass Importing Company, Toronto. The excellent work which has at all times issued from this company's plant and the policy of improvement followed by the directors have won for the concern a reputation which is regarded by the company as one of its greatest assets.

Upon a visit to the offices and works last week, the "Contract Record" was very kindly received by the management and conducted over the plant. The works, warehouses and offices are extensive, but compact and easily reached. They are situated on the Don Roadway, near the Queen street east bridge, over the Don river, ten minutes by street car from the corner of Yonge and



Unloading Large Case of Plate Glass.

King streets, the centre of the city. The company claims that its plant is the best organized and equipped of its kind in Canada and we are credibly informed that it is not surpassed, if equalled, by the works of the United States companies. Indeed, the fame of the Toronto concern has extended to many parts of the States, proof of which has been furnished by the visits of leading American glass workers in the interests of their business.

The business is managed by Messrs. Edwin Hill and Samuel J. Rutherford. The works and machinery were planned and constructed under the immediate personal supervision of the former. The business details of the concern are ably supervised by the latter gentleman. Mr. Hill came to this country from Birmingham, Eng., in February, 1886, having acquired a thorough knowledge of his business in the old country. Mr. Rutherford has been associated with him in the enterprise practically the whole time.

The factory, exclusive of the bending works, covers an area 292 by 123 feet. It is thoroughly equipped with all modern appliances for heating and fire protection.

Our attention was attracted by the great ease with which large cases of plate were handled by means of a travelling overhead crane, extending over to the road. By means of this crane, a heavy case of glass is lifted from the wagon and deposited in the warehouse, wherever desired, without further handling. It is then unpacked and stored in spacious racks. Some of these are as large as 20 feet 6 inches high by 13 to 14 feet long.



Racks for Storing Large Sizes of Plate Glass.



Power House and Machine Fitting Shop.



Lifting a Large Plate of Glass on to the Up-Turned Table.



Examining and Cutting very Large Plates of Glass.



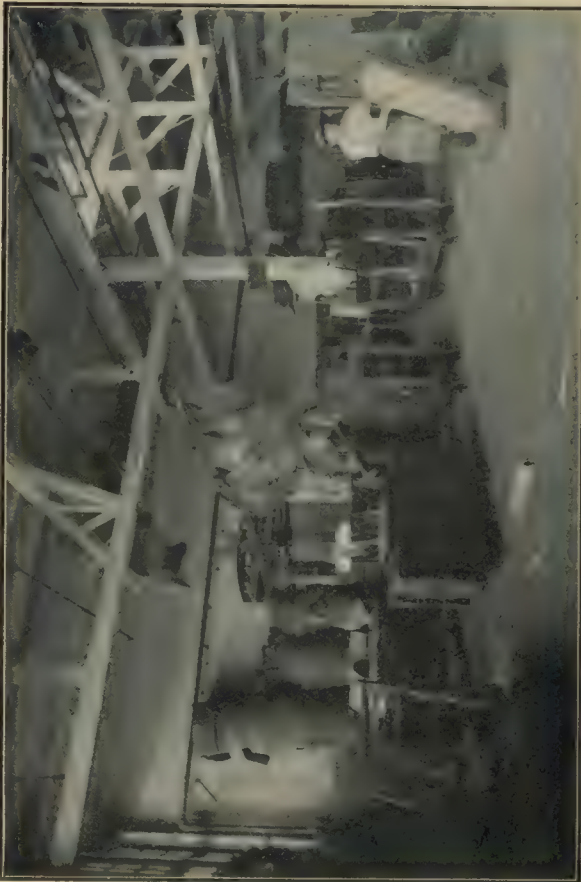
Racks for Storing Medium Size Plate Glass.



Bevelling Edges of Looking Glass Plates.



Polishing Machines Driven by Power from Below.



Cutting Fancy Edge Plates for Looking Glasses.



Handling and Bevelling Larger Glass for Show Cases, Etc.

and are able to accommodate all sizes that may be in demand.

We cannot show all the exceptional facilities for handling and cutting plate glass, but attention is directed to the three illustrations showing where plate glass of medium store sizes are kept in stock; the lifting of a plate of glass nearly 14 feet long by 9 feet high on to the upturned table — quite a hazardous undertaking — and the cutting and examining of these large plates. Particular attention is given to the satisfactory fulfilment of every detail, and to this is partly attributable the excellent quality of production for which this firm is noted all over Canada.

After passing through a large area devoted to the storage of thousands of boxes of every kind of glass known to the trade, one enters the power room, where the power required in the operation of the plant is develop-



Silver Plating Looking Glasses.



Applying the Preservative after Silver Plating Looking Glasses.

ed by a large duplex cylinder engine. Adjoining this is the machinists' shop, well equipped with all necessary lathes, drilling machines and so on. It is here that all the company's machinery is made and repaired.

Special interest is attached to the photos showing respectively the cutting of plate glass to fancy shaped edges, before being passed on to the bevelling shop; the bevelling shop, where looking glass plates are bevelled, and also the larger plates for glass counters, "Silent Salesmen" show cases, and other requirements; also a row of eight spacious polishing machines for putting the final lustre on the surface of the plate glass, so important before it is silver-plated and ready for the customer. Other photos show the method employed in silver-plating looking glasses and coating the plating with a suitable preservative and the as-

sembly of the numerous looking glass orders and packing of same ready for shipment.

The stained glass department is worthy of special mention. We only show a photo of the cementing section of this department. Cementing the work is a very important feature in leaded work of all kinds. It matters but little how artistic or how pleased one may be with the effects produced by a stained glass window, if it is neither wind nor rain proof there is nothing so annoying. If a stained glass window is not properly cemented and well soldered at the joints, it will go to pieces almost in one season, whereas if it is well constructed it will be durable and give satisfactory service as well as an artistic effect.

The company's bending works are located on Victoria street. Here is where bent glass is made in Can-



Assembling and Packing Mirror Plates.

ada," from the very finest of bent glass for high class cabinets to the very largest of bent plates for large store fronts.

Altogether, in its organization, equipment and facilities, the company has a combination which it would be difficult indeed to improve. This is the impression received by a visitor, but it must not be taken as the policy of the concern, which is one of continued progressiveness. After an inspection of the work of the various departments, one would say that the work turned out here was unrivalled. The company itself is its own keenest competitor—ever working to give the best value at the lowest figure.

In any section of the contracting field where glass is required, particularly in regard to high class residences, store buildings, railway stations and so on, the name of the Toronto Plate Glass Importing Company must be a familiar expression.

Great Winter for Railroad Construction

The weather in the West has been exceptionally fine and good progress is reported as being made by the builders of the Grand Trunk Pacific. Freberg & Stone, sub-contractors under Foley, Welsh & Stewart, are drilling a tunnel nearly 400 feet long, near Omineca on the upper Skeena river. Five cuts are open and being worked in the contract of Mr. Duncan Ross. Contract for clearing the right of way to Moricetown, 30 miles up the Bulkley valley, has been let, the work to be completed during the winter. Foley, Welsh & Stewart's headquarters camp on the Sealy property, is a busy point and will be busier still with the opening of navigation next spring. All of the supplies for the work 200 miles east of that point will be landed at this camp and forwarded by teams. Warehouses large enough to hold thousands of tons of freight are being built. A number of buildings for offices and for the accommodation of men are also being constructed. Here will be located the main hospital. For the army of builders on the Ontario slope a branch of the Union Bank of Canada will be established, and Burns & Company will erect a cold storage plant to handle the meat supply for the different camps. Construction work on the east end of the Grand Trunk Pacific, also owing to the unusually fa-



The Cementing of Stained Glass.

vorable winter, is still going on. In New Brunswick the rails have been laid from Cains river westward as far as Napadoggan lake, where in the heart of the great Miramichi forest a divisional point has to be established. This work is being done by the Toronto Construction Company, and the work will be continued so far as possible during the winter.

Hamilton Bridge Company Win Suit

The Hamilton Bridge Company won its case against the General Contracting Company of Toronto, getting judgment for the full amount of the claim, namely, \$11,700. The amount claimed was for steel supplied in the construction of the grand stand at Lansdowne Park, Ottawa. The construction company refused to pay for the steel on the ground that it was not delivered at the time agreed upon, thus causing them delay which resulted in serious loss to the defendants. The Hamilton Bridge Company maintained that it never guaranteed to furnish the steel at a certain time.

In giving his decision Judge Britton said that he was not called upon to decide whether or not there was such a guarantee, for he believed the evidence of Mr. W. E. Noffke, architect, and City Engineer Ker, who had said that the General Contracting Company had not had the cement work of the grand stand in readiness for the steel work until after the steel arrived. Therefore the defendants had not suffered any injury, as the steel was delivered as soon as they were in a position to use it.

The MARSH & HENTHORN

HOISTING ENGINES

All that could be desired

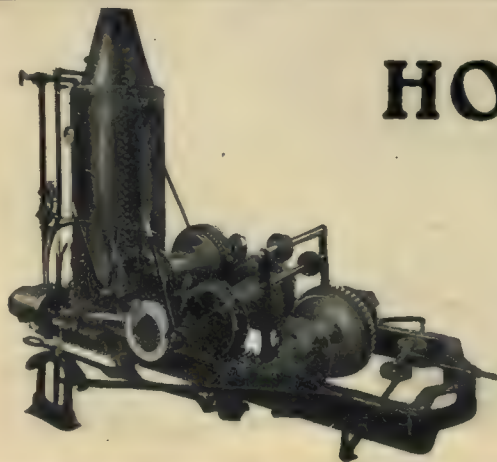
We have been advertising for some time that our Hoisting Engines are built strong and substantial, fitted for the hard, rough work they have to do, that they are built to suit the needs of the man who uses them, and to last for years of constant use. We advertise this because the experience of our customers has proven it to be true.

Read what a large Railway Contractor writes us:

"With reference to the three Hoisting Engines that we bought from you in 1903, I am pleased to tell you that we found these machines all that could be desired and we have two of them in use yet. We sold one of them a year ago for about the price we paid you for it. Speaking in general terms, they are a first-class machine."

Marsh & Henthorn, Limited - Belleville, Ont.

Sales Agents: Mussen Limited, Montreal



Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Fort Erie, Ont.

Press reports state that the city officers re-elected here favor the immediate construction of waterworks. J. J. Foster, Reeve.

Hamilton, Ont.

City Engineer Macallum has prepared plans for a sewage system for the east end annex.

Tenders addressed to John I. McLaren, Chairman, Board of Control, will be received until February 3 for supplying the corporation with sewer pipe, lime, sewer brick, castings, asphalt, paving brick, creosoted wooden blocks, Portland cement, gravel, lumber, lead pipe, pig lead, iron pipe, valves, hydrants, brass work, etc. Specifications at office of the city engineer.

Kamloops, B.C.

The chairman of Water and Light Committee has recommended that another reservoir be built of at least the same capacity as the present one.

Ottawa, Ont.

Dr. B. Law, M.H.O., and City Engineer Ker have been instructed to obtain all the information possible in regard to the water purification question and to look into the question of establishing a municipally-operated ice plant. The Board of Control will ask the city council to agree that Ottawa shall bear one-half the cost of installing septic tanks for the preliminary purification of the Aymer sewage, on the understanding that Aymer bear its share.

Saskatoon, Sask.

Tenders are being called for materials required for house sewer and water works service connections, etc., by J. H. Truesdale, city clerk. For further particulars see advertisement in this issue.

Toronto, Ont.

Contracts for the construction of the following sewers have been awarded as follows: (1) Dingwall avenue, Pape avenue to east end, Excelsior Construction & Paving Company, \$707, the lowest; (2) Albany avenue, C. P. R. tracks to Davenport road, Excelsior Construction & Paving Company, \$1,337, the lowest; (3) Campbell avenue, Lytton avenue to Davenport road, National Contracting Company, \$829, the lowest. Other tenders were (1) \$819, \$768, \$869, \$880, \$1,102 and \$895, the City Engineer's; (2) \$1,409, \$1,398, \$1,465, \$1,582, \$1,449, \$1,915 and \$1,580, the City Engineer's; (3) \$862, \$880, \$1,190, \$1,171 and \$1,060, the City Engineer's.

Victoria, B.C.

It is reported that the bylaw to raise \$1,500,000 to bring water for the city from Sooke Lake was defeated.

Vancouver, B.C.

The bylaw (\$350,000) for street improvements (opening, clearing and rough-grading city streets) was carried, as also was

that to raise \$100,000 for macadamizing and grading streets.

The ratepayers approved of the bylaw to expend \$30,000 on the widening of Robson street to Cambie street bridge.

The civic water committee have opened tenders for the supply of pipe for 1910. The specifications called for steel pipe as follows: Three and one-half miles of six inch; one mile of eight-inch, and two and a half miles of twelve-inch. The lowest bidder was the firm of Evans, Coleman & Evans at the following prices: Per lineal foot, six-inch, 37 cents; eight-inch 57 cents; twelve-inch, \$1.11, the aggregate amount of the bidding being \$24,499.20. The award to the firm was recommended. For 250 tons of four-inch cast iron pipe seven offers were submitted. That of the Robertson, Godson Company at \$39.91 per ton was the lowest by a considerable amount. The contract was recommended for the firm at its stated price. The next prices on cast iron pipe were as follows: F. Hankin, \$38.35; Evans, Coleman & Evans, for the Stavelly Coal & Iron Company, \$38.40.

Tenders addressed to W. McQueen, city clerk, will be received until February 8th for the construction of granitoid, Hassam and cedar block pavements, also bitulithic pavements on concrete base and on bituminous base on the following streets, Georgia, George, Burrard, Howe and Beatty. Plans, etc., at office of city engineer, City Hall.

AWARDED.

Montreal, Que.

The Dominion Bridge Company, of Lachine, Que., have been awarded a contract for structural steel for power racks and tail race bridge by the Canadian Light & Power Company. The John McDougall Caledonian Iron Works Company received the contract for cast iron wheel chamber drain pipe in connection with the above company's plant for the development of power at St. Timothee.

Stratford, Ont.

J. Davis Barnett, chairman, Water Commissioners, writes re the recent awarding of tenders: "From the alternatives possible covered by the Stratford Ontario Water Commissioners' recent specifications for turbine pumps and motors they selected the four units clutch coupled on one bed plate, viz., a 50 K.V.A. syn. motor and a million imp. gallon pump, and a 100 K.V.A. syn. motor and a million and a half pump, all running at 1,500 revolutions per minute, with exciter and switchboards; the power being 2,200 volt, 25 cycle, 3 phase electricity. There were many partial tenders, but the complete bids were: A, \$5,185; B, \$5,500; C, \$6,008; D, \$9,175; E, \$10,500. The lowest, A, for Lancashire motors and rees roturbo pumps, was accepted."

The Lancashire Dynamo & Motor Company, Limited, of Manchester, England, and Rees Roturbo Pumps, from Wolverhampton, Eng., will furnish motors and pumps. The contract calls for the whole apparatus to be erected and in working shape nineteen weeks hence, or about July 1st.

Railroads, Bridges and Wharves

Edmonton, Alta.
It is reported from a reliable source that the C. P. R. has secured a large area in the northwest corner of the Hudson's Bay Company's reserve lying between Eighth street and 21st street. The deal has been put through in Winnipeg between the Hudson's Bay Commissioner, C. C. Chapman, and William Whyte, second vice-president of the C. P. R.

Negotiations are being opened for the construction of the high level C. P. R. bridge. Further information: Length, 2,687 feet; height from the river bed to the rail base, 166 feet. It will be supported by four main piers, which will be of solid concrete to the bridge seat. On the Strathcona side there will be ten steel towers, on concrete pedestals, similar in type to those used in the great Lethbridge viaduct. A retaining wall will be built at each end. Total estimated expenditure, \$1,500,000.

Quebec, Que.

The following tenders were received for the removal of the Quebec bridge debris: Leopold Stern, Cobalt, \$132,000, material to remain property of the government; L. A. Beauchemin, Chantillon, Que., one cent a foot, no time stated for completion; Linde British Refrigerator Company, of Montreal, actual cost of labor, etc., plus 10 per cent, the government to retain material; no time stated for completion; Hamilton Bridge Works, \$50,000; Chaudiere Machine & Foundry Company, Ottawa, Ont., offered to buy the scrap for \$1,000, no offer to remove; Frankel Bros., Toronto, \$45,000, could not go on with contract this winter. Noted in issue of January 12th.

Saskatoon, Sask.

Tenders are being called for erection of foot bridge on Twentieth street. For further particulars see advertisement in this issue.

Sault Ste. Marie, Ont.

General Manager Franz, of the Lake Superior Corporation is authority for the statement that in February tenders for the extension of the Algoma Central Railroad will be called. Estimated expenditure, \$3,000,000. Probable extension 20 miles, presumably to connect the Soo with the C.P.R. at Grasset.

St. Thomas, Ont.

The plans of the Michigan Central Railway for the improvement of their property it is expected will include the remodelling and enlarging of the shops, the rebuilding of the roundhouse, the extending of the yards, and probably the erection of a new depot. The roundhouse will probably be built this year.

AWARDED.

Toronto, Ont.

The contract for the reinforcing rods required for the Wilton avenue bridge, has been awarded to Clarence W. Noble, the lowest. The tenders were as follows, timber piles supplied and driven to 30 feet

per lineal foot, 23½c., 34c., 24c., 52c., 29c., 21c., 18c., 25c.; Wakefield sheet piling, 6 by 12 inches, supplied and driven to 16 feet per lineal foot, 38c., 35c., 48c., 52c., 45c., 50c., 50c., and 36c.

Vancouver, B.C.

Wm. Mackenzie, president of the C.N.R., it is stated, has signed an agreement with the government for the construction of the Canadian Northern in British Columbia.

Winnipeg, Man.

It is stated that the Algoma Bridge Company has filed a tender for the new structure of the Louise bridge.

AWARDED.

Abbotsford, B.C.

The contract for 50 miles of the line of the V. V. & E. to Hope has been awarded to P. Welch, of Spokane, or Foley, Welch & Stewart, Grand Trunk contractors. In the contract is a clause providing that, all other things being equal, construction supplies shall be secured in this province. The contract for the line from Princeton to Otter Flat is stated to have been given them also.

Toronto, Ont.

The Don Construction Company has been given the contract for the piling at Wilton avenue bridge. The tender for 1808 feet of sheet piling is 50 cents per foot, and 18 cents per foot for 16,320 feet of common piling.

Winnipeg, Man.

M. Peterson, secretary, Board of Control, writes that the contract for additions to Louise street bridge has been awarded to Messrs. Wm. Newman & Company, at \$17,910.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

A committee was appointed at the annual meeting of Knox congregation on the 12th inst. to look for a building site for a new church.

Brampton, Ont.

Chairman Follis and Trustee Duggan were in Toronto recently interviewing Superintendent Bishop, in regard to the new ten-roomed school building which is being planned.

Cardston, Alta.

It is stated that a rink will be built at once here. Mr. Low is interested.

Campbellton, N.B.

The Bay Chaleur Lumber Company are erecting a new mill at Mission Point, opposite here, to replace the structure that was burned last season. The new mill, it is said, will be larger and superior in every way to the one that was burned.

Edmonton, Alta.

It is stated that Col. Edwards has written to the council that on the resolution being passed that the city would provide a site for the armories, the Dominion Department of Militia would probably make a grant in the estimates at this session of the House of Commons.

Fort William, Ont.

The Seaman Kent Company are establishing a hardwood manufacturing plant. Expenditure on buildings, \$75,000. A new dock is also in the plans.

Hamilton, Ont.

The Roman Catholics of this city have decided to erect a new church at the corner of Dundurn and Marguerette streets. Lindsay Wardell, formerly of Winnipeg,

has been instructed to prepare the plans, and work will be begun as soon as the frost is out of the ground.

London, Ont.

The congregation of Wellington street Methodist church feel the need of a new Sunday school building.

Montcerf, Que.

The Roman Catholic church was destroyed by fire. Estimated loss, \$6,000. Rev. Father Limoges is the parish priest.

Norwood, Ont.

At the annual meeting of the East Peterborough Agricultural Society Messrs. Pearce, Squire and O'Reilly and others, were appointed to consider plans and obtain estimates for the erection of a new exhibition hall and grandstand. Meeting of directors on January 31st.

New Glasgow, N.S.

The council have under discussion the question of new school buildings.

Ottawa, Ont.

Colborne P. Meredith is preparing plans for a brick and stone school building, to be erected at Westboro. Estimated cost, \$12,000.

Mr. C. P. Meredith, Sparks Chambers, has been recommended by the board of control as architect for the city hall alterations.

The congregation of Bethany Presbyterian church at its annual meeting unanimously decided in favor of purchasing the McGill property on the corner of Parkdale and Heatherall avenues, on which at some date in the near future to erect a new church. A special committee was appointed, composed of Messrs. A. McArthur, J. G. Young and others.

Prince Albert, Sask.

Plans are before the council for alterations to the city hall.

Prince Rupert, B.C.

Application is being made to the provincial government for a charter for a ten-thousand dollar hospital.

Portage la Prairie, Man.

The city hall was damaged here to the extent of about \$4,000.

Port Arthur, Ont.

It is stated that the Canadian Linen and Paper Company get a free site of 50 acres and exemption for ten years. They must expend \$250,000 in five years and employ 150 men.

The Canada Artificial Leather Company get a 10-acre site free and exemption for ten years. They are to employ 250 men and expend \$400,000.

Regina, Sask.

The city council has ratified the grant of 40 city lots as a site for the proposed armory which is to be erected at a cost of \$100,000.

Sarnia, Ont.

Representatives of the council are to meet Col. Hodgins in regard to the proposed site for the armory, which may be erected here.

St. Thomas, Ont.

The Board of Education have secured option on two suitable building sites for the new school.

St. John, N.B.

Secretary Vincent reported for the committee appointed to consider the erection of a new city hall. They asked that \$200 be placed at their disposal for preliminary

investigation and the procuring of rough plans. Noted in issue of December 22nd.

The Royal Hotel will be enlarged and remodelled. Messrs. Raymond & Doherty, proprietors.

Tilbury, Ont.

The mayor has recommended to the council the consideration of the construction of a new town hall, in the near future.

Toronto, Ont.

Iron stairs will be constructed at once on nine schools for fire exits.

The City Architect has issued a permit for the erection of a four storey addition to St. Michael's hospital, Bond street, north of the present building, to cost \$180,000.

Victoria, B.C.

The ratepayers voted against the granting of a free site for the new opera house.

Valleyfield, Que.

The committee of the Presbyterian church have decided to erect a church, hall and school room at an estimated cost of \$8,000.

Vancouver, B.C.

The bylaw to raise \$230,000 for general school extension was carried, and another for school board offices to cost \$42,000.

The ratepayers voted in favor of the exhibition bylaw to spend \$85,000 for preparing grounds and erecting buildings at

Hastings Park.

The bylaw to expend \$50,000 on fire halls was approved by the ratepayers.

Welland, Ont.

At the annual meeting of the Welland County Agricultural Society last week, the directors recommended new buildings. The society authorized the new directors to make an expenditure not exceeding \$15,000. President, G. C. Brown.

Winnipeg, Man.

Architect G. W. Northwood has prepared plans and specifications for the proposed improvements to the St. Charles Country Club. It is stated that work will commence immediately and will extend over a period of two years. Noted in last issue.

The Headingly school house was destroyed by fire on the 15th inst. Estimated loss \$28,000.

Elaborate plans are being made by members of the Winnipeg Automobile Club for a club house in the vicinity of Stonewall, with a road from there to Winnipeg Beach.

At the annual meeting of All Souls' Unitarian church plans for the erection of a building at an early date were discussed. A. W. Puttee, president, Board of Trustees.

At the annual meeting of the Children's Home, J. Galt, of the advisory board, brought in a report re plans for the new building. The building proposed would cost approximately \$80,000, and would afford accommodation for 200 children, with every modern convenience.

It is stated that the congregation of St. Stephen's will sell their present edifice on the corner of Spence and Portage and with the proceeds erect another church. A. Stewart and A. Andison, managers.

AWARDED.

Toronto, Ont.

We have been informed that the contract for the stone work in connection with the erection of St. Paul's church on Bloor street, has been awarded to Page & Company, 89 Crescent road.

Residences

Chilliwack, B.C.

The house of Wesley McIntyre was destroyed by fire on the 8th inst. Estimated loss, \$2,000.

Montreal, Que.

Recent building permits include: H. Fortier, 2091 Hutchison street, one house containing three dwellings, cost \$4,500; J. F. Charpentier, 157 Papineau avenue, two houses containing five dwellings, cost \$8,000; E. Paradis, 443 Joliette, three houses containing nine dwellings, cost \$5,500; E. Dufresne, Credit Foncier Building, six houses containing twelve dwellings, cost \$1,000; and the following permits for alterations have been awarded: Mr. Aitken, Drummond street, one house containing one dwelling, cost \$2,000; Mrs. Jas. Levert, 396 Mount Royal east, one house containing three dwellings and one store, cost \$6,000; J. A. Aumais, 1046 Sherbrooke street east, house containing seven dwellings and one store, cost \$3,500; A. Meunier, 45 Bonsecours street, one dwelling, cost \$3,000.

Ottawa, Ont.

Colborne P. Meredith is preparing plans for a brick and stone residence for Hon. Justice Duff, to cost about \$18,000.

Toronto, Ont.

The property on the northeast corner of Beverley and St. Patrick streets has been sold to Mr. David Lavine, who intends to build a six storey apartment house on the corner. The frontage is 86 feet, and the depth is 150 feet.

Victoria, B.C.

A permit has been issued for a dwelling to be erected in the Craigdarroch sub-division by J. W. Spencer, to cost \$10,000. T. Hooper, architect; E. Logan, contractor.

A permit has been issued to R. P. Clark for a two storey building of concrete, steel and brick, on the west side of Broad street, between the Salvation Army barracks and Johnson streets. Estimated cost, \$8,000. W. K. Wilson, architect.

Winnipeg, Man.

It is stated that a large apartment block will be erected in the spring on Kennedy street on a site recently sold by W. T. Christie.

Plans are being prepared for the apartment block on the corner of Corydon avenue and John street, Fort Rouge, for R. R. Pattinson and W. W. Fraser.

AWARDED.

Montreal, Que.

R. Montgomery Rodden, architect, 8 Beaver Hall Square, has awarded the following contracts in connection with the erection of four houses on Roslyn avenue, Westmount, for Mr. John Stewart, as follows: Roofing, Sibley & Huot; millwork, Itzweire & Sarrazin.

Winnipeg, Man.

L. A. Smart has been awarded the contract for the erection of a residence to cost approximately \$10,000. For further information address E. D. Tuttle, 204 Bannatyne avenue.

Business Buildings and Industrial Plants

Bradwardine, Man.

The Windsor hotel was destroyed by fire on the 19th inst. J. France, proprietor.

Bass River, N.B.

The Dominion Chair Company will at once rebuild their factory and warehouse here. Dimensions of former, 200 by 50 feet. Estimated expenditure \$31,000.

Chatham, Ont.

The Model Malleable Range Company, Limited, have purchased the Byram property on St. George street, with the G.T.R. property to the rear, on which they will immediately commence building a plant 160 by 60 feet. J. Piggott & Sons, contractors. President, W. R. Landon.

Calgary, Alta.

The Great West Saddlery Company are contemplating building a horse collar factory and also additions to their wholesale warehouse. E. F. Hutchings, president.

Deloraine, Man.

The office of the Beaver Lumber Company and J. Reid's implement warehouse were destroyed by fire on the 22nd. Total estimated loss, about \$10,000.

Edmonton, Alta.

It is possible that next summer the retail meat dealers of the city will build an abattoir in the city for their own use, and operate the business as a joint stock company. Proposed capitalization, \$100,000.

Fort William, Ont.

It is stated that J. H. Ashdown, president of the J. H. Ashdown Hardware Company, of Winnipeg, has secured options on two sites here.

Hamilton, Ont.

Plans and specifications have been prepared for the police station which is to be erected with the \$50,000 which the citizens recently voted.

Kenora, Ont.

The King Edward hotel was damaged on the 19th inst. to the extent of about \$6,000.

Lachute, Que.

The hotel formerly known as the Victoria hotel, was destroyed by fire on the 17th inst. Total estimated loss, \$8,500.

Limoilou, Que.

It is announced that La Caisse d'Economie will open a branch here. It is the intention of the directors to erect a branch building next spring.

Lindsay, Ont.

It is stated that Horn Bros., proprietors of the local woollen mills, will erect a large addition to their factory. Estimated cost \$15,000.

London, Ont.

It is expected that plans for remodelling the city hall will be submitted shortly with an estimate of the cost.

Montreal, Que.

A. F. Dunlop, architect, Lindsay building, is mentioned in connection with the proposed extensions to be made on the site recently purchased by the A. E. Rae Company. Noted in last issue.

The grocery store, corner of Amherst and Robin streets, owned by M. Darveau, was destroyed by fire on the 17th inst. Estimated loss to property, \$10,000.

It is reported that Messrs. Childs Company, of New York, have leased the lower floor and basement at 232-234 McGill street, which will be fitted up as a first-class restaurant. H. G. Stone, 84 St. Francois Xavier street, associate architect.

G. A. Monette, architect, 97 St. James street, is preparing plans and specifications for the erection of a new furniture factory on St. Catherine street, opposite La Patrie Building, for Messrs. H. P. Labelle and Company, Limited, 5 Notre Dame street.

Ottawa, Ont.

Messrs. Henry Birks & Sons, jewellers, Sparks street, who will occupy the building

now occupied by the Murphy Bumble Company, Limited, on their removal to the Carling Building, are, through Architect C. P. Meredith, awarding contracts for extensive alterations and improvements.

Port Kells, B.C.

The Railway Commission of Canada has issued an order to the Great Northern to erect a passenger and freight depot here with a 60 foot platform.

Peterboro, Ont.

The Quaker Oats Company will commence shortly the construction of a large warehouse, 294 by 50 feet, and four storeys in height. Materials, brick and concrete. Estimated cost, \$80,000. W. H. Denham, local manager.

Quebec, Que.

The St. Lawrence Car Works, Limited, was recently incorporated by a number of Quebec railroad men, and it is stated that they will erect a plant in this city with a capacity for turning out 600 cars yearly.

It is stated that the National Transcontinental Railway Commission and the railway companies have agreed on the Champlain market as the site for their terminal.

It is announced that a recently formed company will erect next summer a cotton factory on the shore of the Haha river, a mile from the village of Grand Bay. I. Tremblay, F. Bergeron and J. Dufour are interested.

St. John, N.B.

The Canadian Wood Working Company, now located in Hampton, desiring to locate in Lancaster, has been given the desired privileges by the municipality.

The building owned by the Lawrence estate was destroyed by fire on the 22nd inst. Total estimated loss, \$15,000.

Souris, Man.

Superintendent J. A. Macgregor is in charge of the operations of the C. P. R. in reference to land purchase mentioned in last issue.

St. Hilaire, Que.

The nitro-glycerine works of Hamilton Powder Company were damaged to the extent of about \$2,000.

Toronto, Ont.

Tenders will be received until January 24th for all trades required in the erection of office, warehouse and cold storage building at Front and John streets. Plans, etc., at office of F. H. Herbert, architect, 65 Adelaide street east.

Vancouver, B.C.

It is understood that Mr. P. Welsh, the Spokane railroad contractor, will build on the fine site diagonally across from the C. P. R. depot, this year.

In all probability Mr. Jonathan Rogers, capitalist, who owns the southeast corner of Granville and Pender streets, will build a large office structure.

J. S. Hellyer, architect, has prepared plans for a three-storey and basement brick block to be erected on the southwest corner of Pender and Burrard streets by Messrs. A. E. McEvoy and E. W. MacLean.

Canadian Pacific Architect Painter is the authority for the statement that work will be commenced in a month on the enlargement of the Hotel Vancouver, and will continue five years. The plans provide for a hotel of six hundred rooms.

Victoria, B.C.

The Western Canada Bag, Envelope and Boxboard Company, Limited, recently organized by Greely Koitz, of Vancouver, is

preparing to erect a large plant at Sapperton Siding, for the manufacture of box-board, building papers, roofing, etc.

It is stated that the fishing company of British Columbia, of which L. Finch is president, will erect shortly an oil and fertilizing plant on the site recently secured at Massett Inlet. On the thirty-two additional lots dwellings for employees will be erected.

Winnipeg, Man.

W. H. Rowley and G. H. Milton, joint managers of the E. B. Eddy Company, at Hull, Que., are contemplating the location of branch factories in the West. Fort William and this city were visited. J. B. Perse, Winnipeg representative.

It is stated that the Great West Saddlery Company will build in the spring a new factory opposite their present one on Market street east. Dimensions, 85 by 100 feet. Estimated cost, \$75,000. E. F. Hutchings, president.

The Canadian Bank of Commerce has purchased property north and south of its present building, and plans are being prepared for a new structure on the site, which will have a frontage of 105 feet.

AWARDED.

Bathurst, N. B.

Mr. Herbert Evans, of the Leonard Company, has been awarded the contract by the Nepisquit Lumber Company, Springfield, Mass., for large Corliss and Tangye engines, 1,200 horse power, for their new mill at Bathurst.

Petrolia, Ont.

The contract for the erection of the branch office of the Bank of Toronto here has been secured by the J. & J. Kerr Company, and work on same will be started as soon as weather conditions will permit.

Power Plants, Electricity and Telephones

Armstrong, B.C.

The Shuswap Falls Light & Power Company is negotiating for the purchase of the local electric light plant. The construction of an electric railway connecting Enderby, Armstrong and Vernon with Grand Prairie and Salmon River is under consideration by the company.

Bridgeburg, Ont.

The Canadian Niagara Power Company will erect a power plant here at a cost of \$6,000.

Calgary, Alta.

Smith, Kerry & Chace, Confederation Life Building, Toronto, are calling for tenders for two 4,000 K. V. A. generator units with 6,000 horse power turbines for switching equipment and transformers for the generating station and for the terminal station this city. These will include three 2,000 K. V. A. transformers at present, although prices are being asked on six, which will be the total equipment. At the generating end the transformers will be 55,000 volts and 50,000 at the terminal station.

We have been informed that the general work in connection with the Calgary Power & Transmission Company, referred to in last issue, is now about half completed and will be delivering power to Exshaw in the spring, and to this city in June.

Chatham, Ont.

It is stated that preparations are being made by the Chatham Gas Company to furnish electricity to operate the system of the Chatham, Wallaceburg & Lake Erie Railway Company. The gas company will

install a 250 kw. motor generator set, to be used in connection with a 275 kw. alternator. P. S. Coate is secretary and manager. Noted in issue of January 12th.

Dunnville, Ont.

Bradford & Bradford, barristers, of Dunnville, have written to Hamilton for information about poles, T rails and wires required for the projected electric line.

Dawson City, Yukon.

It is reported that preparations are being made for the construction of a power ditch near the north fork of the Klondike river in the spring. The water is to be carried eight miles to a point on the main river, where it will have a fall of 30 feet, and will be utilized to generate electricity, which will be transmitted to points along the Hunker or over the divide. A. N. C. Treagold is interested in the enterprise.

Fort William, Ont.

Double tracking and extensions to the street railway, including the purchase of four new cars, which will cost \$137,000, will be made here shortly. A. McNaughton, Clerk.

Lunenburg, N.S.

The ratepayers will be asked to decide on the 24th inst. on the advisability of purchasing the electric plant at \$65,000, thus increasing the present efficiency. Councillor Whynacht is interested.

London, Ont.

The time limit set for receipt of the tenders for equipment for power station, it is stated, has been placed at February 1st. Noted in last issue.

The question of the advisability of electrifying the London & Port Stanley Railway was taken up by the new directors at a meeting last week, and a committee, consisting of ex-Mayor Stevely and others, appointed to report.

New Westminster, B.C.

The Conteau Power Company has recently made an application in Victoria for a franchise to build an electric railway.

Nelson, B.C.

Tenders addressed to E. B. McDermid, secretary, Nelson Street Railway Company, Limited, will be received until February 1st for poles, ties, etc. Delivery is to be made on or before March 15th.

Tenders addressed to E. B. McDermid, secretary, Nelson Street Railway, will be received until February 10th for the following material, prices to be f. o. b. Nelson: 123 tons of 56-pound steel rails, 32 kegs spikes, 5½ by 9-12-inch, 600 tin plates suitable for 56-pound rails, 1 left-handed turnout, consisting of split rail switch, frog and two guard rails, with all necessary rods and sliding plates. Separate tenders may also be put in for 123 tons of 56-pound relaying rails. Time of delivery to be stated by tenderer.

Prince Rupert, B.C.

A citizens' meeting held on the 6th inst., appointed a committee, consisting of Thos. Dunn, Alfred Carss and others, to employ an engineer to value the plant of the British Columbia Tie & Timber Company, and advise as to the best way and means of establishing a permanent lighting system.

Port Arthur, Ont.

Welford Beaton, Seattle, is quoted as saying that a complete chain of long distance wireless telephone towers connecting the Pacific coast stations with those now doing a commercial business in cities along the Great Lakes will be erected during the coming summer in cities in Alberta, Sas-

katchewan and Manitoba, and in Kenora and Port Arthur.

St. Catharines, Ont.

At the last meeting of the directors of the Dunnville, Wellandport and Beamsville Electric Railway it was decided that connection with St. Catharines must be a part of the programme.

St. John, N.B.

Included in the estimate of expenditures on account of the Light Department for 1910 is an item of \$23,500 for 314 arc lamps at \$75, while large amounts will be spent by the Fire Department on hydrants, hose and fire alarm supplies generally.

Toronto, Ont.

Tenders are wanted for approximately \$8,000 kw. of 13,800 volt transformers. For information apply at once to Electrical Department, City Hall.

Tenders addressed to G. B. Geary, Chairman, Board of Control, will be received until February 8th for the construction of feeder conduit runs and manhole at the terminal station. Specifications at the Electrical Department, City Hall.

Preparations are being made by the G. T. R. Company to install a telephone system on a portion of the Northern division, which will be used as an auxiliary to the present telegraph service.

Winchester, Ont.

The present street lamps are being replaced by 60-watt tungsten lamps. Thomas C. Van Bridger, local manager.

Winnipeg, Man.

Controller McArthur has reported to the Board of Control that the street railway company is purchasing hose bridges to prevent blockades in the street car service when hose is laid across the tracks for fire fighting purposes.

Tenders will be received by M. Peterson, secretary, Board of Control, until February 15th for the erection of the power terminal station. Smith, Kerry & Chace, Carnegie Library Building, engineers.

Tenders will be received by M. Peterson, secretary, Board of Control, until February 28th for the erection of five wire fences and gates, along both sides of the city's transmission line right-of-way between Winnipeg and the Brokenhead river. Smith, Kerry & Chace, power engineers, Carnegie Library Building.

AWARDED.

Revelstoke, B.C.

Authority has been given by the council for the signing of the contract with W. Newman & Company for the new power dam and gatehouse to be constructed.

Toronto, Ont.

Tenders for the supply of special bricks to be furnished to the electrical branch of the Works Department have been opened, and the contract awarded to the Milton Pressed brick Company, at \$16.50 per thousand. One other tender (informal) was received at \$20.00 per thousand.

Vancouver, B.C.

It is reported that the British Columbia Electric Railway Company has placed an order with the Allis-Chalmers Company, Milwaukee, Wis., for equipment for steam turbo-generator units which will be used in connection with extension of the service.

Winnipeg, Man.

M. Peterson, secretary, Board of Control, writes that the contract for supply of wire fence and posts for fencing the power transmission line between Winnipeg and the Brokenhead river, has been awarded as

follows: For wire fence and gates, The Canadian Steel & Wire Company, Winnipeg, \$3,348; for cedar posts, Weatherby & Eklund, Winnipeg, at \$3,399.30.

It is reported that the Winnipeg Street Railway Company have let the contract to the Babcock & Wilcox Company, Limited, of Montreal, to instal boilers sufficient to give an additional 3,000 horse power. This will cost in the neighborhood of \$35,000, and will simply be maintained as a reserve.

Miscellaneous

Assiniboia, Man.

Tenders will be received until February 1st for \$3,493 7-year 5 per cent. local improvement debentures.

Escuminac, N.B.

Tenders are being called for the construction of a wooden dwelling for light-keeper and a boat house at the light station. Plans, etc., at Department of Marine and Fisheries, Ottawa, and at its agency, St. John, and at the post offices, Chatham, Newcastle, Escuminac and Richibucto. G. J. Desbarats, Deputy Minister.

Edmonton, Alta.

Plans showing the best lay out of grounds, the location of buildings, main entrance, driveways, walks, etc., may be submitted by anyone to the Edmonton Exhibition Association, Limited, until February 10th. The following prizes are offered:—For the best plan, \$250; second best, \$150; third best, \$75; which are to become the property of the Exhibition Association. A. G. Harrison, Manager.

Fort Erie, Ont.

The International Waterways Commission, with offices at Buffalo, N. Y., have completed its report on the advisability of constructing a dam across Lake Erie from the Bird Island pier to Fort Erie to maintain the level of the lake; the report has been signed by the members of both sections of the commission, and sent one copy to the Secretary of War at Washington, D.C., the other to the Minister of Public Works, Ottawa. No facts concerning the findings will be made until these officials have made their reports.

Hamilton, Ont.

The mayor stated that he had hopes of seeing the revetment wall extension started this spring.

In the estimates for the expenditure on public works, it is considered by the council that \$500,000 will not cover the cost of the various works, the proposed west end sewer probably necessitating an extra \$110,000. \$200,000 will be spent on pavements and another \$30,000 on general road work and repairs. City Engineer Macalum.

Kingston, Ont.

The city is calling for tenders for hardware, sand and rubble. H. B. R. Craig, city engineer.

The Board of Works have decided to call for new tenders for the supply of 4,000 barrels of cement, or purchase in the open market.

Manitou, Man.

Tenders will be received until February 1st for \$15,500 5 per cent. 20-years local improvement debentures. Geo. T. Armstrong, Town Clerk.

Moose Jaw, Sask.

Tenders are being called for two two-horse street sprinklers, steel tanks. For further particulars see advertisement in this issue.

Montreal, Que.

L. O. David, city clerk, writes that the following tenders have been received for steam fire engine: Canadian Fire Engine Company, 1,800 gallons, engine, \$4,500; American Lafrance Engine Company, 1,800 gallons, engine, \$5,450; Waterous Fire Engine Company, 1,800 gallons, engine, \$5,300. For one 75-foot aerial ladder: American Lafrance Fire Engine Company, \$5,280; W. E. Seagrave, Walkerville, Ont., \$5,400. For fire hose: Canadian Fire Hose Company, 30 St. Francois Xavier street, city, keystone, \$1.10; patrol, \$1.00; standard, 95 cents.

Ottawa, Ont.

Plans for the biggest drainage scheme projected in Ottawa for years were laid before the Board of Control last evening by City Engineer Ker. The whole of Hintonburg and its environs are to be drained by the system, which will take three years to complete, and will cost \$350,000.

City Engineer N. J. Ker has suggested to the civic waterworks committee that two pumps and electrical equipment for the generation of power be installed to increase the fire pressure.

The project of damming the St. Lawrence has been favorably reported on by the International Waterways Commission which recently held a meeting at Buffalo, N. Y.

Regina, Sask.

City bonds to the extent of \$250,000 have been purchased by G. A. Stimson & Company, Toronto. They were issued for the following purposes: Electric light, \$78,000; sewerage, \$59,000; waterworks, \$113,000.

Revelstoke, B.C.

The following is a local forecast for the year: Building will be active here this year. New three storey buildings will cover the sites now occupied by the Climax and Queen's hotels. A. McRae and W. A. Foote intend to erect several residential buildings. The Knights of Pithias will build a hall. It is probable a high school building will be erected and an addition made to the public school. R. Howson & Company will erect a large furniture store. The Armour Packing Company will build a warehouse and put in a cold storage plant here next spring. The Bank of Commerce intend erecting a fine office building.

St. John, N.B.

The following amounts have been voted by the council in connection with work to be done during this year: Schools, \$136,418; public works, \$78,000; sewerage maintenance, \$15,000; interest, \$27,575; lighting, \$26,500; police, \$48,000; fire, \$65,000; ferry, \$10,400; city debentures, \$54,571; free public library, 5,750; exhibition purposes, \$636; street lighting debentures, \$12,375; total \$480,227.

Toronto, Ont.

Recent building permits include: F. S. Harcourt, 2 1-2 sty. brick addition to dwelling, northwest corner Wilton and George, \$2,000; J. M. Hickey, alterations to store front, on 97 Yonge street, \$2,500; Ida Hill, 2 sty. and attic brick dwelling, near Broadview avenue, on Fairview avenue, \$3,000; Geo. Phillips, 3 att. 2 1-2 sty. brick dwellings, northwest corner Winchester and Sackville, \$7,000; A. J. DeCarle, 3 det. 2 sty. brick dwellings, near Belfair, on south side Pinehurst, \$4,000; T. J. Ford, 1 1-2 sty. brick dwelling, near Shanley street, on east side Gladstone, \$2,500; Sisters of St. Joseph, 4 sty. brick addition to hospital, near Shuter street, on west side Bond street, \$180,000; L. M. Schwartz, 3 sty. brick warehouse, near Elizabeth street, on

Edward street, \$10,000; J. J. McKinney, 1 pair semi-detached 2 sty. brick stores and dwellings, and 1 sty. brick office attached, near Grace street, on 658-660 College street, \$8,000; James Smith, alterations and additions to hotel, southwest corner Queen and Simcoe streets, \$10,000; B. J. Case, 2 det. 2 1-2 sty. brick dwellings, near Sunnyside, on south side Westminster, \$8,000; S. McLellan, 1 1-2 sty. brick dwelling, near Broadview avenue, on north side Sparkhill avenue, \$4,500; C. A. Ward, 3 storey brick and reinforced concrete addition to warehouse, on 28 Oxford street, \$4,800.

Victoria, B.C.

Building permits have been recently issued to R. P. Clark, for a two storey and basement block of offices and stores on Broad street, to cost \$8,000; to McPherson & Fullerton Bros., for a six roomed house on Beachwood avenue, to cost \$2,400; to Lim Bang, for additions to the Majestic Theatre, to cost \$2,200, and to W. H. Burton, for a \$3,000 house on St. Charles street.

Vancouver, B.C.

Tenders will be received by Wm. McQueen, city clerk, until February 8th for the supply of broken stone. Specifications at office of City Engineer, Burwell.

Building permits have been issued recently as follows: J. Douglas, 27 Tenth avenue west, five houses, \$10,000; J. B. Reid, 957 Granville street, \$2,500; Western Sheet Metal Works, Howe street, \$2,000; H. B. Walsh, 1904 Arbutus street, two houses, \$3,800; Catholic church, Campbell and Weeber streets, \$2,000.

Winnipeg, Man.

The Board of Control are calling for tenders for street cleaning supplies until February 2nd. Specifications, etc., at the office of the Street Commissioner. M. Peterson, secretary.

Tenders addressed to R. Rogers, Minister of Public Works, will be received until February 3 for the supply of timber required for drainage district No. 19.

The T. Eaton Company, Limited, have applied for a permit to build a tunnel, 21 by 9 feet in width, 8 feet deep and 66 feet in length, under Hargrave street, between the store and the workhouse.

AWARDED.

Buckingham, Que.

Mr. W. H. Kelly has secured the contract for the building of a large tug for the government. It is to be constructed on the Ottawa river.

Montreal, Que.

Canadian Fire Hose Company, 30 St. Francois Xavier street, city, have been awarded by the city the contract for salvage covers, 9 by 14, \$11.35.

St. Catharines, Ont.

The Martin Electric Supply & Construction Company of this city has been awarded the contract of wiring and installing a direct system in the dredge constructed by M. A. Beatty & Sons of Welland.

Toronto, Ont.

Tenders for two auto trucks for street sprinklers, etc., have been opened and in accordance with the recommendation of the Medical Health Officer the contract was awarded to the Berna Motor & Taxicab Company, Limited, at \$4,850 per truck. Other tenders were as follows: (1) Leyland Motors (informal), Class "A," \$4,665; Class "1-1," \$4,530; (2) Dennis Motors, \$4,800, or with water cart body fitted, \$5,500; (3) \$4,850; (4) (informal), Ryknield or Eastern Power Truck Company, 5-ton, \$5,000, 7-ton, \$5,500, 10-ton, \$6,800.

Tenders and For Sale Department



Proposals

Tenders are wanted for approximately 8,000 k.w. of 13,200 Volt Transformers.

For information apply at once to ELECTRICAL DEPARTMENT, City Hall, Toronto, Canada. 5



Department of Railways and Canals

Dominion Canals

Notice to Dealers in Cement

Sealed tenders endorsed "Tender for Cement" will be received by the undersigned, up to 16 o'clock on FRIDAY, THE 28TH OF JANUARY, 1910, for the supply of some 140,000 barrels of Cement, more or less, required for the construction and maintenance of the various canals of the Dominion and to be delivered in such quantities, at such places and at such times as may be directed.

Dealers in cement may tender for the total quantity required, or for such portions thereof as may suit their convenience.

Specifications, forms of tender and full information can be obtained at the Department of Railways and Canals, Ottawa, on and after this date.

The Department does not bind itself to accept the lowest or any tender.

By order,

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 12th January, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 4

The Simcoe Railway and Power Company, Limited, Midland, Ontario

Tenders for Hydraulic and Electrical Equipment

Sealed tenders endorsed "Tender for Hydraulic Equipment," or for other respective sections, will be received by the Secretary of the Simcoe Railway and Power Company, Limited, at the Head Office, Midland, Ontario, until February, 1st., 1910 for the following:—

For Generating Station at Big Chute, Severn River.
Hydraulic Equipment
Penstocks
Electrical Equipment

For 27 Mile Transmission Line
Wire
Insulators
Crossing Towers

For Receiving Station at Midland
Electrical Equipment

Specifications for the above may be seen at the office of the Secretary, Midland, Ontario, or at the office of Engineers, C. H. & P. H. Mitchell, Traders Bank Building, Toronto, Ontario. No tender necessarily accepted.

W. FINLAYSON,
Secretary.

Midland, January 6th, 1910. 4

City of Moose Jaw

Notice

Tenders will be received for two (a), two-horse street sprinklers, steel tanks.

Tenders stating capacity and weight, giving prices f.o.b. Moose Jaw, to be laid on the council table not later than 8.30 p.m., on MONDAY, FEBRUARY 21ST., 1910.

THE CITY OF MOOSE JAW
W. F. Heal, City Clerk.

CITY OF STRATFORD

Sealed tenders addressed to the undersigned will be received until 5 P.M., JANUARY, 31ST, for each of the following:

1 Concrete Mixer 7 to 15 yards per hour capacity.

2 Dump Wagons 1½ to 2 yards capacity.

The lowest or any tender not necessarily accepted

M. FERGUSON,
City Engineer.

Notice to Contractors

Tenders for 42 inch Steel Intake Pipe

Sealed tenders addressed to the Chairman of the Water Works Committee will be received by registered post only, up to 5 p.m., TUESDAY, FEBRUARY 15TH, 1910, for the supply and delivery of 3,000 lineal feet of 42 inch steel intake pipe.

Specifications, form of tender and full particulars may be obtained on application to the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer. 6

Ottawa, January 24th, 1910.

City of Saskatoon

Tenders wanted

House, Sewer and Water Works Service Connections

Sealed tenders will be received at the Office of the undersigned City Clerk until 5 o'clock p.m., MONDAY FEBRUARY 14TH, 1910, for certain materials required for H. use, Sewer and Water Works Service connections, including Sewer Pipe, Galvanized Iron Pipe, Lead Pipe, Brass Fittings, Service Boxes and Water Meters.

Instructions to Bidders may be obtained on application to George T. Clark, City Engineer.

The lowest or any tender not necessarily accepted.

WILLIAM HOPKINS J. H. TRUSDALE
Mayor. City Clerk.

Saskatoon, January 21st, 1910.

City of Saskatoon

Tenders Wanted

Steel Overhead Footbridge at Twentieth Street

Sealed tenders addressed to the undersigned City Clerk and endorsed "Tender A" and "Tender B" will be received, for the construction of a Steel Overhead Footbridge at 20th Street, until five o'clock p.m., on the following dates:

Contract A, Foundations, MONDAY, FEBRUARY 14TH, 1910.

Contract B, Steel Superstructure, MONDAY, FEBRUARY 21ST, 1910.

Plans and specifications, etc., may be seen at the office of the City Engineer, Saskatoon; also at the office of the Canadian Engineer, at the following addresses:

Toronto, 62 Church Street, Phone Main 7404
Montreal, B33 Board of Trade Building, Phone M 1001
Winnipeg, Room 315 Nanton Building, Phone 8142
The lowest or any tender not necessarily accepted.

WILLIAM HOPKINS J. H. TRUSDALE
Mayor. City Clerk.

Saskatoon, January 21st, 1910. 5

Situations Vacant

WANTED — Architectural Draughtsman, middle-aged, capable of supervising construction, state experience, salary expected, etc., Position to be filled at once. W. W. LA CHANCE, Architect, Saskatoon; Sask. 4

Miscellaneous

Fine Factory Site—New Westminster, B. C., the coming factory city Lot 7, Block 96; corner 198x132, three frontages; close to tracks and waterfront. Right in city, and already surrounded by industries. \$15,000. Snap. Will bring double this inside two years. Investigate. Address P. O. Box 516, Vancouver—owner.

New Companies

Dominion Corrugated Steel Pipe Company, St. Johns, Que., incorporated, capital \$20,000. Incorporators, C. H. Richardson, St. Johns, Que.; H. Proctor, and A. Carson Seller, both of Sandusky, Mich., and G. Donaldson, Topeka, Kansas.

Caledonia Gypsum Company, Limited, Hamilton, Ont., incorporated, capital \$150,000. Incorporators: H. Lewis and E. Rubenstein, both of Buffalo, N.Y.

Canadian Pressed Brick Company, Limited, Hamilton, Ont., incorporated, capital \$40,000. Incorporators: J. H. Williams, contractor; D. New, brickmaker, and A. M. Lewis, all of Hamilton, Ont.

The friends of Mr. H. D. Willmott, representative of the mining department of the firm of Mussels, Limited, will be glad to learn that he came safely through the recent disastrous wreck on the C. P. R. near Sudbury. Mr. Willmott was in the dining car at the time and found himself submerged to the neck. By dint of his own efforts he was able to extricate himself and was the second person to climb out of the car. He was not seriously injured, sustaining only slight cuts on his fingers, but the experience, he says, is one that he will remember for a long time.

Contract Record

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LONDON, ENG. 3 Regent St., S.W.
W. A. MOUNTSTEPHEN, Representative

SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24 Toronto January 26, 1910 No. 4

Conventions and Rumors Thereof

There is every indication that the annual convention of the Canadian National Association of Builders, which is to be held at London, Ont., Feb. 8-9, will be a most successful event. Secretary J. H. Lauer, of Montreal, is sparing no effort to make the meeting of great interest to those engaged in building and allied work, and our own idea in this connection is that the convention will be productive of many important and helpful things. While no detailed programme of the meeting has yet been issued, we have an inkling of several papers that will probably be read, and these being based upon subjects of vital interest to the trade, should result in discussions that will bring out many good points. There will be a representative contingent from Montreal leaving that city on Monday, Feb. 7th. This party will arrive in Toronto on Tuesday morning and make connections with the band now being organized by Mr. P. L. Fraser, secretary of the Toronto Exchange. Representatives will be in attendance from Ottawa, Hamilton and other important centres. Inasmuch as the retail hardware merchants' convention is being held the same week, it will be advisable to make the necessary arrangements for accommodation as soon as possible.

Incidentally, the convention of the Canadian Society of Civil Engineers is now in progress at Ottawa. This is the day of conventions. Some people are possessed of such wide experience and expert knowledge that they can learn nothing at such meetings as these. But the average man will come back wiser every time. The opportunities which such meetings afford for the interchange of ideas by practised experts have done much to correct faulty design and slipshod methods of construction,

to elevate the status of the engineer, and to improve the general conditions under which he works. In every line of human endeavor conditions are changing continually. That which obtained yesterday is behind the times to-day. There are three branches primarily and fundamentally concerned in the development and up-building of a country—the architect, the engineer and the contractor. It is essential for each one of these to keep well posted in the latest things pertaining to his work; consequently he cannot afford to miss the chances of improved knowledge that are to be found at a convention. The best brains and interests are on hand to greet a man and he can always find a few kindred spirits interested in his particular line of work. Our own opinion is that a man might just as well be out of business as out of date in his calling. At the convention, one is afforded an opportunity of comparing his achievements with what others have accomplished. He is able to meet his competitor on terms of friendliness and come to a better understanding of him. He is able to hear the last word in problems pertaining to his work and to lay the lines of future effort in a better direction. In nine cases out of ten he acquires more helpful knowledge in the two or three days of a convention than, left to his own resources, he would obtain in so many months—or even years.

Remuneration of the Building Inspector

Considering what is required of him, the responsibility he is called upon to bear and the technical knowledge and training that he must have in order to occupy the position, it would seem that the average building inspector, as a rule, is about as inadequately paid as any in municipal service. There are some people of a somewhat cynical tendency who will tell you that in civic work it is generally the man who has the most to do who is the worst paid, and that fat salaries are usually identified with easy jobs. We are in rather a delicate position to express an opinion on this point, but we do think there is a measure of truth in it as regards the official in question. After all, the post is no sinecure. The duties attached to the position are both onerous and diversified, and with even the most perfect by-laws to guide him it is necessary that the building inspector be possessed of discrimination and judgment. The average councillor, with his short-sightedness in such matters, fails to see these things in the proper light and thinks a man well paid at a thousand dollars a year, a sum which most journeyman carpenters can earn. He does not take into consideration the experience needed for the work, neither apparently has he an adequate conception of the responsibilities of the post. There are doubtless many excellent men serving as building inspectors in our various cities, but at its present rating it is not likely that the position will either retain these or attract others competent of fulfilling the duties satisfactorily.

As the result of a dispute with one of the leading local firms in the trade, the city painters' association of Regina, Sask., has branched out with a new experiment in industrial unionism by making contracts on its own account without reference to any employer. The dispute arose over the employment of two non-union men engaged in painting one of the city hotels. Their dismissal was called for by the union men engaged on the job, but the contractor refused to accede to the request, whereupon the men walked out. The men now refuse to return to work under 10 cents per hour, which rate of wages the employer refuses to pay.

Annual Reports of Builders' Exchanges

Efforts Made during 1909 and Previous Years—Working Steadily for the Betterment of the Industry—General Optimism Prevalent

The annual meeting of the Toronto Builders' Exchange held on Jan. 17th, was marked by good attendance and enthusiasm in the work of the institution. Reports of the secretary and treasurer, having been found most satisfactory, were duly passed.

Mr. A. Dinnis, president of the Exchange, reported for the Board of Directors the work which had come before that body during the past year. Mr. Dinnis pointed out that the personnel of the Exchange had been considerably changed during the past year owing to the membership cards which had been taken out by members of many of the more important city firms. He considered that the Exchange was now being operated



Mr. Arthur Dinnis, who was re-elected President of the Toronto Builders' Exchange.

on a most satisfactory basis. In all the various branches of the building trade the Exchange is holding a higher position than ever before. Mr. Dinnis gave a glowing account of the past year's activity and predicted good things for 1910. Reference was made to the affiliation of the Toronto Exchange with the Canadian National Association of Builders, which was accomplished last May. The Exchange rooms were thoroughly overhauled and decorated recently and the quarters are now most accommodating and comfortable.

Mr. P. L. Fraser enters upon his secretarial duties for 1910 with every encouragement—and incidentally, with several pet projects for making the Exchange absolutely indispensable to every progressive builder in Toronto.

The election of officers resulted as follows: President, Mr. A. Dinnis (re-elected); 1st Vice-President, Geo. Gander; 2nd Vice-President, Chas. Bulley; Treasurer, Jno. Aldridge. Board of Directors: Messrs. Chalkley, Jennings, Moore, Pears and Rumney.

Brandon, Man., spent \$160,000 upon civic improvements during 1909.

Good Year's Work at Montreal

The Montreal Builders' Exchange is to be congratulated upon its successful operation during the past year as revealed at the 12th annual meeting, a brief notice of which appeared in our last issue.

The annual report of the board of directors and financial statement were duly presented by the secretary-treasurer, Mr. J. H. Lauer, and these both being of a satisfactory character, were favorably received and unanimously adopted. In proposing the adoption of the report, the secretary drew attention to the work accomplished by the Builders' Exchange during the past year and to the wide range of subjects which were covered by these activities.

In the first place the most important move of the Exchange was to have well equipped offices of up-to-date and modern type; and in spite of the large financial responsibility involved, the whole additional expense has been met out of current revenue, and the annual statement showed a larger balance on hand at the close of the year than at the commencement. From handling a revenue of only some \$900 five years ago, this Exchange has now to provide "ways and means" amounting to nearly \$10,000 annually.

The most important local work in connection with the Exchange was the establishment of a Department of Permanent Exhibits, open daily to the public free of charge, the first of its kind in Canada. In presenting the building figures for the past year, the fraternity was to be congratulated on the record total established in 1909, almost \$20,000,000 in round figures for Greater Montreal. One danger that beset the contractor, was the anxiety to get work at any price, and this was the cause of a larger number of failures than usual during the past year. There was no reason to repeat this blunder, as there was ample work enough to go all round.

Mr. Lauer drew attention to the technical schools now being erected by the Quebec Government, and the urgent importance of not emphasizing the theoretical side to the exclusion of the practical. The new buildings offer ample room for the inclusion of the trade school, in which full scope can be given to the practical training of craftsmen.

The Exchange has exercised its customary supervision in matters pertaining to Federal legislation. Two important measures merit the attention of employers throughout Canada, namely, the endeavor to extend the operation of the Lemieux "Investigation and Industrial Disputes Act" to all current branches of trade, and the annual appearance of Mr. Verville's "Eight Hour Day Bill" on all Government public works. The most important fruit of provincial legislation was "Compensation for Accidents" bill, which, however, has not produced as favorable an effect upon insurance rates as was anticipated.

Improved prospects are held out for obtaining municipal contracts. In this connection the following extract from the report may be of interest: "It is a matter of congratulation to you as contractors and supply dealers, that, as a result of the Royal Commission, a new regime of better things in civic administration is assured in the near future. Under the new order of things, controlled

by a Board of Citizens enjoying public confidence, our members who have hitherto abstained from taking any interest in municipal works, from a hopeless conviction that no square deal could be had, should once more come to the front and secure their fair share of civic contracts. Your directors have also made application, and intend to follow it up with the new council, that copies of plans and specifications of all municipal works be filed at the Builders' Exchange so as to ensure a larger field of competition, and better prices for public works."

The election of officers for the current year, 1910, voted as follows: President, J. N. Arcand; Vice-President, Jas. Ballantyne; Board of Directors—A. Bremner, Jos. Brunet, E. G. M. Cape, K. D. Church, W. T. Castle, Thos. Gilday, J. W. Hughes, Wm. Rutherford, T. A. Morrison, Frank Pauze and E. W. Sayer. A cordial vote of thanks was unanimously voted to the retiring officers, the secretary and working staff, whose labors during the past year were greatly appreciated.

Activity at London, Ont.

The twelfth annual meeting of the London Builders' Exchange, which was held last week in the new quarters over the Bank of Nova Scotia, disclosed the most gratifying interest among the members, and the officers and directors have reason to be well satisfied with the results of their efforts during the last few years. The following were in attendance or represented: W. Pace & Son; I. Quick & Son; H. Stratford; T. R. Wright; Donald Ferguson; Jones Bros.; London Foundry Co.; Wm. Tytler; E. Martyn & Company; Jas. Moran & Sons; Geo. H. Belton; John Nutkins & Son; G. H. Gould; Sutherland Bros.; Scott Murray; A. & E. Nobbs; Geo. Young; Wm. Gerry & Sons; Purdom Hardware Company; Chas. Dyson; Wm. Stevely & Son; Jas. Cowan & Company; Dennis Wire & Iron Company; John Murray; L. H. Martyn; Thos. Redge; Fleming & Houghtby; John Whittaker; Geo. S. Gould.

In presenting the report of the work of the board for the past year, President Whittaker drew the attention of the members to the opening up of the new and commodious quarters on which they had taken a ten-year lease, and which were adapted both for business and social purposes. The Exchange, he felt, would continue to become of more and more benefit to its members. Mr. Whittaker believed that very shortly new building operations would be in full swing, and everybody would have a busy season. Feeling reference was made to the death during the year of Mr. Ed. Martyn, an esteemed member of the Exchange.

Among the recommendations submitted for approval was that the delegate to the Federated Exchanges' convention, to be held here next month, should urge that body to take up with the Association of Architects the matter of having a more satisfactory code of practice established, regarding the calling for and submitting of tenders.

It was decided to entertain the delegates to the C.N.A.B. convention at a banquet on one of the evenings and a committee was appointed to make the necessary arrangements.

The following officers were elected for the ensuing year: President, Geo. Everett; 1st Vice-President, John Jones; 2nd Vice-President, William Nutkins; Secretary-Treasurer, George S. Gould; Assistant Secretary-Treasurer, A. C. Nobbs; Auditors, D. Ferguson and T. R. Wright; Directors, J. Moran, E. Gerry, G. Belton, E. R. Dennis and W. T. Brown; Representatives on Western Fair Board: George Everett and George Belton; Delegates to the Canadian Builders' Convention, Messrs.

Everett, Ferguson and Stevely; alternatives, J. Jones, Stratfield and L. H. Martyn.

Votes of thanks were passed to the retiring president Mr. Whittaker, and to the secretary-treasurer, Mr. Geo. Gould.

The Work of the Quebec Exchange

At the annual meeting of the Builders' Exchange of Quebec, Que., Mr. E. T. Nesbitt was elected president and Mr. E. Cote, vice-president, for the current year. In addition to these gentlemen, the following were elected to the Board of Directors: Alex. Fackney, J. E. Bedard, Hector Jobin, Achille Dugal, A. G. Auger, Arthur Laforce, C. A. Vezina, P. DeCourcy and Chevalier J. Martineau.

President Nesbitt was chosen to represent the Quebec Exchange upon the corporate directorate board of the National Association of Builders. Those who will represent the Quebec Association at the annual convention of this body are Messrs. A. G. Auger, J. E. Martineau and P. DeCourcy. The report of the Board of Directors for the past year was read and duly confirmed, as were the reports of the secretary and treasurer. The latter showed a substantial financial balance to the credit of the Exchange.

In all respects the Quebec Exchange enjoyed a most successful year during 1909. The prospects for the current year are viewed with much optimism. Preliminary arrangements were made for a banquet which will be held in the near future. Mr. J. G. Lafaire is to be complimented upon the efficient manner in which he has discharged his secretarial duties.

Death of Mr. Randolph Macdonald

We regret to record the death of Mr. Randolph Macdonald, of the Randolph Macdonald Company, Limited.

Mr. Macdonald was born in Drummondville, March 30th, 1849, and was the son of the late Mr. A. P. Macdonald, who represented West Middlesex in the Dominion Parliament for a number of years. His connection with railways began early, and at the time of his death he was one of the best known railway contractors in Canada.

In 1870 he became a partner with his brother, under the firm name of W. E. Macdonald & Company. They built sections of the Intercolonial, sections 1 and 2 of the Lachine canal, and the Welland Basin, near Montreal, and the Fenelon Falls part of the Trent Valley canal.

In 1887 Mr. Macdonald was awarded the Don improvement contract by the city of Toronto, and he continued this work in partnership with Alexander Manning, contractor and capitalist, under the partnership name of Manning & Macdonald. From 1891 to 1903 they built the Port Dalhousie harbor works, the Midland Division of the Grand Trunk to Campbellford, Ont., the Esplanade works of Toronto, the Canadian Pacific Railway section on the Don river, the Toronto Belt Line Railway, section 18 of the Soulages canal at Coteau Landing, and section 9 at Coteau-du-Lac, these two sections costing \$1,200,000, and the St. Lawrence river improvements at Cornwall. Mr. Macdonald purchased the Manning interests in the firm, and carried out a harbor contract at Three Rivers, Que., and other dredging contracts.

The late Mr. Macdonald was 60 years of age. He is survived by his wife, a daughter and two sons. One of the latter is Mr. Wm. R. Macdonald, a member of the Macdonald Company, Limited.

New Bridges at Vancouver, B.C.

There is probably no better indication of the commercial development and prosperity of a city than the number and condition of its bridges. This, of course, does not apply to an inland town, where bridges are unnecessary; but to a city situated as Vancouver is, on both sides of an arm of the sea which practically divides the city into two parts, the subject of bridges is a most important one.

The first means of transport across False creek, Vancouver, was a rudely constructed raft of cedar logs, used by the early settlers whose business took them over the trail between Gas Town and New Westminster. Later on, when the Government constructed the Westminster Road, the present timber structure, which has spanned

more quickly opened and closed than any other type. The new bridge at Granville street is a very handsome structure, consisting of 25 plate girder spans and a draw span, the latter being 265 feet in length and presenting two channels of about 90 feet in the clear.

The main piers of both of these bridges were sunk to bed rock by what is technically known as the pneumatic process, and are sufficiently deep to provide for the future deepening of False creek without in the least affecting their stability. This class of pier work was something entirely new in this part of the country, and necessitated an enormous quantity of plant and equipment, but notwithstanding this it was carried out by the contractors without a hitch, much to the satisfaction of the consulting engineers and the city authorities.

The principal dimensions of the bridges are as follows:

Granville street:

Length of steel work, feet	2,065
Total length, inclusive of approaches, feet	3,290
Number pedestal piers	50
Number pneumatic	4
Quantity of concrete, cubic yards	5,300
Number of barrels cement used	6,000
Total cost, about	\$500,000
Weight of steel in superstructure, tons ...	2,375

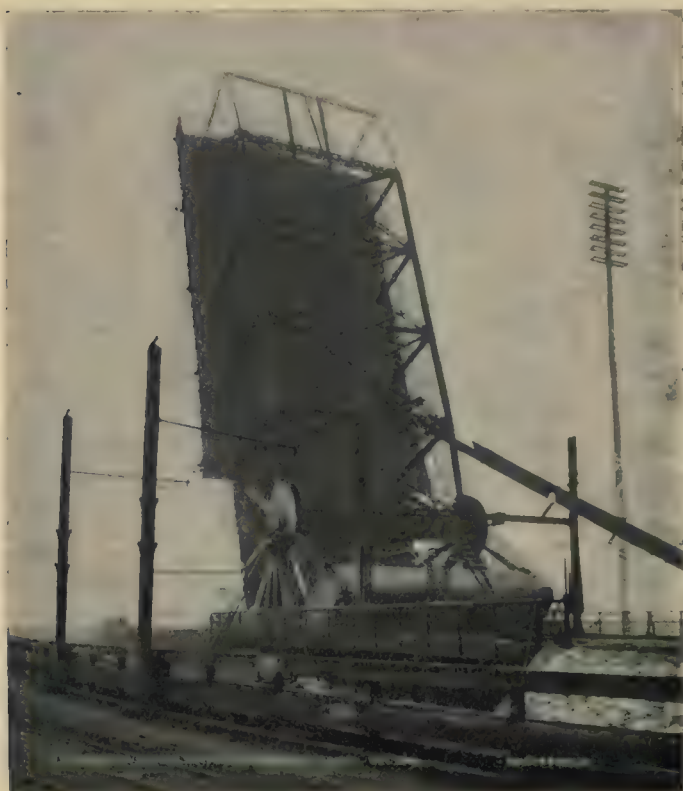
Westminster avenue:

Length of steel work, feet	280
Number pneumatic piers	4
Number abutments	2
Quantity of concrete, cubic yards	2,000
Number barrels cement	2,300
Weight of steel, tons	500
Total cost, about	\$180,000

It is a coincidence worthy of note that the old bridges at Granville and Cambie streets were both built under the supervision of Mr. W. H. Armstrong, now senior member of the firm of Armstrong, Morrison & Company, the contractors for the new steel structures.

One hundred and fifty employees of the Seaman, Kent Company, Limited, were entertained recently at the first annual banquet given by the firm. The representatives of the company and guests present included W. B. Seaman, J. M. Sparrow, J. D. Lowery, M. Rowland, G. Kastner, F. Kent, Major Cleland, Dr. Clarke, W. A. Moore, J. A. Simpson, J. A. Sinclair, etc., etc. The various items on the menu card were of a most delectable variety made up of such palatable courses as "Beaver brand salmon," "kiln-dried turkey," "bundled chicken," "selected white shavings," and so on. In the course of one of the addresses it was stated that 25,000 tons of freight had been shipped out of Meaford last year and that half of it issued from the works of the Seaman, Kent Company. The company is to be congratulated upon the success of the function and also upon the growing popularity of the "Beaver Brand" of hardwood flooring.

The C.P.R. claim that with the 1,760 miles added to the system during the past year it has taken the premier place for mileage amongst the railroads of this continent. The C.P.R. now has 10,048 miles of road in Canada and nearly 5,000 owned or controlled in the United States, making a total of 15,000 miles. This is nearly 3,000 miles more than its largest competitor in the United States, the New York Central, which between owned and controlled lines has 12,524 miles.



New Westminster Avenue Bridge, Vancouver, B. C.
—Bascule Raised.

False creek at Westminster avenue for so many years, was built, and since then has served to carry the traffic between the business part of the city and Mount Pleasant. The next bridge to be built was the one at Granville street, and later on the present structure at Cambie street was erected. These were but rude beginnings when compared with the splendid steel and concrete structures recently completed by Messrs. Armstrong, Morrison & Company, contractors, but they served their purpose and at the time were considered a big undertaking.

The new bridge erected at Westminster avenue is something of a novelty in bridge construction for this part of the country, the draw being of the Bascule type instead of the ordinary swing span. Where this type of bridge can be built, it has a decided advantage over the other type, presenting, as it does, a free and uninterrupted channel for the passage of craft. It is also

Bridge Framing Problems—Wood vs. Steel

Some Surprising Achievements in Heavy Timber Framing, old and new — Advantages for certain kinds of Bridges

By J. B. KIDNER.

It cannot fail to be of interest to know that there is at least one portion of Canada where the humble wood is still holding its own in a large measure as a constructive material.

The province of New Brunswick is entirely different in its physical conformation from many other parts of the country. Instead of vast plains stretching away for hundreds of miles, the face of the eastern province is broken up in every direction by hills and valleys, brooks and streams, lakes and rivers. As a consequence, bridges innumerable have to be provided on all the highways of the land and these are all in charge of the Provincial Government. The department of public works, with a staff of skilled engineers and designers, is kept busy with the construction and maintenance of bridges of all sizes and descriptions, varying from small bridges over creeks and streams up to huge spans of 300 feet and over.

In consequence of this demand, the matter of the best designs and materials for bridge work has been particularly studied by the government experts in charge of the public construction work of the province.

Formerly, of course, all the bridges were of wood, and many fine examples still remain to attest the skill and ingenuity of the bridge carpenters of a generation or so ago. Such a one as is shown in fig. 1, where wooden trusses of 240 feet span, resting on cribwork piers, are depicted, calls forth the admiration of all true lovers of craftsmanship. For it must be remembered that the problem of designing and constructing a wooden bridge of such a span was a vastly different task from that which confronts the modern designer of steel structures of similar size. With his formulas at hand to guide him, the modern draughtsman can go ahead and design his bridge with perfect confidence that the steel works can meet his every requirement in plate and girder, bar and bolt, rivet and pin.

But it was otherwise with the men who planned the old wooden structures, such as that shown in the illustration, whose first thought before putting a pencil to paper was as to what sort of timber could be obtained and in what lengths and sizes. Then came the problem of designing the joints; a matter which gave play to great skill on the part of the old engineers. For the points of failure in wood construction are almost always at the joints; which must therefore be scientifically de-

signed and properly divided with suitable fastenings of straps, bolts, etc.

The second illustration is a view taken at the other end of the long bridge (over half a mile in length), where the wooden trusses of the first picture were taken. As will be seen, a modern steel bridge is being erected on granite piers, the steel being supported during construction on a temporary platform carried on piles driven in the river bed. This picture shows the contrast between a modern granite pier and an old cribwork one.

But while steel holds the field for large bridges, it is otherwise with those of small span. For some years after the introduction of mild steel in construction, the Government engineers built all their new bridges of that material, but for several years past that policy has been abandoned and for all spans up to 180 feet, wood has been resorted to once more.

A number of reasons have led to this re-adoption of wood, one of the most important being the great cost of



Fig. 2.—Steel and Granite Replacing Wooden Spans and Crib Work.

maintenance of steel bridges. Every third year a steel bridge requires to be very thoroughly painted with a heavy coat of either the well known carbonized coating paint, or a graphite compound.

The cost of painting a span of the size mentioned (180 feet) is from \$300 to \$400, and even then there are likely to be enclosed portions which cannot be reached and where oxidization may be doing its dangerous work in rusting and decaying some important fastening.

With the modern wooden bridge, however, not one penny need ever be spent on paint, with the one exception of a coat of hot tar which is given the joints as they are put together in the first place. There is little doubt also that the life of such a covered wooden bridge will greatly exceed that of a steel one, a recent estimate by a leading designer of these structures placing the duration of the former as at least 100 years. Of course, during that period the cedar shingles of the roof would require renewing several times; the life of cedar shingles being only about 25 years. The modern steel shingles will, however, undoubtedly last much longer than those of cedar, and may not require renewing more than once in a century.



Fig. 1.—Wooden Truss of 240 feet span.

Another important question is that of the up-keep of the floor of the bridge. The usual floor is composed of a planking of hemlock overlaid with a top floor of hardwood, usually birch or maple. In the case of the steel bridge, open to all weathers, it is invariably found that the hardwood upper flooring rots long before it wears out, and thus requires frequent renewal. But with the covered wooden bridge, the reverse is the case, and the hardwood flooring will wear down to the thinnest possible piece before showing any signs of rotting. On the question of the cost of maintenance then, the evidence is all in favor of the wooden as against the steel bridge.

But there is another consideration of great weight and that is that in many cases the cost of transportation of steel to the site of the structure would be enormous. Many bridges are necessarily in remote portions of the country, away from railroads and water carriage, while the forests all about afford endless supplies of timber on the spot. If no sawmill exists within reach, a portable mill is easily obtainable, and these, with the addition of a blacksmith's shop, will provide



Fig. 3.—Typical Modern Wooden Bridge before being covered.

all the equipment necessary for carrying out the work. Fig. 3 is a view of a modern wooden bridge, the trusses being of the Howe type.

Municipal Improvement in the West

Many municipal improvements are being carried out in the cities of the west. The accompanying table shows that eleven cities now have 640 miles of sidewalks, 345 miles of sewers, and 416 miles of water mains. In two years the increase has been respectively 31, 38 and 43 per cent.

	Water Mains			Sewers			Sidewalks		
	1907 Miles.	1909 Miles.	P.C. Inc.	1907 Miles.	1909 Miles.	P.C. Inc.	1907 Miles.	1909 Miles.	P.C. Inc.
Brandon.....	16.35	19.35	18.8	14.00	16.77	19.8	26.	31.5	21.1
Calgary.....	26.7	48.5	77.9	19.00	44.00	131.5	19.	47.	142.0
Edmonton.....	32.30	41.34	28.0	24.97	41.87	68.0	46.2	57.05	11.3
Lethbridge.....	6.00	18.50	208.3	5.00	8.0	60.0	4.20	17.25	310.7
Medicine Hat.....	8.50	12.70	50.0	1.20	3.80	21.60	.....	5.38	.....
Moose Jaw.....	9.10	19.75	117.0	7.00	10.50	50.00	7.50	16.50	120.0
Portage la Prairie.....	9.00	11.00	22.2	9.00	11.00	22.2	15.79	21.00	31.00
Prince Albert.....	4.00	9.60	140.0	2.91	5.83	100.00	.....	.....	.....
Regina.....	8.50	20.50	142.3	7.25	19.00	162.00	19.50	41.00	110.2
Saskatoon.....	.....	9.62	.....	2.00	9.62	381.00	3.00	10.46	248.6
Winnipeg.....	170.00	205.72	21.00	159.75	175.50	16.1	347.00	393.50	13.1
Totals and inc. P.C.....	290.45	416.58	43.00	252.08	345.89	38.00	488.19	640.64	31.00

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

1917. Agents—A Scottish firm manufacturing fire bricks, sewerage pipes and all kinds of fire clay goods wishes to enter the Canadian market, and is prepared to appoint agents.

1921. Agent—A firm in the English midlands desires to appoint a Canadian agent for the sale of their gas, steam radiators and other heating apparatus.

1931. Pulleys and lifting tackle—A London firm manufacturing pulleys and lifting tackle is prepared to appoint Canadian resident representatives.

8. Sewage machinery, etc.—A firm in the English Midlands manufacturing all descriptions of sewage machinery, refuse destructors, steam disinfectors and general sanitary appliances, hydraulic tools, roofs, bridges, girders, engines, boilers hoists, pumps laundry machinery, etc., wishes to do business with actual users of such machinery in Canada.

M. G. McArthur, Guelph, is stated to be a candidate for the city engineer's office at Victoria, B.C., which is now vacant owing to the resignation of Mr. C. H. Topp.

City Clerk Littlejohn, of Toronto, who has been ailing in health for some time, has obtained two months' leave of absence and gone to Bermuda.

Toronto fire losses during 1909 totalled \$740,932. The figures for 1908 were \$1,073,990. The actual loss on buildings during 1909 was \$283,585.

The mileage of railways in actual operation in Canada during the year 1909 was increased 1,138 miles, as compared with 514 miles in 1908, according to a blue book on railway statistics placed on the table of the Commons last week. 24,104 miles are now in operation in Canada.

The C. N. R. is planning important extensions radiating from Edmonton, Alta. Branches will run to Calgary, Peace River, Yellow Head Pass, the Pacific Coast and the prairie country. Work on the main line west will be rushed next season and supplies are now being sent forth. The company is preparing to build into the grand prairie country next summer and surveyors are now in the field running preliminary lines.

Estimating by a Reliable Uniform System

The Fourth of a Series of Practical Articles Designed to Illustrate the Advantages of Up-to-date Figuring—Plumber Work

Specially Contributed by W. M. BROWN, C. E.

In measuring the plumber work we begin at the roof, taking note of the materials adopted for hip rafters, valley gutters, flushings and aprons at chimney stacks, rooflights, etc. It is the most natural way to commence at the roof material and outside work, as it is generally the first to be completed, before the internal fittings are finished or in operation. The class of material for the roof will be regulated by the various requirements for the proper protection of the property from fire, or from climatic or atmospheric influences. The cost to be expended will also regulate the class and quality of material to be utilized.

In this case the material is 12-inch galvanized iron for valleys, flushings around dormer, roofs over verandah and oriel, chimneys, etc., which are to be made thoroughly watertight, measure per lineal foot. Galvanized iron ridges measured per lineal foot, and charge finials price for each, describing same according to catalogue. Supply and place around eaves a 10-inch galvanized iron eavetrough, the lineal measurement to be taken, and allow for slips at joinings. Enumerate the raised corners, as per plan, and charge a price for each. Supply carpenter with 3-inch x 8-inch galvanized saddles for hips, charge price for each. Verandah, oriel and dormer roofs to have an 8-inch galvanized iron eavetrough, to be lineal measurement, and allow at slips as before. Enumerate and price raised corners as before. Supply carpenter with the necessary 3x8 galvanized saddles as before. Three-inch corrugated cast iron conductors from main roof, and 2-inch corrugated cast iron conductors from verandah, oriel, and dormer roofs, to be measured and priced per lineal foot. The whole of the above galvanized iron work to be done in the best manner, with the best quality gauge galvanized iron, to have all cross seams well rivetted, and the whole thoroughly soldered.

After all the exterior work has been noted down, then we take all the internal pipes and fittings. The cold supply from the main should be measured first, taking generally from the centre of the road or street, to the house, and led up through the apartments, where the water closet, bath, sinks and hot water tank are fitted up in their respective places. There may be more pipe required for one house than another of the same dimensions and character; for owing to the different arrangements of the apartments where the fittings are situated, the main supply and soil pipes, etc., may require greater lengths than what would be adequate for a more convenient arrangement. The supply pipes to bathroom and hot water tank may be greater in length in some cases than others, owing to the distances to travel between the hot water tank and bath and wash hand basin. The arrangements are dependent upon the architect's plans, and it is for the plumber to use his practical knowledge in adopting the nearest method possible of leading his pipes that will be consistent with the best sanitary requirements and efficiency. The following are the pipes and fittings, with their connections as specified:

Soil Pipe—Soil pipe to be 4-inch in diameter, sound and free from flaws or other defects, to be of a uniform thickness of at least one-quarter of an inch, and coated with coal oil; the soil pipe to be continued as straight as possible through the roof, the full size at least three

feet above the roof, and connected to a 4-inch vitrified tile drain outside of building, and to be provided with a brass ferrule and caps for cleaning. All joints to be properly caulked with oakum and molten lead, joints between cast iron and lead pipes to be made with brass ferrule and wiped joints. Wherever soil pipe passes through roof, a watertight joint to be made, providing a flashing of sheet lead of the proper size for around same. All changes in direction of soil pipe to be by bends, and all branches to be Y branches. Iron soil pipe to be supported with strong hooks and hangers, as the case may require. After completion of soil pipe, and before any fixtures are attached, all openings in waste or vent pipes to be plugged, and the whole system filled with water and allowed to stand for 24 hours to test pipes.

In measuring soil pipe take the shortest method of travel, not down length, allowing for slips and charge



East Elevation

per lineal foot; also keep traps, ferrules and wiped joints separate, and charge same price for each respectively.

Boiler—Supply and place in kitchen where directed on proper cast iron stand, one galvanized iron range boiler of 85-gallon capacity, with the necessary connections to range and to system, and leave same coupled. In measuring this, take price of boiler separate, then the connecting pipes per lineal foot, couplings at connecting price each. Hot and cold water taps to be priced each.

Water Closet—Supply and place in bathroom, one syphon jet closet combination, golden oak finish, push button, flush properly connect in place and supply with $\frac{1}{2}$ -inch water supply. In measuring this, take water closet separate price. Measure then supply or service pipe to closet from cistern, charge any bends, couplings, or wiped joints a separate price each.

Bath—Supply and place in bathroom, one first quality enamelled iron bath, 5 feet 6 inches long, with 8-inch roll rim, nickel plated fuller taps for hot and cold water, combined waste and overflow, plug and chain, properly connected to soil pipe with $1\frac{1}{2}$ -inch lead waste

and centrifugal bath trap, and supply with hot and cold water. In measuring this, charge for bath a price. Take the different pipes connected therewith per lineal foot and price. Charge taps for hot and cold water separate (each), also plug and chain, and centrifugal bath trap as specified.

Lavatory—Supply and place one enamelled iron lavatory with 8-inch back, with plug and chain, nickel plated fuller taps for hot and cold water, nickel plated centrifugal trap, waste and supply pipes, all to be properly supported and connected to soil pipe with 1½-inch lead waste pipe. In measuring this, note down all the separate details, and price in a similar manner as described for bath.

Sink—Supply and place one enamelled iron sink, 16-inch x 24-inch, properly supported on iron brackets with holes to secure wood run to, to be supplied with hot and cold water in ½-inch water service, fuller taps, 1½-inch lead waste pipe and centrifugal trap with break syphon vent, all properly connected to soil pipe.

In measuring this, note down all the separate details, and price in a similar manner as described for lavatory.

Laundry—Supplying and fitting up two division laundry tubs, supplied with hot and cold water, fuller taps, and to have break syphon trapped waste, properly connected to soil pipe. Provide 2-inch trapped connection with strainer cover to soil pipe in floor near laundry tubs.

In measuring this, note down all the separate details, and price in a similar manner as described for sink.

Water—Bring water from street line in ½-inch galvanized iron pipe, putting in a lawn hydrant with stop and waste where required, and connect to the system; supplying heavy stop and waste cocks for turning off, the whole of the exposed pipe work to be nickel plated, all other water pipe work to be galvanized iron, all waste pipes to be of cast iron or lead, and all connected together in the best and most workmanlike manner.

In measuring this, take each item separately and price at current rates.

Advantages of the Uniform System in this Department

In contracts where lead, copper, or other heavy material are adopted for the roof work, then certain allowances would be given which might be overlooked in framing the estimate in a loose and haphazard manner. In the case of lead, copper or zinc, all overlaps are taken and added to the length. All straps or "clips" securing ridges or hip rafters to be enumerated and priced each. All ornamental eaves of outside conductors, and lead or galvanized iron eaves securing service pipes at closets, to be enumerated and priced.

All wiped joints on lead pipes to be enumerated and priced. All bends formed on lead soil and waste pipes to be enumerated and priced. The iron eave gutters to be measured to extreme points both ways, and extra to be charged for angle pieces according to class, such as right angles, obtuse angles, acute angles, or specially made angles, and to be described as such and priced. All lead, copper or other material formed to any uncommon or elaborate shape, to be described and priced as such for extra labor entailed. The prices will be regulated in a great measure according to the kind of contract to be done, its convenience and facility of execution, and the degree of high-class finish adopted.

An Ottawa painter, named John Preston, came into a legacy of \$50,000 last week, upon the death of his god-father in England.

Trade News from Montreal

No Serious Losses from Frank Gilbert's Assignment — The Ice Palace Contractor's Problems

Montreal Office of the "Contract Record."
January 24th, 1910.

The assignment of Mr. Frank Gilbert, of Westmount, was announced at the latter end of the week. Mr. Gilbert was well known through the extensive dredging operations he was engaged in, and the news of his failure comes as a surprise. From the statement issued it is apparent that his creditors were not heavily involved, the liabilities being announced at \$66,036, with assets of \$62,960, plus a third interest in a claim against the Government.

John Murison's Failure

The winding up of the estate of Mr. John Murison, the Montreal contractor who assigned a short time ago, is being proceeded with. The liabilities are announced at \$150,000, with assets of about \$80,000.

Mr. Murison left unfinished a number of contracts, including the erection of Point St. Charles' Congregational Church, four houses, and three National Transcontinental Railway contracts. He was interested in a plumbing business in Westmount and owned a stone quarry in Outremont. Insufficient capitalization to carry out his different projects seems to have been responsible for his failure.

Modern Paving Company Take Action

Messrs. R. Brunet and E. Belanger, of the Modern Paving Company, have each entered an action for \$10,000 damages against Mr. J. H. Anderson, who a short time ago petitioned for a judgment for seizure of their funds in the Banque Nationale, and later for an order to liquidate their business. The actions allege injury to their business due to the course pursued by defendant.

The LaPrairie Brick Company, Limited, have increased their capital stock from \$800,000 to \$1,000,000.

Local Firm's Great Rock Crusher

The largest rock crusher in the world will be one of the features of interest at the rock crushing plant which Messrs. Laurin & Leitch, the well known Montreal firm of contractors, will have in operation at Outremont within a few months. They have contracted with the Montreal Water & Power Company to build a reservoir about 800 feet long and 400 feet wide on the side of the mountain, and as the contract must be completed within four years, one of the problems involved was the economic disposal of the rock which is to be excavated. In view of the large and increasing demand for crushed stone for concrete and other purposes, they decided to erect a plant of sufficient capacity to take care of all the rock which might accumulate during the progress of the work. Having visited the largest and most modern crushing plants in the United States, especially in New York and Michigan, Messrs. Laurin & Leitch selected the Gates gyratory breakers as those best suited to their requirements, and gave to Allis-Chalmers-Bullock, Limited, the contract for the complete equipment. It will involve an expenditure of upwards of \$200,000.

Another serious problem was to arrange a plant of such proportions on the land available in that locality. Messrs. Laurin & Leitch purchased a site about 1,000 feet away from the reservoir and have arranged for direct connections with both the electric railway and the

C.P.R., while the quarry cars will be hauled along two incline railways from the reservoir to the edge of the crushing plant property. There will be a powerful hoisting engine capable of lowering four cars, each carrying 20,000 pounds in one train over the incline of 1,000 feet, at the rate of 250 feet a minute. The incline will be operated with two barneys, so that, if desired, an additional train of rock may be elevated to the crusher plant without letting the empties down as the barneys carry the rope back. By this method no coupling or uncoupling of trains will be necessary. Two additional hoists will operate separately, each taking one of these loaded cars at a time, elevating it to the crusher, and, after it is dumped, lowering it to the bottom of the incline again. Steam shovels will be used for loading the quarry cars.

The principal rock crusher, known as a No. 21, weighs 240 tons and has a capacity of 10,000 tons in ten hours, or about 500 railway car loads daily. This machine receives the largest pieces which it is practicable to take from a quarry and crushes them without the need of any preliminary breaking by sledge, hammer or secondary blasting. There are two discharge openings through which the crushed product leaves the machine, instead of only one which is usual with smaller breakers. It is thus possible to build the machine lower and make it more stable. The broken rock from each spout will fall into large steel frame elevators, which in turn, will deliver it into heavy steel frame screens, each 6 feet wide and 22 feet long, with $2\frac{3}{4}$ -inch perforations. The rock which escapes this mesh will be conveyed to several of the No. 6 Gates breakers, equipped similarly, though on a smaller scale, with elevators and screens. To care for such an enormous amount of stone daily there will be a carefully planned system of storage piles and bins, while the tracks will be arranged in such a way that crushed stone can be loaded by steam shovels into either railway cars or horse carts.

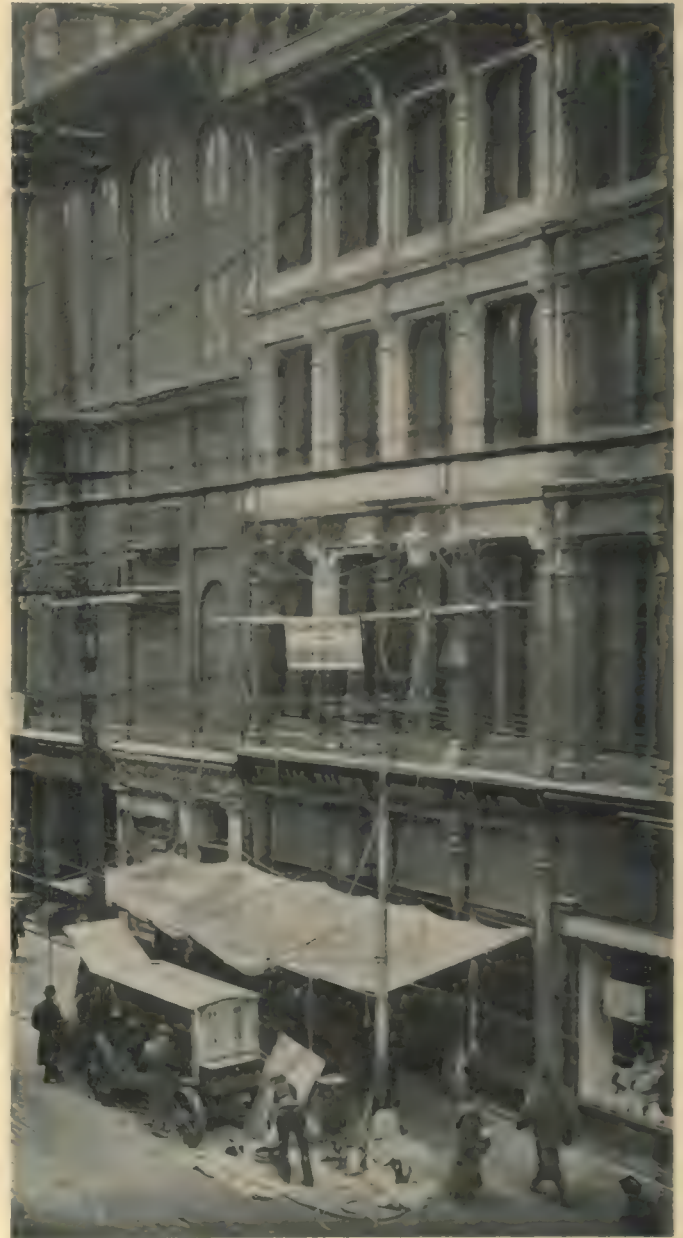
Having purchased the largest rock breaker in the world, Messrs. Laurin & Leitch determined that the rest of the equipment should be of the most modern character. The entire plant will be driven by a 700 h.p. triple expansion engine, and a cooling tower will be erected so that the engine may run condensing. Electric power will be used whenever it is advantageous, and the firm will have their own electric plant, consisting of a 175 k.w. alternating current generator belted to the main shaft of the engine, switchboard, transformers and other apparatus. The smaller breakers, elevators and conveyors will be run by induction motors. Even the rock drills will be operated by electric power. When completed the plant will be the largest of the kind in Canada. Allis-Chalmers-Bullock, Limited, will act as consulting engineers in connection with the erection and operation of the plant.

Interesting Sand Cleaning Process

The operations of the Canadian Sand Blast Company, at the corner of McGill and St. James streets, during the past week, have been watched by continuous throngs of interested spectators. This company have the contract for cleaning and renewing the sand stone fronts on several of the older business buildings on this important thoroughfare and are employing methods entirely new in Canada.

The plant and equipment used by the company is quite neat and compact and has the advantage of being readily portable, allowing transference from point to point as required.

The machinery consists of an Abenque air compressor, direct connected to a 10 h.p. gasoline engine. These are mounted in line on steel beams and connected by large spur gears of such size as to allow both engine and compressor to run at their most efficient speeds. The air receiver and gasoline tank are located under the beam and the unit is entirely self contained. The compressed air is connected in turn to a Buckeye sand blast machine and a very sharp and gritty sand is employed for the cleaning process.



Sand Blast Cleaning by a New Principle.

An idea of the remarkable effect obtained by training the air-driven sand against the building can be observed from the accompanying photograph, which shows the Canadian Sand Blast Company at work on St. James street, one of their first contracts. In the picture may be noted the canvas arrangement to catch the sand as it falls from the building, practically no inconvenience being felt by the public even on this busy thoroughfare, as a result of this protection. The workmen are themselves specially garbed and well protected against the flying sand particles.

The portable Abenague air compressor unit and the Buckeye sand blast were supplied by the well known firm of Mussels, Limited, of this city, Canadian sales agents for these machines. Mr. Colby, the manager for the Canadian Sand Blast Company, has made contracts for renewing several of the down town buildings, and already the old section of the Queen's Hotel building and several of the C.P.R. sheds have been cleaned by this new process.

Progress on the Ice Palace

The work of Messrs. Corriveau & Brunett, contractors for the erection of an ice palace for the Montreal Carnival Committee, has been proceeded with during the past two weeks under the greatest of difficulties. The weather during that period has continued mild, and extremely so during the last week, making their task doubly difficult.

A staging was erected close to the car tracks to facilitate the unloading from the flat cars supplied by the Street Railway Company, but objection was taken to the entailed delay to the passenger traffic, and this method had to be abandoned and the ice roughly rolled from the cars with the assistance of all the workmen.

The first ice, supplied from the Back river, was of very poor quality, and it is feared that the foundation work made with this ice may not prove satisfactory and durable.

The contractors have also had trouble with their staff of workmen, finding it difficult to keep their night gangs on hand. The element of danger entered into the work, due to the misty rain, rendering footholds insecure. This difficulty was partly overcome by supplying the workmen with new rubbers.

In the face of their numerous troubles, the contractors have made excellent progress and expect to have the work nearly completed on time. At the present time two derricks are employed in raising the ice for the central tower, which will be 90 feet above the ground level.

Items of Interest

Mr. Kenneth G. Rae, architect, Beaver Hall Hill, has returned from Europe after spending a month on the Continent.

Congratulations to Architect J. Z. Resther, re-elected alderman by acclamation for Centre Ward.

The students of the Faculty of Applied Science, McGill University, are appreciating Mr. G. W. Cowie's series of lectures on Harbor Engineering. Upwards of 100 are taking the course delivered by the chief engineer of the harbor commission.

Mr. Dakers Cameron, B.A., has resigned the secretaryship of the Montreal branch of the Canadian Manufacturers' Association.

Mr. H. W. Weller, of Montreal, manager of Babcock & Wilcox, Limited, was in Winnipeg recently and signed an important contract with the Winnipeg Electric Company for the supply of boilers required for an auxiliary steam plant to be installed in that city. It is estimated that the boilers will cost \$35,000.

It is reported that the John McDougall Caledonian Iron Works Company, Limited, will erect their recently destroyed foundry building in Three Rivers, Que., in lieu of again building in Montreal.

Mr. Patrick McGovern, of Boston, the contractor for the Montreal conduit, has presented the water committee with an account of \$12,229 for supplementary work in connection with his contract.

New President of the R. A. I. C.

Mr. A. F. Dunlop, R.C.A., of Montreal, who was president of the Royal Architectural Institute of Canada, recently resigned from this position, which he had held for two years. At a meeting of the executive council of the Institute at Montreal, on the 18th inst., Mr. F. S. Baker, F.R.I.B.A., of Toronto, was elected president to fill the vacancy.

While the Institute will regret the loss of Mr. Dunlop, the resignation of this gentleman was not entirely unexpected, and we venture to think that the election



Mr. F. S. Baker, Toronto, who has been elected President of the R. A. I. C.

of Mr. F. S. Baker, who is well known, and popular in the profession, is a wise choice.

Mr. Dunlop expects to be absent on the Continent during the greater part of the current year.

Nineteenth Annual Meeting of the P.Q.A.A.

The nineteenth annual meeting of the Province of Quebec Association of Architects took place at the City Hall, Quebec. The report of the council, and also that of the treasurer, were presented, and were of a most satisfactory nature. The election of officers also took place and a number of other matters were settled. The visitors were tendered a banquet at the Chateau Frontenac. At this function, honor was paid to Mr. F. X. Berlinguet, who has just passed the 60th anniversary of his practice as an architect.

Among those present at the banquet were the following: Sir Francois Langelier, Hon. J. C. Kaine, Messrs. T. Raymond, Maxwell, J. S. Archibald, J. R. Gardner, A. R. Decary, David Brown, E. Resther (retiring president), C. S. Burgess, H. Vallance, Jos. Venner, J. P. Ouellette, R. P. Lemay, G. E. Tanguay, L. E. Auger and W. D. Baillarge.

The officers elected were as follows: President, Thomas Raymond, Quebec; 1st Vice-President, J. R. Gardiner, Montreal; 2nd Vice-President, L. Lemieux, Montreal; Treasurer, W. Maxwell, Montreal; Secretary, J. E. Vannier. Council: J. Z. Resther, Montreal; J. Venne, Montreal; H. Vallance, Montreal; Jos. P. Ouellette, Quebec; G. A. Monette, Montreal, and K. G. Rea, Montreal.

Possibilities of Cement as a Road Material

Mixing Cement with Asphaltic Base Oils — Lessons Obtained from a Study of the Roman Roads — Suggested Improvements

Lime-cement concrete is the oldest road material that we have any record of. The Roman roads, which were of this type of construction, are the only ones which have endured for any great length of time. The Appian Way, which is undoubtedly the best type of Roman road, was begun by Appius Claudius, 312 B.C., and parts of it are in a remarkably good state of preservation to-day. We know perfectly well that any of our modern Portland cements are far superior in strength and durability to the lime mortar used by the Romans, and yet I have never seen a road built of Portland cement concrete that I considered altogether a success. There are two characteristics of Portland cement concrete which in my opinion bring about the failure of roads constructed of it. The first is the tendency of concrete, where exposed as in a road surface, to develop shrinkage cracks. These cracks are generally parallel to the road, and increase in size as time goes on. The second characteristic which brings about failure is the ease with which concrete spalls along the margins of cracks. I have never seen a concrete road fail through what I thought was due to expansion, but it is the general practice to place expansion joints at right angles to the line of concrete roads at frequent intervals, and the road suffers from much spalling at these joints.

It is perfectly apparent to anyone who has made a study of the subject that there could be no better form of road construction, at so low a cost, to meet only automobile traffic conditions than a cement macadam road. The most durable types of rock could be used as an aggregate, which would give maximum life to the road, and it would be practically dustless. So apparent is this, that in the endeavor to use Portland cement in road construction much ingenuity and refinement have been resorted to, but with the exception of a few isolated cases, real success has not been attained.

It might be appropriately asked: Why have the Roman roads stood varying conditions for so many centuries? I believe that a consideration of this point might be helpful in meeting our present conditions.

In the construction of Roman roads of the best type, a trench about 3 feet deep was excavated the entire width of the road, and wherever poor material was present it was removed and replaced by suitable material, and the whole subgrade was thoroughly compacted by ramming. Generally four distinct layers were placed in these roads. The bottom course, or *statumen*, was composed of two courses of stones placed in lime mortar. On top of this was placed the *rudus* or rubble, which consisted either of broken stone or, when available, broken bricks, potsherds, etc. When the latter composed the aggregate, more lime was used in the proportion of 2 to 5. This course was very thoroughly rammed, and was usually about 9 inches thick. The third course, or *nucleus*, was composed of old building material, such as brickbats, broken tiles, etc., mixed with lime in proportion of 1 to 3. This course was not rammed and the sand was mixed hot. Above this course came the top or wearing surface, called the *summa crusta*, which was made of blocks of flat stone set in mortar and fitted together with great refinement. It

can be seen that the third layer, or *nucleus*, was much softer than any of the others, and was placed purposely below the top layer, which was designed to take the wear of traffic.

This type of road was undoubtedly the result of much experience. There are four distinct features which I consider worthy of the fullest consideration. First, an absolutely secure foundation was always obtained; second, a resilient or cushion layer was placed just beneath the wearing surface; third, the four layers composing the road had different coefficients of expansion, which would probably preclude the development of definite lines of stress brought about by contraction; fourth, the exposed or wearing surface was composed of a material which would not only withstand the wear of traffic, but atmospheric conditions as well.

We frequently hear the statement that the Roman method of road building is a lost art, and that we cannot build roads to-day of a similar character. This is altogether a mistake. We could not only build similar roads, but roads which, under the same conditions, would be more durable. A road of the Roman type under modern city traffic conditions would last only a few years, and would probably cost \$250,000 a mile to build. The traffic they were subjected to consisted of light vehicles and unshod horses, and the fact that unshod horses were used leads one to believe that an earth cushion was probably maintained on the surface of these roads, as otherwise a horse would go lame after 50 or 60 miles of travel. The portions of Roman road that we find intact to-day are those which have either been subjected to very light traffic or have been completely covered up with earth for long periods of time. In most cases we find only portions of the foundations.

The nearest approach we have to the Roman road to-day is the best type of paving brick, laid on a concrete foundation with a 2-inch sand cushion, and this type of road suits automobile traffic admirably, but is very hard on the feet of horses. As far as I have observed the concrete foundations, both for brick pavements and asphalt streets, rarely crack except from faulty foundations. The contraction cracks, therefore, I believe, are due to no fault in the cement, but to the great range of temperature to which the road surface is subjected, and the fact that it is generally laid during the warmest season of the year, when expansion is greatest. This view is further upheld when one considers that concrete floors and pavements laid on earth foundations inside of buildings rarely crack.

Whether this view of the matter is correct or not we know that concrete roads at present are not satisfactory, and our next consideration is whether they can be made so. Concrete has been almost universally adopted as a foundation for almost all types of heavy traffic pavements. It gives perfect satisfaction when protected from direct exposure, and whether methods of construction, or treatment, can be devised by which concrete can be used as a wearing surface for roads is a matter for investigation.

It is my belief that in most concrete roads the concrete is too uniformly mixed and too homogeneous in composition. This may account, in a measure, for the development of shrinkage cracks, where the surface is

* A paper read before the Association of American Portland Cement Manufacturers by Logan Waller Page, Director of the office of Public Roads.

exposed to a great range of temperature. Concrete is also too unyielding to the blows of traffic and too brittle, both of which characteristics facilitate spalling. It seems to me that a pavement can be made which, to some extent, will obviate these undesirable characteristics, and I would suggest the following general specifications:

About 6 inches of No. 1 broken stone mixed with the screenings below one-half-inch, thoroughly rolled with a steam roller as a foundation course. On top of this, spread a uniform layer about one inch in thickness of rather dry cement sand mortar. Over this course of mortar at once spread about three inches of No. 2 stone which should immediately be rolled with a steam roller until the cement sand mortar rises flush with the surface. Such a road as this, I believe, would have many advantages. It could be opened to traffic within a short time after completion; it would not be as rigid as an ordinarily mixed concrete road. I do not believe it would be as likely to crack as ordinary concrete, as the stones forming the aggregate would rest firmly upon each other, receiving the blows of traffic, and the cement mortar only acting as a binding matrix. Further than this there would be a minimum amount of cement used, and no two horizontal sections of such a road would have the same coefficient of expansion. Rock of the very highest resistance to wear could be used without any consideration of its natural binding power, which is so important in the ordinary macadam road. Another most important feature of this type of construction would be the absence of dust on the surface, which is so much sought after by highway engineers at the present time. It would also give an excellent surface, not too slippery nor too noisy. Most important of all, however, such a road would not cost more than 10 or 15 cents per square yard more than ordinary macadam, which is about the annual cost of spreading bituminous dust preventives.

I have mentioned this type of construction as a possible cheap method of using concrete in road building. Another way of approaching the problem is to treat Portland cement so that its brittleness will be reduced and its resilience increased. This, I believe, would be of great advantage, even if in so doing the tensile strength was greatly lessened. It can be seen that a material like asphalt, which meets so successfully the wear of traffic, is of a semiplastic nature, with very low tensile strength and no elastic limit. Alone, a slight blow will permanently deform it. Its adhesiveness to mineral matter, however, permits its being tempered by a mineral aggregate to the desired consistency. It is also known that the addition of Portland cement to asphalt surface mixtures is very desirable.

With these points in view, an investigation has been begun to ascertain the practicability of mixing semi-asphalt base oils with Portland cement concrete, with the object of obtaining the desirable properties of both the cement and asphalt. Up to the present time, our results have been somewhat encouraging. We have succeeded in making mixtures of as high as 20 per cent. of oil, and both the 7 and 28-day tests for toughness and tensile strength showed a regular increase. Briquettes with 5 per cent. additions of oil broke in tension at 230 pounds after 7 days in soak, and 296 pounds after 28 days; with 10 per cent. oil, 228 pounds after 28 days; with 15 per cent., 246 pounds; and with 20 per cent., 203 pounds. The results obtained under impact were practically parallel with those under tension. Increased proportions of oil retarded both the initial and final set in increasing amounts; the tensile strength and toughness were also reduced, but not in like proportions. It has been shown that concrete immersed

or mixed with animal and vegetable oils disintegrates and, of course, this may be the case with petroleum. It is my intention to continue this investigation until the several points under consideration have definitely been settled. I might mention further that parallel tests were made with tar and cement, but the results were practically all negative.

If it is found that cement can be mixed with asphaltic base oils, and increased toughness obtained, I believe that the value of cement as a road-building material will be very much increased. The matter of mixing the oil is very simple, and can be conducted in any ordinary concrete mixer. All that is necessary is that the cement be thoroughly wet before the oil is added. On account of the lime present the oil quickly emulsifies and is evenly distributed. It has been suggested that the addition of hydrated lime would permit of larger proportions of oil, which I believe will prove to be the case. I further believe that concrete mixed in this way will be impervious to water.

While a laboratory investigation of this nature is very interesting and instructive, yet no final results can be obtained until an actual service test is made, and it is my earnest hope that in the near future I may be able to make satisfactory arrangements for one or more co-operative service tests.

Prospects of Western Canada

Second Vice-President Whyte, of the Canadian Pacific Railway, recently made the following statement with reference to the general prospects of Western Canada in 1910:

"The area under crop in Manitoba will not be largely increased in 1910, but in Saskatchewan the increase will amount to 20 per cent. Within a short time the Province of Saskatchewan will produce more wheat than any State in the American union, and within a few years it will produce more wheat than all the American States combined.

"In Winnipeg, more building will be done in 1910 than in any previous year in the history of the city. What is to be done in Winnipeg in this regard is the keynote of what will be done in all parts of the western provinces. The Canadian Pacific completed a very large amount of work during 1909 and there will be no cessation in the activities of the company in this matter in 1910. The list of extensions and improvements has been prepared, but it is impossible to state specifically what will be done until the matter has been submitted to the president.

"The investment of British and American capital in these provinces continues very large and there will be no cessation in the flow in 1910. Any proposition from western Canada which has merit can secure capital in Great Britain. It is essential that the project should have merit, but if it has merit the capital will be forthcoming.

"The immense sums of money paid to western farmers during the year 1909 must attract wide attention. From figures which have been prepared with great care I have learned that there were under crop in the three western provinces this year 6,922,000 acres, from which there were harvested 122,000,000 bushels of wheat. The average price actually received by the farmer for his wheat is estimated at 37 cents. The actual value of the crop to the farmer was thus \$106,445,000. In oats there were sown 3,920,000 acres, producing 176,000,000 bushels. The average price received by the farmer for oats sold was 27 cents, making the value of the crop \$9,309,000. The yield of flax was small, only 3,600,000 bushels, but the price was high, \$1.35 per bushel, a total value to the farmer of \$5,000,000. The total value of these crops to the farmers of the three prairie provinces was thus \$168,000,000."

Architectural Education in Canada

An Interesting Paper Read by Professor Nobbs, of Montreal, at the Recent Convention of the Ontario Association of Architects

Mr. Chairman and Gentlemen,—Of the many kindnesses and encouragements I have received at your hands, your president's request to me to speak on "Architectural Education in Canada" is the greatest compliment. I assume it is not an historic retrospect that you desire of me, but rather a statement of what I consider may be done in this field of activity to-day, with some reference to what we should aim at on the morrow, that was implied by the addition of the words "in Canada" to the phrase "Architectural Education"; for architectural education among us is just beginning and it is a good time now to consider whether the foundations we are laying are adequate to their future loads. To save your time, and mine, I shall adopt a somewhat dogmatic method of exposition, which I trust will have the incidental result of bringing out some criticism and discussion. I knew there is another side to all the aspects of the questions with which I shall deal, and I have the deepest respect for the views of my most direct opponents. What I feel is not so much that we of the Unacademic School misunderstand our Academic friends, as that they are uninformed about our principles. This opportunity is therefore doubly welcome to me.

I shall try to divide the question before us into two parts, (1) College work, and (2) Outside influences. I use the word "outside" advisedly, for I am here I know in virtue of my post at McGill University.

To begin with, I suppose we are all agreed that it is desirable that every professional man should take a college course if he can afford it, an ordinary Arts course if possible. As very few can afford that luxury of time and money, the next best thing is to devise university work in connection with professional study. Of course there are lots of people about a university who can say a good deal to prove that technical and professional training is essentially different from, and of no service to, general culture; and there are lots of professional people who are quite eloquent on the uselessness of theoretical training in comparison with what they call practical work. Still, the compromise has much to be said for it. It all depends, like the cherry, on the spirit in which it is offered. Now, a "School of Art," as the term is understood to-day, is a different thing from a "Department of Architecture" at a self-respecting university, and yet the department of architecture has to do some school of art work.

By a school of art we mean a place where young people (for the most part of inferior education, I am sorry to say), are taught to be very skilful at drawing in various media, charcoal, water color, oil paint, and at modelling in clay and wax and at designing imaginary buildings and representing their intentions in black and white; a school of art is, in fact, a place where people learn a good deal of slight of hand and slight of eye, and very little about things in general, past, present and yet to be.

Now, of course, we all know that one cannot either study, gain experience in or achieve architecture to-day without great skill in drawing, and this takes an unconscionable time to acquire. Some departments of architecture at American universities try to be just schools of art in this sense, and I think their success as schools of architecture is in inverse ratio to their success as mere schools of art. The public, alas, understands by the word art just drawing, and I have used the word so far in this narrow and vulgar sense.

The school of architecture should require a very fair per-

formance in draughtsmanship of those who come to it to study; its teaching must, of necessity, be largely conducted through the medium of drawing and its graduates should incidentally go out far better draughtsmen than they went in, but it is no part of its business to teach drawing as a thing in itself, or to teach anything by drawing which can be taught in a more rapid way by other methods. The graduate must be turned out ready to be a useful office hand, but the success of the school is not to be gauged by the good office hands it turns out, but by the progress of these good office hands to positions of trust and responsibility and independence after leaving college. Design, and not drawing, is the main end of such a department. Those things which tell in later life when a man begins to think for himself are what the school of architecture has to do with. Drawing is a matter for the school of art and the office to teach.

Perhaps I have laboured this point unnecessarily, but the good of the art must be thought of apart from the good of the existing members of the profession when we talk of education. Cultivated gentlemen cannot be produced except by accident, by a system which prides itself of teaching all that an architect need know "*par le crayon*,"—by the pencil. This question of drawing being disposed of for the present, let us consider the branches of study in an Architectural Department of a University. They are six in number:

(a) Design; (b) Aesthetic; (c) Archaeology; (d) Science; (e) Construction; (f) Professional Practice.

Design can, of course, only be taught "*by the pencil*," and I am of opinion also that it should only be taught by people engaged in the active practice of their profession, and that it is an honor to be allowed to teach it. In this I concur most heartily with the official views of the A. I. A. Also there is only one best way of running design classes, and that is by the accepted Beaux Arts method of sketches done without assistance, elaborated under criticism and guidance. At the beginning, frequent subjects, though they result in nothing that can be exhibited to passing strangers and give the teacher much to ponder over, lead, I think, to more rapid progress than the elaboration of what must of necessity be poor designs. It is practice in getting ideas together and knocking them into shape that a school of architecture can give. Time enough will be found in offices to learn to make a complete set of drawings.

Aesthetic may sound rather a portentous word, but it is useful as including the theoretic studies which may with advantage be associated with work in design. The elements of architecture, the theory of design and theory of planning, and, I think, ornament and decoration (if the arts of the ornamentalist are considered in relation to material and technique, and not historically,) may be grouped under this head. A sketch of my courses in these subjects will develop the view I take, so I must ask your indulgence while I explain what is, after all, a personal matter of opinion and prejudice.

The things that really matter for the expression of sentiment in building (and that is a fair definition of architecture) are proportion and scale above all things. Next come such matters as refinement, grace, breadth, and all the more or less abstract qualities of character. The meaning of these things should be learned early in order that criticism may be understood and historical examples be appreciated. Then there are the material elements—masonry and roofing and vaulting, etc.—and the physical elements—plinth, voids,

solids and features to consider. By the principles of composition, the chief of which is unity, something can be taught of the instinct whereby all these abstract, physical and material elements can be composed in one thing, revealing meaning and emotion, through mere sensuous beauty of line, form, mass and color. That is what I mean by the elements of architecture.

The theory of design may be taken to mean the first principles of art and their application to practical design. The senses, the phenomena of pleasure and pain and expression explain the art impulse. Beauty and its relation to the arts through subject matter, emotional content and physical media affords a basis of appreciation and criticism. Pure design in nature and in art and ornament, with its moral or significant aspect and its material logic, throw light on the evolution of architectural form. Such matters are in the domain of philosophy.

The theory of planning affords practice in methodical thinking—dimensions, arrangement, scales, aspect, prospect are common considerations for all problems. The study of domestic art illustrates the evolution from simple cottages to complex mansions of what is after all one organism—the house. Ecclesiastical art shows small differences of use affecting vitally the layout of typical examples within one class of problems. Libraries, fire stations, hospitals and the like show extreme specialization of type, while public buildings on analysis afford good illustration of various nationalistic sentiments expressing themselves almost independently of use and purpose. These subjects afford valuable side lights on the work of the design classes.

Archæology as an architectural subject may be shorn of much of the connotation of Hittites and Babylonian Captivities with which recent research has invested it. The traditions of our civilization, however, involve some study of the buildings of the Biblical peoples as well as the Greeks and the Romans. Mediaeval France and England have a very special bearing on ourselves, for it was through these countries that Italian art comes to us. France, never as long as she had any connection with this land, quite lost the mystery of her Gothic period, while England in her most classic phases has always retained something of the patent honesty of design which culminated in the 14th century. But, perhaps, things being as they are, the Renaissance in Italy and the later art, of France and England, contain the main body of tradition for us, and though the Greek and Roman work explains much of these things, I feel very strongly that it is enough for us to direct the chief efforts of our scholarships to France and England, rather than to Greece and Rome. Revivals are excellent influences within reasonable limits; their weakness is their self-consciousness. Roman revivals meant something to 15th century Italians; Greek revivals meant something to 18th century Frenchmen; French revivals even meant a good deal to 19th century Americans; but to 20th century Canadians, English revivals will have a more real meaning, and there is this to be said for them, that mere imitation in this case is out of the question. The serene sentiment, traditional in English art, we may hope to continue to achieve; we must, however, give up the physical details of mullioned ranges of lights and parapeted roofs—therein there is hope for Canadian architecture as such. It must invent!

The study of archæology or our traditions needs a background, (and the historical department of any university should be able to provide that) before a beginning is made with the history of architecture. That is the weak point of lectures on ancient architecture to the public or to students in offices. Half the meaning of St. Peter's, and Westminster, and the Parthenon is lost if Papal, Edwardian and Periclean policies and the popular forces behind them are not subconsciously applied by those who would learn their secrets.

Science for an architect is, after all, not a very serious

affair; of course, a thorough scientific training is a very desirable thing, but "life is short and art is long," and literature and history are, I firmly believe, of more importance to an architect. His mathematics may well stop short of the calculus. Physics is vital up to a certain point, but the ultimate constitution of matter will not help him to "build for eternity," as Wren expressed it, or express human sentiment in what he builds. Chemistry bears directly, it is true, on hygiene, but hygiene (from questions of pure air and pure water to those of heating and ventilation appliances) can, I think, be grasped in principle with very little chemical knowledge.

Construction may be regarded as the architect's branch of applied science. Possibly elementary construction can be best learned by practical experience, but as it is quite as impossible to teach composition in architecture to people who do not know how roofs and floors and windows are made, as to teach literary composition to folk who cannot parse words and analyze sentences, even elementary building construction (mere technology as it is) has to find a place in a university course. Structural design is a subject scientific enough to be admitted by a university faculty without protest. My own view is that an architect should know just enough about structural engineering to have the fear of death and judgment always by him and induce him to call in the engineer before, rather than after, things have been built. Familiarity with the stresses in a 100-foot roof truss will certainly not breed contempt for the possibilities and responsibilities involved.

Professional Practice is a matter on which I should like to say a great deal, but time will not permit. To speak and write the King's English and one other language; to know how to construct a short essay, report, paper or speech; to behave to inferiors, equals and superiors respectively, with courtesy, charity and dignity. These things are expected of a college man, and by hook or crook a good deal can be done even in an architectural department to justify the expectation. It was done by Prof. Ware at Columbia.

Specification writing is very badly done all over the world, and yet no better exercise in form and construction could be undertaken by a student of literature. By lectures and exercises much can be done to show how to say what has to be said, briefly and in order and once only.

Conditions of contract and building by-laws, I almost think, should form a part of any good citizen's education, while certain aspects of the law which can be dealt with in university courses to architectural students should prove invaluable in later life.

Drawing—In administering to the student the many subjects which fall within the six groups—design, æsthetic, archæology, science, construction and practice—one lecture to three hours of graphical work will be found to work out well.

Eye and hand, and imagination too, can, I think, be trained far more rapidly by modelling than by drawing, and for the sake of this technical suavity, modelling all through the course is desirable. Freehand drawing, as such, is hardly a subject.

All sorts of drawing and sketching are connected with the work in design and rapid memory sketching, freehand and mechanical, and elaborate measured drawings, are all involved in the study of archæology.

The ornament and decoration in connection with æsthetic implies a good deal of water color work and free sketching.

Construction gives ample opportunities for practice in the preparation of general working drawings and also for steel plans.

Descriptive geometry, sciography, stereotomy and perspective, besides their scientific value, afford good practice in mechanical drawing and are essentials, in my opinion, in the work of the earlier years.

These (counting the incidental drawing as one) seven

parts of architectural education can be begun in a college course, and for an ordinary general practitioner of our trade, is to be hoped that none of them would end there.

Some of these things may be held unnecessary, and I wish I could be convinced of that, for the expense of my department, where these things are all done as I have explained, is a grievous question with those responsible. Some things, such as post-graduate work in Ecclesiastical and Landscape Art, might be though desirable, but I feel that these can only be studied on the higher plane where they exist, in merry England, happy France and smiling Italy, and this brings me to outside influences in architectural education in Canada.

Outside we have no museums as yet, but we shall have some soon, and it is devoutly to be hoped that the nation's traditions will find adequate representation in them and that they will not degenerate into mere treasure houses of curios, bric-a-brac, pictures and things rich and rare. There is some reason to hope that at the Victoria Memorial Museum at Ottawa parallel type collections of French and British art (architectural detail and decorative sculpture that is) from 1000-1800, will be installed, together with a library of art, a collection of industrial arts, and a gallery of home industries. But all that is another story, and his Majesty's Ministers have not yet dealt with the petition concerning these things.

Outside we have few old buildings worth measuring, though quite a number that should be preserved. In Montreal there are some examples of the purest Louis XV. and the late Georgian work. Still, our architectural students must go far afield for their direct study of past tradition, and it is high time that every Province had a good scholarship to take a man to England, France and Italy for a year, and that the Dominion had a series of travelling scholarships for special study in the realms of art.

Hitherto the main outside influence in professional training has been due to the fact that at no great distance, in the cities of the United States, more work and better work was being done. Thither went, and still go, the Canadian students of architecture, to bring back second hand ideals of the Beaux Arts school, which were, perhaps, better than nothing, but very far from supplying us with national traditions. For what has Canada, either French or English, Lower or Upper, Maritime or Northwest, to do with 19th century Paris? The far flung vault of Beauvais, the jewelled walls of Blois might well inspire a Quebecer, but latter day French academic design, a petrified art lagging behind the emancipation of French painting and French sculpture and oscillating between the "Neo Grec" and the "Louis XIV." What, I ask, has that to do with us?

Now we are beginning at last to achieve as good work as our friends to the South, and it is the museums, libraries and design schools of the United States, quite as much as the office work, that still draws so many of our students across the line; and the libraries and museums of Canada will soon, I believe, be adequate to our needs. What about the offices?—for we can do without colleges, museums and libraries, but we cannot train architects without properly organized office experience and practical work.

In older lands, where a thousand years of architectural history stands revered and respected in every city, an apprenticeship or a pupilage system, though apt to shorten the general education of the architects, is adequate, but we, here, must rely on college education, museums and libraries, instead of old buildings, and would make a fatal mistake if we did not organize our office training better in the future than we have done in the past. Of course, supply and demand must be taken into account, but I think four or five years, bound to a principal, or, in case of college students, say three years, part of which could be done in the long vacation, should be made a universal requirement. The power to do this rests with the Provincial organizations. It is bad for

the student to get a little experience here and a little there, and it is cruelly unfair to the careful architect whose office has an educational influence, that no sooner has he taught a boy something than he is held up for a rise or given the slip.

The architect who is an artist deserves his help cheaper than the architect who is a commercial agent only, and without cheaper help the best kind of work cannot be done. When things are slack it should not be necessary, as it now is, to disband the office. By the present arrangement the art suffers, the office student suffers, and the architect suffers.

We can only make a good thing of our trade by doing far too many jobs at a time as things are. If an architect could by exercising some restraint on his output and by doing things more to his own real satisfaction, at the same time establish a reputation for giving good experience, pupils, apprentices and improvers would help him out, provided such status were recognized and encouraged by the by-laws of the associations. The assistant paid rather more than he is worth cannot be spared to run about on the job, and cannot be expected to identify his interests with those of his master, when he only sees one end of the work.

There is a tendency among some of my friends here to have a childlike faith in what the university can do. In future, let us hope to see the offices doing their full share of the teaching, the schools of architecture doing their little part, the local public theirs by providing museums and libraries, and the Government theirs, by endowing scholarships.

The teaching of architecture generally will, I think, undergo some drastic changes before long. The history of architecture has to be approached in a new light—it has been regarded as technical education—as a means for enabling people to forge and imitate past styles in approximate purity. It should, I think, be treated as a purely "culture subject," like Latin and Greek and Anglo-Saxon, as a means of enabling people to understand what the art of design is—the great popular art of expressing national sentiment.

The public at present suffers from that little knowledge which is such a dangerous thing. They know the difference between Norman work and Rococco in a superficial sort of way, by sight, not by feeling, and they think the greatest compliment they can offer one of us is to recognize in our performances some resemblance to past types, and "fellows of the baser sort" trade upon this poor thin semblance of culture and give them modern forgeries, more or less ingenious, of Tudor, or Francis I., or Early English, or what not. If the much abused word "style" could just be stricken from the vocabulary of every architect for a decade, the educational value of the omission to the public would be immense. We would, I think, get some real style into our work without having to break our hearts over it.

Our architecture should be "solid, proportional, according to the rules" (which means that effects should be calculated and not be accidental), "masculine and unaffected." That is how Inigo Jones put it, and "built for eternity," as Wren used to say. Our architecture should be as logical to our climate and our materials as were the flat-pitched colonaded fanes of Greece and the steep-roofed buttressed churches of England. It should be simple, natural, dignified, true to its purpose, whether cottage, house, shop, office, church or town hall;—a fruit of the glorious traditions we inherit from our fathers, with nothing of the "insolent boast" and the "slaves' nightmare" which Morris saw and fought against in the artificial art "all French and fine" which hails from the place and peried most away from all our aspirations—the court of Versailles.

The Roofers' Supply Company, Limited, Toronto, have favored us with an attractive calendar for 1910. The company's specialties are sheet metals, and roofers' supplies and materials of all kinds.

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Few manufacturing concerns in the building specialties line are better known to architects and builders than Samuel Cabot, Inc., Boston, Mass., inventors and manufacturers of Cabot's creosote shingle stains, Cabot's sheathing and deafening quilt, waterproof cement stains, waterproof brick



Roof Stained moss-green, walls silver gray, lined throughout with Cabot's Sheathing Quilt.

stains, and Conservo wood preservative. This firm has constantly applied scientific chemical principles to the production of a line of building specialties which is recognized as of the highest type

Cabot's creosote shingle stains are rich in artistic color-



G.T.R. Station, Portland Me., Stained with Cabot's Red Brick Stain and Preservative—Spier & Robins, Architects, Detroit.

ing effects, and for their lasting qualities and preservation of the wood as specified by many leading architects.

Cabot's sheathing and deafening quilt has introduced a new era into the insulation of houses, cold storage and sound-deadening. Before its invention, sound-deadening was ac-

complished only by the most haphazard methods. The Cabot quilt is a matting of cured eel-grass which has the power of breaking up and absorbing sound-waves, and which is thoroughly sanitary and is absolutely proof against decay. It is also inflammable and a protection against fire. The discovery of the valuable properties of quilt for this purpose is one of the great achievements of the late Mr. Cabot. It is of interest to know that a large part of the eel-grass that goes into the manufacture of this remarkable material is purchased in the Canadian Maritime Provinces. The use of quilt is increasing in all parts of Canada, and in our climate its value for insulating houses is especially great. The makers claim that it renders houses practically wind and



Residence of Mr. George von L. Meyer, U.S. Secretary of the Navy. Stained with Cabot's Waterproof Cement Stain.

frost proof and that it pays for itself in two winters in fuel saved, to say nothing of comfort.

For several years now this company has been perfecting a waterproof cement stain, designed to waterproof and color exterior cement surfaces. They have finally produced an article which stains cement just as their shingle stains stain wood, and the coloring effects produced are exactly as if the cement had been made in that color, and yet the cement is not weakened, as it would be if the color were mixed in it. The waterproofing effect is complete and permanent, and the demand for these stains is reported to be growing steadily.

The company also manufacture Cabot's waterproof brick stain and preservative, which does the same for brickwork as the cement stains for cementwork.

Wooden Floors for Factories

New York, January 19, 1910.

Editor, "Contract Record":

As this is a subject of great interest to engineers and mill owners, the writer recently investigated the various methods of protecting such floors against decay and submits the following to supplement the article in your issue of November 24, 1909.

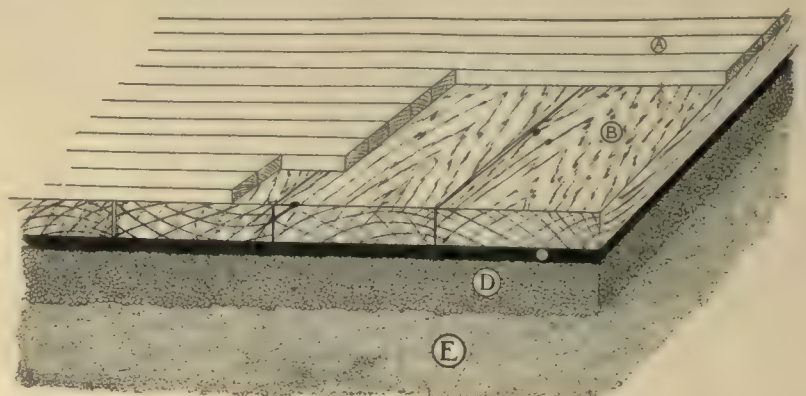
The accompanying illustration shows a cross section of construction which conforms to the best engineering practice. The reference letters refer to—A, hardwood wearing surfaces; B, planking; C, 1-inch tar and sand; D, foundation course; E, earth.

Wooden floors laid directly on the ground without air space beneath have two very distinct advantages. First, low cost from saving of piers, heavy timbers and excavations. Second, absolute rigidity regardless of the character of the machinery.

It is, however, necessary to protect the floors against decay, and to do this they must be pro-

ected against dampness from the ground. The essential features of this construction are foundation, damp course and planks.

Foundation.—This should be from 3 inches to 6 inches thick, depending on the nature of the soil, and may consist of whatever local conditions make cheapest, either lean ce-



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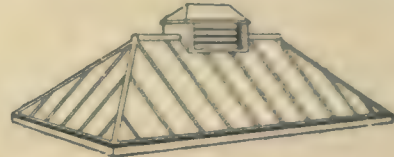
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ment or tar concrete, and the latter may be of either cinders, crushed stone or screened gravel, and should be thoroughly compacted and graded evenly to correspond with the level desired for the finished floor.

Damp Course.—This should be 1-inch thick and composed of sand mixed with enough coal tar from which the water and light oils have been distilled (but containing all the creosote oil), so that all the voids in the sand are filled. Usually 50 to 60 gallons of tar are required to each cubic yard of sand and a proper test is "If 10 to 20 cubic inches of the mixture at a temperature of 175 to 200 degrees F. be placed in a tight vessel to a depth of not less than 1-inch and patted, it shall be deemed that the mixture contains sufficient tar, if tar shows on the surface."

With the voids in the sand filled, there is absolute protection against dampness* from the ground, and if a good coal tar is used the creosote oil in the tar acts as a wood preservative. Asphalt should not be used in the damp course mixture, as it does not contain any creosote oil, and coal tar pitch is only slightly better in this respect. Although ¼-inch of coal tar pitch on a concrete base will provide ample protection against dampness from the ground, it will not provide a bedding for the planks but what sleepers will be necessary, and furthermore, the pitch does not contain the creosote oil necessary for its wood preserving qualities.

The sand must be dry and both sand and tar heated to 200 degrees to 250 degrees F. and thoroughly mixed. The mixture should be spread while warm and levelled with a straight-edge or rake, but not rolled or compacted in any way except by the bedding of planks on it.

Planks.—These must not be less than 2-inch thick and should be bedded directly on the tar and sand mixture and toe-nailed together. Sleepers should not be used, for they are not only unnecessary but a distinct disadvantage, as the tar and sand mixture provides a perfect bedding for the planks and they are tied together as firmly when the hard wood floor is laid at right angles or diagonally as is a single floor when nailed to sleepers. The planks should be spaced ¼-inch to ½-inch apart, as this will lessen the danger of dry rot, if they are not well seasoned.

Floors Above Ground Level.—Frequently in reinforced concrete buildings a wooden surface is required on some of the floors and the same method used so extensively for the lower floor is becoming quite popular. The 1-inch of sand and tar furnishes suitable bedding for a two or three-inch plank, and this, with the hard wood surface, provides ideal conditions for setting machinery, as lag screws can be used at any point. This method eliminates the wooden screeds or nailing strips which, when bedded in concrete, soon dry rot and are the source of much trouble.

*Dampness should not be confused with water, for this form of construction will not protect against water, and in such cases the usual felt and pitch waterproofing is required.

Yours truly,

Barrett Manufacturing Company.

In connection with the Third Annual Cement Show which is to be held at Chicago on Feb. 18-26 next, the railroads in the Eastern Canadian Passenger Association will make a rate of one fare and one-half for the round trip, on the certificate plan. Going tickets may be purchased any day from Feb. 15th to the 24th inclusive.

The following figures prepared by the Department of Labor, show "the proportion in which nearly a thousand accidents were distributed among eight branches of labor: Railway, 326; agriculture, 225; mining, 148; lumbering, 113; navigation, 84; metal trades, 63; general transport, 54; building trades, 46.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Duncan's Station, B.C.

The installation of a \$25,000 sewerage system is being considered.

Edmunston, N.B.

It is understood that this place has been chosen as one of the divisional points upon the G. T. P. The town agrees to put in a water system for which the railway will pay \$2,000 per annum.

Edmonton, Alta.

It has been made imperative by an important order just issued by the provincial Board of Health that all municipalities in the province shall have proper and satisfactory sewage disposal systems installed before December 31st. It practically necessitates the expenditure of close upon \$2,000,000.

Nanaimo, B.C.

The bylaw providing \$100,000 for the installation of a sewerage system was carried.

Ottawa, Ont.

N. J. Ker, city engineer, is calling for tenders for supply and delivery of 42 inch steel intake pipe. For further particulars see advertisement in this issue.

Saskatoon, Sask.

Tenders addressed to J. H. Trusdale, city clerk, will be received until February 14th for the following, f.o.b., viz.: 100 lbs. 1-inch palmetto packing; 75 lbs. 3-4-inch palmetto packing; 35 lbs. 1-2 inch palmetto packing; 20 dozen hand hole gaskets; 5 dozen manhole gaskets; 25 lbs. spiral packing, 5-8 inch; 10 lbs. spiral packing 1-2 inch; 50 lbs spiral packing 1-4 inch.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until February 22nd, 1910, for supply of cast iron pipe, main drainage works. For further particulars, see advertisement in this issue.

AWARDED.

St. Catharines, Ont.

At a meeting of the Water Commissioners the report of the Extension Committee was adopted, recommending the quotation of the Canada Brass Company, of Galt, be accepted for brass goods required for the current year; that of Coy Bros. for galvanized pipe and pig lead, and that of the James Robertson Company, of Toronto, for lead pipe.

Vancouver, B.C.

W. McQueen, city clerk, writes that the contract for supply of steel water pipe for the ensuing year has been awarded to Messrs. Evans, Coleman & Evans, Vancouver, at \$9,600; cast iron pipe to Messrs. Robertson-Godson, Vancouver. The following is a list of bids: Canadian General Electric Company, total \$11,760 (4-inch cast iron pipe); A. J. Forsyth & Company, total \$10,497.50 (price for 6-inch steel, \$9,424.80; for 8-inch steel, \$3,669.60 for 12-inch steel,

\$17,820); Robertson-Godson Company, total, April, \$8,477.50, May, \$8,445 (price for 6-inch steel, \$10,334.06, for 8-inch steel, \$3,867.72, for 12-inch steel, \$14,502.84); F. Hankin, totals \$9,587.50 and \$8,562.50 (2,240 lbs. and 2,000 lbs.); C. F. Jackson & Company, 4-inch cast iron pipe, \$9,912.50; Gartshore-Thompson Pipe Company, \$12,000; C. Gardiner-Johnston & Company, (price for 6-inch steel, \$9,424.80, 8-inch steel, \$3,643.20, for 12-inch steel, \$17,688); F. Darling & Company, price for 6-inch steel, \$9,794.40, 8-inch steel, \$4,435.20, 12-inch steel, \$24,024; Evans, Coleman and Evans, 4-inch cast iron pipe, \$9,600, price for 6-inch steel, \$6,837.60, for 8-inch, \$3,009.60, for 12-inch \$14,652; Crane Company for 6-inch steel, \$10,315.53, for 8-inch steel, \$3,981.88, for 12-inch steel, \$14,520.

Railroads, Bridges and Wharves

Allumette Island, Que.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, will be received until February 28th for the construction of piers, abutments and approaches for a highway bridge across the Culbute channel of Ottawa river at Chapeau. Plans at Department of Public Works and on application to the local postmaster and the post office at Pembroke, Ont.

Montreal, Que.

The C. N. R. have made application to the Harbor Commission for berthing space.

Ottawa, Ont.

The time for the construction of the Esquimalt & Nanaimo Railway and the Edmonton, Dunnegan & British Columbia Railway has been extended.

Sault Ste. Marie, Ont.

The report of Mr. Sing, district engineer in the Department of Public Works, recommends that the proposed dock be made 18 feet deep, with four feet of head room under the keel of the vessel when docked. The total cost of the dock is given as \$538,576, with an additional one hundred thousand dollars for buildings and equipment.

Winnipeg, Man.

Tenders for the Brant street bridge are to be called by the Board of Control. Time limit, March 7th. Estimated cost, \$299,646. Controllers McArthur and Cockburn.

AWARDED.

Adamsville, Que.

The Laurentian Construction and Engineering Company, Limited, have been awarded the contract for the construction of a bridge over the eastern branch of the Yameska river, by this municipality. The tenders submitted are as follows: Laurentian Construction & Engineering Company, Limited, \$9,350; Phoenix Bridge and Iron Works, Limited, \$9,750; MacKinnon, Holmes & Company, Sherbrooke, Que., \$9,875; Structural Steel Company, Limited, \$10,600. The work will be commenced at most immediately. E. Vanier, town engineer.

Howick, Que.

D. R. Hay, secretary-treasurer, writes us that the contract for the erection of the Allens' Corners' Bridge has been awarded to the Western Bridge & Equipment Company, of Chatham, Ont., subject to the approval of the government engineer. Price \$15,549.50. The following is a list of other tenders received: Dominion Bridge Company, Montreal, bridge only, \$8,937; New Lattice Bridge & Concrete Works, Chatillou abutments, \$8,800; the Jenks-Dresser Company, Sarnia, Ont., bridge only, \$9,970, bridge and abutments, \$18,150; Henry Williams, Cornwall, Ont., abutments only, \$9,952; John H. Leahy & Company, Montreal, abutments only, \$10,250; Phoenix Bridge Company, Montreal, bridge and abutments, \$18,350; Jas. A. McBain, Ormstown, Que., abutments only, \$10,600; Laurentian Construction & Engineering Company, Montreal, \$18,500, abutments, \$9,200; The Canadian Siegwart Bridge Company, Montreal, Que., their tender reads as follows, \$18,550, piles and pile driving, extra; R. MacManus & Company, Hamilton, Ont., bridge only, \$10,200; R. T. Smith & Company, Westmont, Que., abutments only, \$7,400; T. Lemoine & Fils, Montreal, Que., abutments only, \$7,300; Structural Steel Company, Montreal, Que., bridge and abutments cash, \$15,400; time, \$15,600; paid 1st of March, 1912, 16,100.

Outlook, Sask.

It is stated that the contract for the erection of the C. P. R. bridge over the South Saskatchewan river here has been let to J. D. McArthur & Company, Limited. Dimensions, over 3,000 feet in length, 146 feet in height.

Tiverton, Ont.

Bruce Township Council has awarded the contract for the building of reinforced flat arch bridge 54 foot span over 6th concession Willow Creek to C. S. Wood, this place. Also reinforced flat arch bridge 25 foot span, over the 8th concession to C. S. Wood.

Toronto, Ont.

The city council awarded to the Don Construction Company the contract for constructing the piling at the Wilton avenue bridge, the amount being \$3,928.58. Through some oversight a letter from the company, withdrawing their tender, was not read at the council meeting, and the company will forfeit the \$75 deposit. The next lowest tender, \$5,418.88, was from R. Arbuckle, and the indications are that the contract will be awarded to Mr. Arbuckle.

Winnipeg, Man.

It is stated that the contract has been signed between Kelly Bros. & Mitchell, and M. H. McLeod, manager of the C. N. R., for the Pembina street subway, and construction work will be started at once. Noted in last issue.

The Charlottetown Foundry & Machine Company, Limited, Charlottetown, P. E. I., have sold out to Bruce, Stewart & Company, Limited.

Public Buildings, Churches, Schools, etc.

Barrie, Ont.

Tenders are being called until the 16th of February for the heating of the county gaol. For further particulars see advertisement in this issue.

Calgary, Alta.

The congregation of Knox Church have purchased six lots on the corner of Sixth avenue and Second street, where it is understood that a new church will be built when the present church property is disposed of.

Dunboyne, Ont.

Tenders are being called until February 19th for the erection of a new brick Methodist church. Plans at residence of Dr. L. A. Brown, Water street, Aylmer.

Edmonton, Alta.

The recommendation of the Public Library Board that the city purchase the corner property on Howard and Rice street for a library site was accepted, and the city solicitor was requested to bring down the necessary bylaw at once so that the matter might be voted on without delay.

The congregation of the First Presbyterian Church on the corner of Third street and Jasper avenue, are said to be in favor of selling their present building and erecting a new church.

The enlargement and remodelling of Westminster Presbyterian Church was discussed at the annual congregational meeting and referred to the board of managers. Estimated expenditure, \$5,000.

Fort William, Ont.

It is stated that John Whalen, owner of the Lyceum theatre will build a theatre here. Estimated expenditure, \$75,000.

Minnedosa, Man.

Tenders are being called until February 5th for the erection of a brick veneer church on section 21, township 18. Plans at Black Bros.' store. J. Gugin, secretary.

Milton, Ont.

J. A. Ellis, architect, Toronto, it is reported, has condemned the school buildings and as soon as his plans are submitted, it will be decided whether to remodel the buildings or erect new ones.

Montreal, Que.

The following work will in all probability be executed at once:—Extension to the Church of the Ascension, Park avenue, Laurier Ward; new church on Park avenue extension, for mission purposes; new church on St. Denis boulevard, to be named the Carmichael Memorial Church; Roseland Mission Church on Marquette street; extension to all Saints' Church, on Marie Ann and St. Denis streets; new church at Blue Bonnets or St. Pierre aux Liens; extension to St. Stephens Church, Lachine, P.Q.; St. Columba Mission Church, Kensington, is to be enlarged; St. Clement's Church in Verdun is to be rebuilt; a new hall is to be added to St. Cyprian's Church on Masson street and to St. Augustin's Church, Rosemount; and St. Barnabas Church in St. Labert, P.Q. Rev. J. J. Willis is interested.

Tenders addressed to W. J. White, secretary-treasurer, will be received until February 10th by Montreal Technical School Board for (1) heating and ventilating, (2) switchboard and power wiring in connection with the Montreal Technical School. Plans at room 43, Street Railway Chambers or at the office of J. S. Archibald, architect, 50 Beaver Hall Hill.

New Westminster, B.C.

Arrangements are being made for the erection of a new church and school at Fraser Mills. A. D. McRae, president, Fraser Mills Company.

The Lutherans of this city propose erecting a church here in the near future, considering the sect strong enough now to support two churches, one in Westminster and one across the river.

Owen Sound, Ont.

Tenders are being called until February 4th, 1910, for the erection and completion of the West Side Methodist Church. Plans at store of A. W. McFaul, 912 Second avenue east. Jas. C. Miller, chairman, Building Committee.

Quebec, Que.

It is understood that it is the object of the government to construct a new wing to the parliament buildings, work on which may be started next summer. Estimated cost \$250,000. Architects, G. E. Tanguay, Quebec, and J. O. Marchand, Montreal, are preparing plans.

The Harbor Commissioners will receive tenders until February 7th for the construction of a landing shed, 450 by 80 feet wide to be situated on the Point a Carey pier. Drawings, etc., at office of the Harbor Engineer.

Saskatoon, Sask.

At a meeting of the Board of Governors of the University of Saskatchewan, plans prepared by Architect Brown, of Montreal, were submitted. Three buildings, a general university building, a dormitory and a central power house, will be built. Estimated expenditure, \$350,000. Plans are being prepared for a machinery hall. That and agricultural buildings will also be erected. Tenders will be called and building operations commenced on the opening of spring.

St. John, N.B.

It is stated that the Dominion government has begun to expropriate land for the erection of the new armory.

Saskatoon, Sask.

The hospital board is asking the city council to submit a by-law to the people to raise \$110,000 for improvements and enlargements to the hospital.

Toronto, Ont.

It is announced that the Y. M. C. A. has in view the erection of four buildings at different points in the city at an estimated cost of \$600,000. Executive committee is composed of Messrs. E. R. Wood, S. J. Moore, H. Ryrie, and others.

Weston, Ont.

It is stated that a new High school and post office building are under consideration.

At the annual meeting of Deer Park Presbyterian Church a committee was appointed to procure plans, etc., for a new church in the St. Clair avenue district. Messrs. D. Chalmers and J. S. Anderson are on the board of managers.

At the annual meeting of the Chester Baptist Church the trustees reported having purchased a lot on the corner of Danforth avenue and Bowden street, on which a new Sunday school will be built in the near future, the church being granted the privilege to canvass the different Baptist churches for funds for the year 1910. Finance Committee—H. Revell, A. Hallett; Clerk, A. J. Albion.

Victoria, B.C.

The Philharmonic hall and other buildings owned by Dr. G. L. Milne, were de-

stroyed by fire on the 20th inst. Total estimated loss, \$30,000.

Plans have been prepared by Mr. T. D. Sedge for the improvements to the Victoria West Athletic Association. D. S. Tait, L. K. Okell and others form a building committee. Estimated expenditure, \$5,000.

The Y. M. C. A. building committee is calling for tenders for the removal of the houses on its site at the corner of View and Blanchard, also for the excavation preliminary to building. The contract for the building will be awarded the first week in February. Noted in issue of January 12th.

Extensive plans for the construction of a new Union Club building on a site on Humboldt street, are now being discussed by members of the executive of the club. Construction will be commenced before the spring is far advanced. Estimated cost of building, \$80,000. The arrangements will be decided upon at a meeting of the club executive to be held in about three weeks. Plans will then be called for. Noted in issue of December 29th.

Vancouver, B.C.

The plans re the building of the Labor Temple have been changed. The idea of having a reinforced concrete building has been abandoned. Estimated expenditure, \$75,000. Architect, Hooper. Noted in issue of January 12th.

The question of the erection of an Isolation hospital is again before the council, with the result that an option has been taken on a lot in the east end for its erection.

Windsor, Ont.

A company known as the Masonic Temple Association of Windsor, Limited, with a capital of \$50,000, has been chartered by the Ontario government for the purpose of building temple here. It is proposed to erect a modern three storey building.

Winnipeg, Man.

The Westminster Presbyterian Church are contemplating the selling of their site and the building of a new church west of Sherbrooke street. J. B. Mitchell is interested.

Chief Buchanan has asked that tenders be called at once for the construction of fire halls in wards 1, 3, 5 and 6. Estimated cost of each \$15,000.

AWARDED.

Lethbridge, Alta.

The contract for alterations to the Dominion building here, has been awarded to the J. McDiarmid Company, Limited, of Winnipeg, at \$7,777.50. The same company has also been awarded the contract for alterations to the old post office at Winnipeg, the price being \$41,000.

Montreal, Que.

Marchand & Haskell, architects, 164 St. James street, have awarded the contract for the erection of a gymnasium for Montcalm school, to Messrs. Martineau & Proulx, 643 Berri street.

Mr. Alphonse Content, architect, has awarded the contract for a fireproof addition to the Ste. Therese Seminary, to F. J. Fautaux.

Pembroke, Ont.

The contract for the post office fittings here has been given to R. A. Sproule, of Ottawa, at \$790.

Quebec, Que.

The contract for alterations to the examining warehouse here has been awarded by the Federal Public Works Department to Jinchereau & Lamonde, of Quebec, at \$2,997.

Quebec, Que.

Robt. Anderson, of Ottawa, has been awarded the contract for electric light wiring in the post office here, the contract price being \$2,944.

Whitby, Ont.

H. Gay & Sons, of Courtice, Ont., have been awarded the contract for interior fittings in the public building at Whitby, the contract price being \$1,581.

Toronto, Ont.

The contract for the drill hall fittings in Toronto has been awarded to M. A. Pigott & Son, of Hamilton, at \$3,400.

Knowlton, Que.

J. T. Schell, of Alexandria, Ont., has secured the contract for armory fittings in the public building here, at \$397.

Residences**Fort William, Ont.**

Tenders addressed to R. E. Mason, architect, Victoria Block, will be received up to February 21st, for residence for F. R. Morris, Esq.

Montreal, Que.

Messrs. MacVicar & Heriot, architects, 104 Union avenue, have prepared plans for the erection of seven houses for Mr. Geo. Purnford, and tenders will be received until February 11th, 1910.

Plans have been prepared for a residence to be erected on McGregor street for Mr. Frank Scott. Tenders will be received until February 4th. Messrs. MacVicar and Heriot, architects, 104 Union avenue.

Mr. Alphonse Venne, architect, 15 St. Lawrence Boulevard, is preparing plans for three stores and twelve flats to be erected for Mr. Wilfril Besette, on corner of Esplanade and Bernard streets.

Mr. Scott, Mance street, will shortly erect two houses on Roslyn avenue, Westmount, for which plans and specifications will be made by Geo. T. Hyde, architect, 157 St. James street.

St. John, N.B.

The former residence of Lieut.-Governor John Boyd and recently owned by the J. H. Thompson estate, has been bought with the intention, it is stated, of having it rebuilt as an apartment house.

Toronto, Ont.

The residence on the northwest corner of Sherbourne street and Wilton avenue has been purchased with the intention, it is reported, of converting it into an apartment house. Enoch Thompson, Limited, effect the sale.

Vancouver, B.C.

A new modern apartment house will be erected shortly on the corner of Robson and Burrard by J. H. Singer, real estate broker. J. Donnelan, architect.

The following building permits have been issued recently: J. B. Armishaw, frame dwelling, 489 Thirteenth avenue east, \$2,660; J. E. Guinet, 1216 Woodland drive, two houses, \$4,000.

Victoria, B.C.

Permits have been issued to J. H. Todd for dwelling on Crescent street, to cost \$6,000, and to J. M. Savage for alterations to residence on St. Charles street, to cost \$3,000.

Winnipeg, Man.

Plans and specifications for five large apartment buildings are being prepared by P. C. Samwell, architect, 516 Builders' Exchange. J. E. Wilson, general contractor, has the sites already selected, viz.: two on the corner of Mountain avenue, estimated

expenditure, \$35,000; three on the corner of Langaide and Preston, estimated expenditure, \$170,000. Tenders will be called as soon as specifications are ready.

G. H. Walton, real estate dealer, it is reported, is contemplating the erection of a 3 storey apartment house at Bannatyne avenue and Ellen and Dagmar streets, to cost \$320,000. W. W. Blair, Northern Bank Building, architect.

Tenders addressed to M. Blankstein, architect, 450 Dufferin avenue, will be received until February 5th for raising, excavating and completing basements for two double houses, for D. N. Ribstein, Esq.

Business Buildings and Industrial Plants**Amherst, N.S.**

The four storey building of the Black Printing Company was destroyed by fire on the 28th inst. Estimated loss, \$30,000 to \$35,000.

Brandon, Man.

The agreement between the city and the C. N. R. has been signed. By this the company agrees to have the structure completed by April 31, 1911. Noted in issue of January 5th.

It is stated that Hooper & Hooper, architects, Winnipeg, are preparing plans for extensions and alterations to the Imperial hotel here which will cost \$70,000. When completed the hotel will have 150 rooms fitted with electric lights, bath and all modern conveniences.

Charlton, Ont.

Several business buildings, including those of McClung (hardware), Giles & Company, and others, were destroyed by fire. Total estimated loss, about \$200,000.

Cobourg, Ont.

It is expected that the C. N. R. and G. T. R. will erect stations here during the year.

Fort William, Ont.

It is reported that Nicholson & Bain, grocers, will build a wholesale house early next spring, and Mayor L. L. Peltier, a warehouse adjoining. Another warehouse on a 100-foot lot recently purchased by Neeland & Lumby will be constructed shortly. Sites for these between Christina street and Mary street.

The Superior Rolling Mills Company, which is expected to establish a factory here next spring was incorporated in Ottawa with a capital of \$500,000. Noted in issue of January 12th.

Hamilton, Ont.

The Otis Fenson elevator works, it is announced, will make additions to its plant here to cost \$200,000.

The International Harvester Company has decided to spend \$100,000 in making improvements to its plant here. Large additions will be made to the grey and wood rooms, after which the company will erect a building to be used as a machine shop and erecting addition.

North Sydney, N.S.

A test is being made in regard to the manufacture of briquette from coal found in this region. Should it be satisfactory, it is probable that a plant will be erected along the banks of Little Bras d'Or. W. A. Mackay is interested.

Ottawa, Ont.

The Clinton Fireproofing Company, Limited, Montreal, have been awarded the contract for reinforced concrete floors in the

Chateau Laurier. General contractors, Messrs. Geo. A. Fuller Company. Architects, Ross & McFarlane, Montreal.

The preliminary plans, etc., for the proposed ten storey building, corner of Bank and Sparks streets, have been prepared by C. P. Meredith, architect.

Woodstock, N.B.

Three plans are being considered for the erection of the proposed passenger station, —wood, \$20,000; brick, \$25,000; and stone, \$30,000. Mr. Downie, C. P. R. superintendent.

Montreal, Que.

It is reported that the Mark-Brock Enterprises, Limited, of New York, will operate a series of picture and vaudeville houses in Canadian cities, including Ottawa, Kingston, London, Hamilton, Winnipeg and Montreal. Jacob A. Jacobs, S. Friedman and Geo. S. McLeish, of Montreal, are the interested parties.

It is stated that the Earl Grey Skating Club will shortly erect an extensive club building and skating rink. It is understood that the Eadie property on Drummond street has been purchased for this purpose.

Mr. Theo. Daouts, architect, 103 St. Francois Xavier street, is preparing plans for an extensive amusement enterprise to be erected at Isle Grosse Bois, and expects to call for tenders next week.

Mr. Jos. Perrault, architect, 2106 Park avenue, is preparing plans and details for the "St. Georges" apartments, to be erected at the corner of Park and Fairmount avenue, for Mr. George Poliquin. Mr. Perrault expects to have his plans and details completed by February 5th, 1910.

It is reported that the Royal Edward Hotel Company has been formed with a capital of \$90,000. It is further stated that they have purchased the Carsley block which fronts on St. James and Notre Dame street, east of St. Peter street, and will remodel it extensively for use as an hotel.

The Yorkshire Insurance Company will erect a ten storey office building on St. James street, opposite St. Lawrence Hall, and adjoining the G. T. R. ticket office, at the corner of St. Francois Xavier street. The company will tear down the building now occupying the site, and as soon as spring arrives construction of a modern structure will be commenced. The building is to be completed about the 1st of May, 1911. Estimated expenditure, about \$200,000. Architects, Saxe & Archibald.

The buildings occupied by the United Quick Shoe Repairing Company and other companies on St. Catherine street west, near the Casino theatre, were damaged by fire. Estimated loss, \$25,000.

Quebec, Que.

It is understood that a starch factory will be established in this vicinity. Messrs. C. Amedee Paquet, 114 d'Angillon, and Jos. Falardeau, 271 St. Joseph street, are interested. Proposed site, Riviere aux Chiens, Chateau Richer.

Sprague, Man.

The C. N. R. station here was destroyed by fire on the 30th inst. Estimated loss, \$3,000.

St. John, N.B.

The wood working factory of Hamilton & Gay was destroyed by fire on the 28th inst. Estimated total loss, \$50,000.

Toronto, Ont.

In a recent issue of the "Contract Record" it was stated that the Standard Sanitary Manufacturing Company obtained a permit for the erection of a factory at the

corner of Royce and Lansdowne avenues, Toronto, to cost \$12,500. We understand that the company propose to spend a much larger amount in the erection of their buildings, and will have one of the most complete factories in Canada. The permit in question covers only one of the buildings forming part of the complete plan.

It is stated that the Home Bank of Canada has purchased the lot on the north-west corner of Broadview avenue and Elliott street. Col. James Mason, general manager.

It is stated that Mr. Richards has purchased the northeast corner of York and Adelaide streets, 128 feet on York by 105 on Adelaide. Plans for a large building, combining offices and stores, will be prepared, shortly.

Victoria, B.C.

It is stated that B. Williams & Company are planning improvements to their establishment on Yates street.

The Quaker Oats Company of American are reported to have concluded a deal with the Ashcroft Waterworks for the purchase of the latter property as a site for their Western Canadian manufactory.

The Dominion Trust Company interviewed the council in regard to the erection of a six storey building, on Wharf street, opposite the post office. Estimated expenditure, \$150,000. Materials, stone, glazed brick, or terra cotta. President, J. B. Mathers.

A three storey brick building for stores and offices on land 60 by 120 feet is contemplated on Johnson street, adjoining the warehouse of the Brady-Houston Pickling Company. Estimated cost, \$12,000. Owner, Dr. A. J. Garesche.

Vancouver, B.C.

It is stated that A. S. Marsh, of Calgary, has taken over the Astor hotel, which he intends to thoroughly remodel.

It is reported that a large saw mill will be erected here by the North Star Lumber Company, Elko, B.C. J. Hanbury is interested.

Tenders for the construction of the proposed Howe street addition to the Hotel Vancouver will be called for shortly. It is stated that \$20,000 will be expended in remodelling the hotel at Sicamous Junction by the C. P. R.

Winnipeg, Man.

Tenders are being invited for the office building of Alloway & Champion, near the corner of Main street and Portage avenue, the plans of which are now completed.

The Western Canada Flour Mills Company, Limited, will erect large new elevators at St. Boniface, and at Goderich, Ont. The elevator to be built at St. Boniface will be commenced within the next two weeks, as the contract is expected to be let within that time. A. Kelly, president, and S. A. McGaw, vice-president.

AWARDED.

Montreal, Que.

Messrs. Peden & McLaren, architects, 17 St. Alexis street, have awarded the contract for the marble work required in the new office of the Bank of Montreal, St. Johns, Newfoundland, to the Smith Marble Construction Company.

Shawinigan Falls, Que.

T. Pringle & Sons, architects, Coristine Building, Montreal, have awarded the general contract for the erection of a plant for the Shawinigan Cotton Company, Limited, to Mr. C. E. Deakin, of Montreal. Contract for roofing has been awarded to

Geo. W. Reed & Company; elevators, Otis Fenson Company; chimney, M. W. Kelog.

Victoria, B.C.

The contract for building the 70-room addition to the Empress hotel here has been awarded, it is reported, to J. L. Skene of this city.

Vancouver, B.C.

The contract for the excavation work for the proposed Canada Life Building on Hastings street, next to the Bank of Commerce building, has been awarded to McDonald, Wilson & Snyder, contractors for the new courthouse. A. A. Cox, supervising architect and designer of the Carter Cotton building.

Power Plants, Electricity and Telephones

Blind River, Ont.

Preparations are being made by the Blind River Light, Heat & Power Company, for extensive improvements and additions to its system during 1910, which will include the construction of a new concrete power house and installation of an additional 300 h.p. turbine. Thomas H. Pindell is superintendent.

Edmonton, Alta.

The city of Edmonton is reported to have engaged Walter J. Francis, of Montreal, Que., Can., consulting engineer, to make a report on the power plant and other civic utilities.

The Edmonton Radial Railway Company, it is stated, expects to place contracts during the next six weeks for the construction of about three miles of single track and one mile of double track. Chas. E. Taylor, general manager.

Hespeler, Ont.

Plans are being considered to take electrical service from Niagara Falls, through the Hydro-Electric Power Commission, about May 1. It is proposed to install a synchronous motor to replace the present steam plant, which will be held as an auxiliary. When the change is made a power service will be established. W. Brewster is treasurer.

London, Ont.

February 26th has been fixed as the date for receiving tenders for electrical apparatus, including transformers, motor, generator set, voltage regulators, switchboards, lightning protectors, instruments, arc and incandescent street lighting systems. Address E. I. Sifton, city electrical engineer.

Latchford, Ont.

In connection with the concrete dam to be constructed here, it is stated that a power plant is to be installed as the work progresses and electrical energy generated.

Medicine Hat, Alta.

Arrangements are being made by the Alberta Clay Products Company for the installation of a 500 h.p. power plant, the equipment of which will include three tubular boilers, Corliss engine, generator, pumps, heater, etc.

Montreal, Que.

The Montreal Light, Heat & Power Company, continuing its policy of burying its wires in conduits throughout the city, have decided to lay 60,000 feet of conduits between Mentana and Marie Ann streets, and between Orleans and Forsyth streets.

Ottawa, Ont.

The bill to incorporate the Toronto Central Terminal Company has been defeated by the Commons Railway Committee.

Preston, Ont.

The bylaw to raise \$18,000 for the installation of the hydro-electric plant was carried by a large majority. Noted in issue of January 5th.

Saskatoon, Sask.

Tenders addressed to J. H. Trusdale, city clerk, will be received until February 14th for supply of the following material: 4 tons of No. 00 W. P. copper wire; 4 tons No. 2 W. P. copper wire; 4 tons No. 4 W. P. copper wire; 2 tons No. 10 W. P. copper wire; 2,000 1½ inch top pins; 3,000 D. G. D. F. insulators; 2,000 side brackets; 500 service insulators; 200 5-ampere meters; 100 10-ampere meters; four 30 kw. transformers; two 1 k.w. transformers; 50 lbs. tape; 500 feet olom, 3-4 inch; 20 lbs. solder; 10 pounds solder paste; 200 straine insulators; 400 fuses assorted; 500 5-8 by 15 inches for double arming, with both ends threaded and double nuts; 3,000 5-8 inch washers.

AWARDED.

Galt, Ont.

The contract for the equipment of the hydro-electric transform r station, it is stated, has been awarded to the Canadian General Electric Company, Peterboro.

Montreal, Que.

The Mississiquoi Marble Company have awarded a contract to Laurie & Lamb, of Montreal, for the installation of a 50 h.p. Bellis-Morcom engine to operate their new saw shop. The contract for twelve additional gang saws has been awarded to the Patch Manufacturing Company, of Rutland, New York.

Miscellaneous

Cornwall, Ont.

By-laws have been passed to issue \$4,747 local improvement debentures. Geo. S. Jarvis, clerk.

Fort William, Ont.

Tenders addressed to Chairman of "Utilities Committee" will be received until February 24th for the supply of 7,000 standard railway ties, etc. Delivery to commence on or before April 1st, and full quantity to be in before April 15th. A. L. Farquharson, construction superintendent.

Tenders addressed to Chairman of Utilities Committee will be received until February 24th for the supply of 486 cedar poles, etc. Delivery to commence on or before March 15th and completed delivery before March 31st. A. L. Farquharson, construction superintendent.

Tenders are being called until 10th February for the supply of brass goods, lead pipe, pig lead and service boxes. For information apply at City Engineer's office. J. Wilson, assistant city engineer.

The West Algoma Agricultural Association are calling for tenders until February 7th for delivery of 500 cedar fence posts, each ten feet, six inches long, with a six inch top. Frank Lee, secretary-treasurer.

Hamilton, Ont.

The Works Committee passed estimates amounting to \$356,000, as follows: Street lighting, \$42,000; Board of Works, \$107,000; sewers, \$11,150; waterworks, expenses, \$65,250; sewage disposal, \$19,154; waterworks construction, \$94,000; collection of garbage, \$17,000.

Latchford, Ont.

The work of setting the concrete for the concrete dam to be constructed by the federal government will be started at low water in July.

Moose Jaw, Sask.

Tenders are being called for two street sprinklers until February 21st. J. D. Simpson, city clerk.

Montreal, Que.

Recent building permits include: C. Gauthier, 2516 Mance street, one house containing two dwellings, \$2,500; W. J. Wall, 83 Bleury street, one house containing store and dwelling, \$10,500; A. Beaulieu, 224 Boyer street, one house containing six dwellings, \$4,500; W. Monastee, 526 Chambord street, one house containing five dwellings, \$4,500; F. Locas, 1167 Huntley street, one house containing two dwellings, \$2,000; F. Touchy, 1907 Boyer street, four houses containing eight dwellings, \$8,000; O. Michaud, 1590 A Labelle street, one house containing three dwellings, \$2,000; H. Fortier, 2091 Hutchison street, one house containing three dwellings, \$4,500; Ideal Savings, Loan & Land Company, 292 St. Catherine street east, six houses containing eighteen dwellings, \$5,000; Jenkins Bros., Remi street, factory, one storey, at 103 St. Remi street, \$5,000; Dubuc & Chateaufort, 1125 Delorimier avenue, house containing three dwellings on Cartier street, \$4,000; F. X. Craig, 387 Mount Royal avenue, a three storey store on Notre Dame street west, \$5,000; L. P. Dauphause, 26 Dufferin street, house containing five dwellings on Papineau avenue, \$5,000; H. C. Desaulniers, 1373 Parthenais street, house containing five dwellings on Papineau avenue, \$5,000; A. Lusignan, 385 Plessis street, house containing five dwellings on Papineau avenue, \$5,000; D. Murray, 75 Parthenais street, house containing three dwellings at 71 Parthenais street, \$5,000; E. Dufresne, Credit Foncier Building, six houses, containing twelve dwellings on Dumont street, \$10,000; W. M. Aitken, Drummond street, alterations to property corner Drummond and Sherbrooke street, \$2,000; Mde. V. Joe. Levert, 596 Mount Royal east, alterations to property at 577 Mount Royal east, \$6,000; J. A. Aumais, 1046 Sherbrooke east, alterations to 2063-71 St. Lawrence boulevard, \$3,500; G. Paradis, 432 Joliette street, three houses containing nine dwellings on St. Germain street, \$7,000; T. Charpentier, jr., 157 Papineau avenue, two houses containing five dwellings on Papineau avenue, \$8,000.

North Vancouver, B.C.

Tenders are being called until February 28th for the purchase of the following 50-year 5 per cent. debentures: Waterworks, \$65,000; sewer, \$40,000; school, \$61,000; road machinery, \$10,000; parks, \$5,000; fire equipment, \$3,000.

Ottawa, Ont.

Press reports state that the Commons Railway Committee has passed the bill extending the charter of the Montreal, Ottawa & Georgian Bay Canal Company, and it is said that the company is now prepared to go ahead with the construction of its canal.

Port Arthur, Ont.

It is stated that a committee of the city council has been appointed to develop a scheme for instituting a gas plant here, and an inducement will be offered several companies with whom the city has been in communication.

Smith's Falls, Ont.

Tenders addressed to J. A. Lewis, town clerk, will be received until February 7th for \$4,660.21 20-year 5 per cent. local improvement debentures.

Strathcona, Alta.

On February 7th the ratepayers will vote on a by-law to issue \$8,019 4 1-2 per cent.

30 year debentures; also \$50,000 40 years 41-2 per cent. bridge debentures. Chas. E. K. Cox, secretary-treasurer.

Victoria, B.C.

The management of the Victoria Ferry and Terminal Railway Company is said to be determined to procure from the new city council the permit necessary for the construction of new terminals and offices on Blanchard street.

Winnipeg, Man.

The following building permits have been issued recently: Northern Foundry & Machine Company, pipe foundry on Point Douglas avenue, north side, between Gomez and Gladstone, \$10,000; H. Hirsch, two dwellings on Polson avenue, between Main and Mac street, \$2,000 each; O. Sturster, two houses on Arlington street, between Livinia and Portage, \$2,000 each; Mrs. G. Bradshaw, house on Park place, between Ashland and Florence, \$3,000; Morgan & Daykin, five houses on Home street, between Livinia and Ellice, \$2,000 each; Arni Eggertson, house on Home street, \$3,500; J. Campbell, house on north-east corner of Lily and Alexander, \$3,000.

AWARDED.**Fredericton, N.B.**

We have been officially informed that the contract for lumber for Tobique Narrows steel bridge has been awarded to F. D. Sadler, of Perth, Victoria Co., N.B., at \$18 per thousand. D. B. Winslow, secretary, Public Works Department.

Kingston, Ont.

H. Chadwick has been awarded the contract for four thousand barrels of cement at \$1.69 as a result of further consideration by the board of works. The board decided at a previous meeting not to accept any of the tenders, believing they could secure a cheaper supply on the open market.

Latchford, Ont.

The contract for the Latchford dam has been awarded to W. H. Sinclair and D. B. Campbell, of West Toronto, at an itemized price of about \$38,000.

Montreal, Que.

The Seaman-Kent Company, Limited, have been awarded the following contracts for flooring: Ashbury College, Ottawa, Byers & Anglin, contractor; Canada Life Building, Ottawa, Byers & Anglin, contractors; Carnegie Library, Peterboro, Rutherford Bros., contractors; Lake of Woods Building, Montreal, Simpson & Peel, contractors, architects, Ross & McFarlane; Catholic School, Wellington street, Joseph Jacobs, contractor; G. and J. Esplin, factory, Montreal.

Toronto, Ont.

Tenders have been received and opened, and contracts awarded for the following annual supplies required by the Works and other Civic Departments during the year 1910, viz.: Gravel, screened and unscreened gravel in carload lots, to the York Sand & Gravel Company; screened and unscreened gravel, east of the Don, John Foley, at \$1 per cubic yard, the lowest in each instance; iron and steel, Baines & Peckover, and T. Meredith & Company, the lowest tenderers. General Supplies — hardware, etc., Aikenhead Hardware, Limited, Thos. Meredith & Company, and the Russell Hardware Company; broken stone, Rogers Supply Company, who have intimated their willingness to supply it in bins at \$1.10 per ton; granite paving blocks, David J. Gordon & Son, Gananoque, Ont.; granite flange blocks, both large and small, James Brodie, Graniteville, Que., the lowest; paving

blocks, Ontario Brick Company, the lowest; refined asphalt, The California Asphaltum Sales Agency (1,000 tons); limestone dust, to "Crushed Stone, Limited," at \$5.35 per ton, being the lowest.

Victoria, B.C.

The contract for the sternwheel steamer for the Prince Rupert Skeena Navigation Company to ply between Prince Rupert and Hazelton has been let to the Victoria Machinery Depot at \$10,000. The vessel is to be completed by April 20th.

The contract for the sternwheel steamer for the prince Rupert Skeena Navigation Company to ply between Prince Rupert and Hazelton has been let to the Victoria Machinery Depot, the contract price being \$40,000. The vessel is to be completed by April 20th and will be built in Victoria.

New Companies

Superior Rolling Mills Company, Limited, Fort William, Ont., incorporated, capital, \$500,000. Incorporators, M. J. O'Brien, G. H. Montgomery, K.C., both of Montreal, Que.

Sawyer-Massey Company, Limited, Toronto, capital \$7,000,000, incorporated to carry on business as a manufacturer of and dealer in steam, gasoline and oil engines, and also in timber, wood and metal. Incorporators, J. S. Lovell, accountant, W. Bain, bookkeeper, and B. M. Coates, all of Toronto, Ont.

Dominion Corrugated Steel Pipe Company, Limited, St. Johns, Que., incorporated, capital \$20,000. Incorporators, C. H. Richardson, manager, H. Proctor, merchant, of Sandusky, Mich., U.S.A.

Chateau-Richer Quarry Company, Quebec, incorporated, capital \$85,000. Incorporators, J. W. Baker, hotel manager, J. E. Baker, quarryman, and C. E. Tacher, notary, all of Quebec.

Saint Lawrence Car Works, Limited, Quebec, incorporated, capital \$250,000. Incorporators, J. G. Scott, gentleman, A. E. Doucet, engineer, B. A. Scott, lumberman, all of Quebec, and C. L. Hervay, engineer and W. H. Ford, manufacturer, both of Montreal, Que.

Business Notes

D. Ross, contractor, London Township, is stated to have assigned.

Ville Marie Plumbing Company, Ville Marie, Que., is stated to have assigned.

Stalker & McKeown, electricians, Winnipeg, Man., are stated to have dissolved.

The Annex Hardware Company, St. Louis, Que., are stated to have assigned.

Hodgson & Stearman, hardware and plumbing merchants, Vancouver, B.C., have dissolved.

P. Legare & Fils, builders, Montreal and Three Rivers, are stated to have been asked to assign.

J. Gray, builder and contractor, Peterboro, Ont., is stated to have assigned to A. J. Warne.

The R. Watt Machine Works, Limited, Hidgetown, Ont., are stated to be removing to Chatham, Ont.

The Manitoba Gazette gives notice of the incorporation of the following companies:—J. J. Crowe Company, Limited, Newdale, Man., incorporated to acquire, manufacture and deal in lumber, pulp, brick, building and construction material and supplies. Capital, \$20,000. Incorporators, J. J. Crowe, lumber merchant, Newdale; R. J. Gourlay, manager, J. B. Sinclair, secretary, both of Winnipeg, Man.

Tenders and For Sale Department



Proposals

Tenders are wanted for approximately 8,000 k.w. of 13,200 Volt Transformers.

For information apply at once to ELECTRICAL DEPARTMENT, City Hall, Toronto, Canada. 5

City of Moose Jaw

Notice

Tenders will be received for two (2), two-horse street sprinklers, steel tanks.

Tenders stating capacity and weight, giving prices f.o.b. Moose Jaw, to be laid on the council table not later than 8.30 p.m., on MONDAY, FEBRUARY 21ST, 1910.

THE CITY OF MOOSE JAW
W. F. Heal, City Clerk.

7

Notice to Contractors

Tenders for 42 inch Steel Intake Pipe

Sealed tenders addressed to the Chairman of the Water Works Committee will be received by registered post only, up to 5 p.m., TUESDAY, FEBRUARY 15TH, 1910, for the supply and delivery of 3,000 lineal feet of 42 inch steel intake pipe.

Specifications, form of tender and full particulars may be obtained on application to the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, January 24th, 1910. 6

City of Saskatoon

Tenders wanted

House, Sewer and Water Works Service Connections

Sealed tenders will be received at the Office of the undersigned City Clerk until 5 O'clock p.m., MONDAY FEBRUARY 14TH, 1910, for certain materials required for House, Sewer and Water Works Service connections, including Sewer Pipe, Galvanized Iron Pipe, Lead Pipe, Brass Fittings, Service Boxes and Water Meters.

Instructions to Bidders may be obtained on application to George T. Clark, City Engineer.

The lowest or any tender not necessarily accepted.
WILLIAM HOPKINS J. H. TRUSDALE
Mayor. City Clerk.

Saskatoon, January 21st, 1910. 5

Tenders for Church

Tenders will be received by the undersigned until noon on SATURDAY, FEBRUARY 19, 1910, for the work of the various trades required in the erection of a church building on the corner of Queen Street West, and Beaty Avenue, Toronto, for the Church of the Epiphany.

The lowest or any tender not necessarily accepted.

GORDON & HELLIWELL, Architects,
Confederation Life Building, Toronto. 6

City of Saskatoon

Tenders Wanted

Steel Overhead Footbridge at Twentieth Street

Sealed tenders addressed to the undersigned, City Clerk and endorsed "Tender A" and "Tender B" will be received, for the construction of a Steel Overhead Footbridge at 20th Street, until five o'clock p.m., on the following dates:

Contract A, Foundations, MONDAY, FEBRUARY 14TH, 1910.

Contract B, Steel Superstructure, MONDAY, FEBRUARY 21ST, 1910.

Plans and specifications, etc., may be seen at the office of the City Engineer, Saskatoon; also at the office of the Canadian Engineer, at the following addresses:

Toronto, 62 Church Street, Phone Main 7404

Montreal, 333 Board of Trade Building, Phone M 1001

Winnipeg, Room 315 Nanton Building, Phone 8142

The lowest or any tender not necessarily accepted.

WILLIAM HOPKINS J. H. TRUSDALE
Mayor. City Clerk.

Saskatoon, January 21st 1910. 5



Notice to Contractors

Cast Iron Pipe

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, endorsed "Tender for Cast Iron Pipe, Main Drainage Works", will be received by registered post only, until noon of TUESDAY, FEBRUARY 22ND, 1910.

Each tender must be accompanied by a deposit of \$350.00, and a bond of \$4000.00 will be required for the faithful performance of the contract.

The following are total of approximate lengths of the various sizes required under the contract:

465 lin. ft. of 42-inch Cast Iron Pipe

465 lin. ft. of 66-inch Cast Iron Pipe

160 lin. ft. of 36-inch Cast Iron Pipe

8 lin. ft. of 6-inch Cast Iron Pipe

The above lengths include all specials.

Specifications, form of tender and plans may be obtained from the Main Drainage Department, City Engineer's Office.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.

City Hall, Toronto, January 27th, 1910.

Tenders

Whole or separate tenders will be received by the undersigned up to FEBRUARY 14, 1910, for the erection and completion of a

Church Building

for the West Side Methodist Church, Owen Sound, Ont. Plans may be seen at the store of A. W. McFaul, 912 and Avenue east, Owen Sound, or at the office of the Architect, Jas. S. Russell, Stratford, Ont. The lowest or any tender not necessarily accepted.

JAS. C. MILLER,
Chairman Building Committee,
Owen Sound, Ont.

5

Tenders for Gaol Heating

Tenders will be received by the undersigned up to noon on WEDNESDAY, the 16TH DAY OF FEBRUARY, 1910, for the heating of the County Jail at the Town of Barrie, according to plans and specifications which may be seen on application to A. W. Beardsley, County Clerk's Office, Court House, Barrie. All tenders to be sealed and marked "Tenders for Gaol Heating" and addressed to

C. J. PICOTTE,
Chairman County Property Committee
Box 128, Penetanguishene, Ont.

6

For Sale

A 60,000 gallon Water Tank on Steel Trestle, 90 ft. high.

Sealed tenders addressed to the Chairman of the Water Works Committee, endorsed "Tender for Water Tank", will be received by registered post only up to 5 p.m. TUESDAY, MARCH 1ST, 1910, for the purchase removal of a 60,000 Imperial Gallon Wooden Tank and mounted on a steel trestle, 90 ft. high, at the Ottawa East Pumping Station.

Particulars may be obtained on application to the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the highest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, January 25th, 1910. 7

Miscellaneous

TILLSONBURG, ONT.—Good opening for an Engineer and P.L.S. Town of Tillsonburg. Population 3,000. Town would require part of his services for Public Works. Apply to A. E. RAYNES, Town Clerk. 6

Fine Factory Site—New Westminster, B. C., the coming factory city. Lot 7, Block 36; corner 198 x 132, three frontages; close to tracks and waterfront. Right in city, and already surrounded by industries. \$15,000. Snap. Will bring double this inside two years. Investigate. Address P. O. Box 516, Vancouver—owner. 7

Canadian Sheet Steel Corporation, Limited, Toronto and Morrisburg, Ont., are stated to have assigned.

J. A. Gillis, of Gillis & Wall, lumber merchants, Halifax, N.S., is stated to have assigned.

The Canadian Automatic Air & Steam Coupler Company, Limited, Winnipeg, Man., capital \$750,000. Incorporators, P. A. Senecal, inventor, J. L. Nelson, contractor, and J. Delmage, all of Winnipeg, Man.

Contract Record

ESTABLISHED 1886

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Municipal Progress, Advance Information

**A National Journal of Architecture, Building,
Engineering, Public Works, Tenders, Advance
Information and Municipal Progress**

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Vol. 24 Toronto February 2, 1910 No. 5

Work of the Can. Soc. C. E.

The excellent work which is being done for the engineering profession in this country by the Canadian Society of Civil Engineers and the influence which this body can and will command for the fulfilment of its various purposes are matters that must have been borne in very forcibly upon those who attended the 24th annual convention of the Society at Ottawa last week.

Incidentally, the officers and council of the Society are to be congratulated upon the success of this meeting. We believe that we shall be casting no aspersions upon the efforts made in the past when we say that in point of enthusiasm, the convention was the best ever held; and we feel safe in the assertion that never before was a meeting productive of greater promise insofar as are concerned the fundamental, vital things for which the Canadian Society of Civil Engineers was incorporated, and for which it is working so faithfully.

The unsatisfactory status of the civil engineer in the service of the government is a question that was propounded most ably by Mr. Dodwell, of Halifax, resident engineer for the Department of Public Works, the greater part of whose address is reproduced elsewhere in this issue. While we are hardly prepared to say that in the framing of the Civil Service Act there was discrimination, of "design and intent," against the civil engineer, we are convinced that under present conditions the profession is not receiving proper recognition under its provisions. The appointment of a special committee of the Society to make due representations to the government is most timely. It is a serious reflection upon the authorities that under the absence of

proper regulations the engineer seeking government work is required neither by examination nor testimonial to show his ability to undertake his important and responsible duties. Surely in the development of recent years we have had ample proof of the necessity for a high standard of engineering skill! How then is it conceivable that the present conditions still obtain, and upon whom is the blame attached? The Society will, doubtless, be able to throw some elucidation upon these matters long before the next annual meeting, and it is certainly about time that some investigations were made, for of all the problems of the past, present and future that have to be solved in the development of the country few, or none, are of greater importance than those pertaining to engineering. Mr. M. J. Butler, in the course of his remarks, declared that civil engineers were "the most important factor in modern civilization," and that in view of the important part it takes, the profession is worthy of better recognition.

The expansive nature of the Society's work is attested by the ready assistance given the Conservation Commission in the appointment of members in every province to co-operate in the excellent work of the Commission. The latter body will be greatly strengthened by the engineers, and their observations should be extremely helpful in the development of the work.

The address given by Mr. Mountain, the retiring president, will be read with interest by many of our readers. Mr. Mountain is a gentleman of mature experience, and the views he holds in regard to the supreme importance of transportation problems will be shared by all who are really competent to express an opinion on the point. The "network of steel" now being spread over Canada is undoubtedly one of the greatest factors in the development of the country. With a continuation of a progressive policy on the part of the government and the railway companies, the solution of the present transportation problems will not be difficult to find. It is significant to note that Mr. Mountain considers that we have now entered upon perhaps the greatest year of railway development in the history of our country.

The Canadian Society of Civil Engineers was designed primarily to promote the interests and raise the status of the engineering profession, and for what it has already done in these respects it is entitled to the support and co-operation of every individual engineer throughout the Dominion. But one may ask: What good resulted from the convention? Well, if it did nothing else it brought some 250 of the most prominent members of the profession into close fellowship and to a better understanding of one another. Among engineers, as in every other community, the spirit of unity and esprit de corps is a great desideratum. This spirit is fostered at the annual meeting. The more engineers get together in a friendly spirit, the better the results that will be worked out, both for themselves and for the profession at large. The convention provides the time, the place—and the mood, generally, for discussing not only the plans of the corporate body, but also the peculiar difficulties of the individual practitioner.

At the annual meeting of the Quebec branch of the Canadian Society of Civil Engineers, Capt. A. E. Doucet was elected president in succession to Mr. A. L. Vallee. Mr. P. E. Parent succeeds Mr. O'Donnell as secretary of the branch. Messrs. E. A. Hoare, DeCary and A. Leofred are new members of the council. After the meeting, which took place at the City Hall, the members enjoyed a pleasant reunion in the office of Mr. Leofred.

24th Annual Meeting of the Can. Soc. C.E.

Detailed Account of the Convention at Ottawa last week — Representative Gathering Enacts much Useful Work — Many Interesting Addresses

The 24th annual convention of the Canadian Society of Civil Engineers was held in the council chambers of the City Hall, Ottawa, from the 25th to the 27th ult. The meeting was representative of the best interests of the profession throughout the Dominion and was attended by over 250 members and others closely identified with engineering and allied interests.

The complete list of those who signed the register is as follows:—

- | | | | |
|------------------------------------|---|------------------------------------|----------------------------------|
| Geo. A. Mountain, Ottawa. | D. F. Maxwell, St. Stephen. | G. M. Macreath, Sault Ste. Marie. | A. McDougall, Ottawa. |
| A. A. Dion, Ottawa. | V. Denis, Ottawa. | G. C. Rainboth, Aylmer, Que. | G. T. Desbarats, Ottawa. |
| M. Donaldson, Ottawa. | E. J. Walsh, Ottawa. | J. B. Spence, Ottawa. | W. Thomson, Ottawa. |
| T. C. Keefer, Ottawa. | P. E. Moffet, Ottawa. | Duncan McPherson, Ottawa. | J. B. Challies, Ottawa. |
| Newton J. Ker, Ottawa. | F. R. Burgess, Ottawa. | T. C. Irving, Jr., Toronto. | W. C. Gillis, Ottawa. |
| J. B. McRae, Ottawa. | Wm. A. Duff, Ottawa. | Jas. Lamoureux, Ottawa. | G. S. Macdonald, St. John. |
| A. St. Laurent, Ottawa. | G. C. Carman, Cornwall. | John H. Bryne, Ottawa. | John J. Murphy, Ottawa. |
| A. H. N. Bruce, Ottawa. | H. A. F. MacLeod, Ottawa. | W. F. M. Bryce, Ottawa. | A. W. Achar, Ottawa. |
| Wm. J. Stewart, Ottawa. | F. A. Drought, Ottawa. | G. W. Volekman, Ottawa. | T. C. Keefer, Jr., Ottawa. |
| Wm. P. Anderson, Ottawa. | A. R. Ketterson, Ottawa. | F. R. Wilford, Lindsay. | A. T. Phillips, Ottawa. |
| N. J. F. Cauchon, Ottawa. | Chas. O. Wood, Ottawa. | F. B. Fripp, Sault Ste Marie. | A. H. W. Cleave, Ottawa. |
| C. H. McLeod, Ottawa. | F. E. Patterson, Ottawa. | V. A. G. Dey, Montreal. | Russell Smart, Ottawa. |
| Fred'k H. Fay, Boston. | A. M. Jones, Ottawa. | K. W. Bishop, Owen Sound. | F. J. Hetherington, Ottawa. |
| J. E. Schwitzer, Winnipeg. | A. P. Deroche, Ottawa. | A. T. McDougall, Ottawa. | F. D. Henderson, Ottawa. |
| Louis Vallee, Quebec. | M. Wolff, Quebec. | J. W. LeB. Ross, Sault Ste. Marie. | Alex. J. Grant, Peterboro. |
| W. Dale Harris, Ottawa. | J. A. Freeland, Quebec. | A. Leofred, Quebec. | Jas. A. Beatty, Peterboro. |
| D. L. McLean, Ottawa. | F. E. Bryant, Montreal. | Ernie Ortiz, Ottawa. | Amedie Buteau, Montreal. |
| A. Hector Dion, Ottawa. | H. A. Bogart. | E. Jodone, Ottawa. | C. D. Sargent, Cornwall. |
| Wm. Kennedy, Jr., Montreal. | M. S. Blaiklock, Montreal. | E. Ashton Hassan, Ottawa. | M. J. Butler, Ottawa. |
| John Kennedy, Montreal. | A. Janin, Montreal. | Wm. McNab, Montreal. | T. C. Keefer, Ottawa. |
| E. A. James, Toronto. | R. W. Hannaford, Montreal. | S. J. Chapleau, Ottawa. | H. A. Woods, Montreal. |
| G. A. Bernasconi, Antigonish, N.S. | M. Neilson, Montreal. | J. J. Collins, Ottawa. | O. Sullivan, Ottawa. |
| R. W. Farley, Hull. | Prof. L. A. Herdt, Montreal. | I. J. Steele, Ottawa. | Frederick Lambart, Ottawa. |
| H. N. Ruttan, Winnipeg. | J. Duchastel, Montreal. | R. F. H. Bruce, Ottawa. | G. W. Smith, Toronto. |
| Mrs. Ruttan, Winnipeg. | G. S. Maunsell, Ottawa. | Henri Melancon, Ottawa. | E. G. McLean, Montreal, N.B. |
| T. K. Thomson, New York. | H. F. Cole, Ottawa. | A. T. Pinet, Ottawa. | C. H. Mitchell, Toronto. |
| Mrs. K. Thomson, New York. | Walter J. Francis, Montreal. | E. V. Collier, Ottawa. | J. A. Jamieson, Montreal. |
| S. B. Clement, North Bay. | W. V. Taylor, Montreal. | M. F. Cochrane, Ottawa. | J. Macphail, Ottawa. |
| E. A. Stone, Fredericton. | W. N. Dietrich, Ottawa. | Douglas H. Nelles, Ottawa. | P. Johnson, Montreal. |
| F. X. T. Berlinguet, Three Rivers. | G. K. McDougall, Montreal. | J. Galbraith, Toronto. | C. A. Mathewson, London. |
| Geo. F. Perley, Ottawa. | F. T. Kaelin, Montreal. | J. G. Sing, Toronto. | W. B. Russell, Toronto. |
| Ernest Marceau, Montreal. | R. McColl, Halifax. | W. P. Merrick, Fort William. | R. W. Leonard, St. Catharines. |
| Chas. S. Leech, Montreal. | P. Charlton, Montreal. | H. G. Kelly, Montreal. | H. C. Kennedy, Montreal. |
| Alex. Gray, Ottawa. | J. Aylen, North Bay. | H. S. Greenwood, Peterboro. | Henry Holgate, Montreal. |
| Wm. J. DeWolfe, Edmundstone, N.B. | F. O'Gara, Ottawa. | G. McL. Pitts, Ottawa. | I. G. Henderson, Windsor. |
| H. V. Brayley, Ottawa. | Chas. Baker, New York, N.Y. | W. L. Johnson, Rochester, N.Y. | E. T. Agate, P. Hford, N.Y. |
| R. Steckel, Ottawa. | H. R. Ives, Montreal. | A. Lightall, Ottawa. | A. Ghyssens, Montreal. |
| H. D. Lumsden, Ottawa. | E. A. Ghyssens, Montreal. | Ormond Higman, Ottawa. | G. A. Bayne, Winnipeg. |
| C. G. Keyes, Ottawa. | J. H. Devey, Montreal. | Henry L. Sherwood, Ottawa. | Gordon Grant, Ottawa. |
| H. W. Jones, Ottawa. | E. O'Sullivan, Montreal. | R. O. Sweezey, Quebec. | W. R. McDonald, Alexandria. |
| L. N. Rheame, Ottawa. | A. McCulloch, Montreal. | C. H. Pinhey, Ottawa. | H. de Miffonis, Ottawa. |
| Collingwood Schrieber, Ottawa. | J. Ewing, Montreal. | F. P. Shearwood, Montreal. | De Gaspe Beaubiens, Montreal. |
| Ed. F. Perreault, Ottawa. | J. F. Blanchard, Ottawa. | Paul T. C. Dumais, Hull. | W. R. Duckworth, Montreal. |
| J. K. Scammell, St. John. | I. D. Taylor, Ottawa. | John B. Harven, Ottawa. | A. Boyer, Montreal. |
| Chas. McGreevy, Ottawa. | Gustav Lindenthal, New York, N.Y. | O. P. Schrieber, Ottawa. | C. M. McCreath, Sault Ste Marie. |
| A. T. Genest, Ottawa. | Sir Sandford Fleming, K.C.M.G., Ottawa. | P. B. Whitney, Ottawa. | Harry S. Day, Ottawa. |
| H. J. Heygate, Ottawa. | G. W. N. Day, Toronto. | A. J. Morris, Ottawa. | E. W. Berry, Toronto. |
| Claude V. Johnson, Ottawa. | C. E. W. Dodwell, Halifax. | L. W. Gill, Kingston. | J. de C. Davies, Cornwall. |
| W. M. Everall, Ottawa. | Geo. S. Proctor, Ottawa. | A. T. Tomlinson, Matheson. | H. B. Stuart, Montreal. |
| H. H. Pinch, Ottawa. | E. G. Evans, Hampton, N.B. | R. deB. Cariveau, Ottawa. | Miss H. A. Stuart, Montreal. |
| J. R. Grant, Ottawa. | H. J. Lamb, London. | J. L. Weller, St. Catharines. | Willis Chipman, Toronto. |
| F. M. Davis, Ottawa. | Aime Cousineau, Ottawa. | F. H. Peters, Ottawa. | H. F. Tye, Montreal. |
| C. C. Kirby, Ottawa. | Donald A. White, Ottawa. | W. W. Benny, White River. | G. W. Tornroos, Ottawa. |
| L. E. Allen, Ottawa. | R. Weddell, Trenton. | H. B. R. Craig, Kingston. | W. H. Bowden, Ottawa. |
| W. Bell Dawson, Ottawa. | R. G. Weddell, Toronto. | B. H. Fraser, Ottawa. | C. T. Trotter, Ottawa. |
| F. D. Anthony, Montreal. | Donald S. Barton, Lewis. | P. E. Parent, Quebec. | G. H. Duggan, Ottawa. |
| L. A. DesRosiers, Ottawa. | Wm. Young, Ottawa. | I. Anderson, Ottawa. | A. J. Matheson, Ottawa. |
| E. V. Johnson, Ottawa. | Alex. Hutchinson, Ottawa. | G. H. Garnot, Ottawa. | C. L. Herney, Montreal. |
| C. R. Coutlee, Ottawa. | H. H. Houser, Ottawa. | L. G. Papineau, Sorel. | G. L. Mattice, North Bay. |
| J. S. Armstrong, Rothesay. | Wilfrid S. Lawson, Ottawa. | H. A. Terreault, Sorel. | K. H. Smith, Prince Rupert. |
| P. E. Amiot, Father Point, Que. | W. de Courcy Topley, Ottawa. | A. T. Fraser, Ottawa. | John T. Farmer, Montreal. |
| W. Marchington, Toronto. | John Murphy, Ottawa. | | |
| W. M. Ogilvie, Ottawa. | H. T. Barnes, Montreal. | | |
| | G. B. St. Pierre, Ottawa. | | |

Tuesday, January 25th

The proceedings opened on Tuesday, January 25th, with a meeting in the council chambers for the nomination of scrutineers, reception of reports of council and committees, and general business. At the outset, objection was taken by Mr. Leach to the practice of calling a meeting of the newly elected council immediately upon the adjournment of the annual convention. Mr. Leach contended that the new council should not meet until every one had been properly notified and given an opportunity of attending. No ruling was made on the point other than that the matter could be re-opened

under the consideration of general business. (The question was subsequently re-opened and withdrawn.) The remainder of the morning session was devoted principally to the reception and adoption of the reports of council, special committees and branches. In connection with the report of the first-named body objection was taken to the following clause:

"The council has called the attention of the Prime Minister for the Province of Quebec to the importance of appointing a qualified engineer as a member of the proposed Public Utilities Commission for the Province, and it has also suggested to the Citizens' Committee of Montreal the desirability of naming an engineer as one of the candidates for the new Board of Control. It notes with approval the nomination of Mr. F. L. Wanklyn as one of the committee's candidates."

The concluding paragraph was finally amended to read: "It notes with approval the nomination of an engineer and member of the society as one of the committee's candidates."

A satisfactory financial standing was shown by the report of council. The receipts amounted to \$16,578 against a total expenditure of \$12,431. The membership was reported at 2,659.

In May last the committee on the establishment of testing laboratories waited upon the Minister of Public Works and at his request prepared a memorandum embodying the suggestions of the committee in regard to the project in hand. This memorandum was submitted to the Minister on June 18th last. Following is an extract therefrom:

"The Council of this Society is of opinion that the establishment of a completely-equipped testing labora-

which has been done, and is still being prosecuted in this direction, by the American Government through the establishment of a very fully-equipped testing laboratory at St. Louis, and of another at Pittsburg, with provision for tests of very large steel members of bridges, etc.

"There is a great variety of Canadian structural material, about the physical properties of which very little is definitely known. If the characteristics of the materials were defined by the investigations of a well-organized Government laboratory, the results would not only be of value to the Government in the construc-



Mr. Geo. A. Mountain, of Ottawa, the Retiring President.



The New President: Col. H. N. Ruttan, City Engineer of Winnipeg.

tory by the Government for the investigation of structural and other materials, including models and portions of completed structures, would be a wise and economical undertaking for the Government, which is the largest consumer in Canada of structural materials. It would also be of great benefit to the public at large through the printed reports of the results of the investigations.

"The Council desires to draw attention to the work

tion of its public works, but would also be to the advantage of works undertaken by private enterprise.

"The establishment of a central Government laboratory, with a permanent staff of specialists, should result in economy to the Government, as all departments would have the investigations and tests required for their work made therein, and outside expenses would be reduced to simple provision for field testing."

This memorandum was duly acknowledged and consideration promised, but it reflects little credit upon the Government officials to learn that no further progress has been made. The project is a most important one and one which the Society has very much at heart. At the afternoon session a resolution was carried "that the committee on the establishment of testing laboratories be continued, and that they be instructed to urge upon the Government, through the council, the desirability of appointing a commission to visit the United States Government testing laboratories at St. Louis and Pittsburg and also government laboratories in other places, for the purpose of gaining the necessary information precedent to the establishment of a Canadian laboratory."

Considerable interest is attached to the report of the sub-committee on rails, fastenings and tie-plates. This is reproduced in full in another column.

At noon the convention received an official welcome from Mayor Hopewell, who expressed the hope that the time spent in the capital city might prove both pleasant and profitable. President Mountain responded in

suitable terms. Shortly afterwards the delegates were addressed by Sir Sandford Fleming, who said in part:

"For nearly half a century I have been a member of the American Society of Civil Engineers. Not quite so long as that a member of this Society, for it has not been in existence that length of time. It has been my privilege to witness a great deal of the engineering service which has taken place between the Atlantic and the Pacific, and I think I may be permitted to welcome the younger men to a noble profession. You belong to a profession of the first order. Although it is essentially a practical profession, you will find that its members cannot be too learned. Whatever has been done by engineers in the past, and whatever is doing to-day, I can see a wide field for this profession. There are between the oceans which bound Canada on three sides, great engineering problems which have to be solved in the development of our great inheritance—that inheritance which has been freely given to us by the great



The City Hall, Ottawa, the headquarters of the Convention.

mother of nations for our children and our children's children to occupy and enjoy."

At 1.30 p.m. a complimentary luncheon was given by the members of the Ottawa branch in the dining room of the Russell House. A hearty vote of thanks was accorded to the Ottawa branch on this occasion, the visiting members showing their appreciation by musical honors.

Upon the resumption of business in the afternoon, a committee, composed of T. C. Irving, jr., E. A. James, R. S. Lea, O. W. Smith and N. J. Ker, was appointed to frame standard specifications for cast iron water pipe and to report to council, the latter body having full power to deal with this report. The balance of the day was taken up with further discussion of the various reports. In the course of the afternoon an eloquent tribute was paid to Mr. Keefer, sr., by Mr. Dodwell, of Halifax.

On Tuesday evening an enjoyable "smoker" was held in the council chamber of the City Hall. There

was a good attendance and every provision had been made for the entertainment of the members. An excellent musical programme was provided. Addresses were given by Mr. Geo. A. Mountain, the retiring president, Mr. Dodwell, Halifax, resident engineer Department of Public Works for Nova Scotia, and Mr. M. J. Butler. President Mountain's address is reproduced in full another column.

Mr. Dodwell referred to the speech made in the House of Commons by Mr. Warburton, M.P., who was "the first to take up the cudgels in the House for the civil engineers." Efforts to improve that department in the past had met with indifferent success. Continuing, Mr. Dodwell said:

"No more important subject has come before the Society since its organization—and this not because a good number of the members are in the Provincial or Federal Governments, but because of the functions of the Society to guard the profession as a whole. I am convinced that no more serious subject could engage the attention and the strenuous endeavours of the members of the Society.

"In a letter to Senator Power I explained the disabilities and the anomalous position of the civil engineer of the Federal service, and from this letter I shall quote to a considerable extent.

"The objects in view are: First, a higher professional standing for the civil engineers in the service; secondly, a recognized official status with enrolment in the civil service; thirdly, a system of pensions and superannuation.

"First as to the standard. No standard whatever at present is required, and the engineers in the Government service are not conspicuous by superiority over the engineers not in the service. They are not obliged to pass an examination or to produce testimonials. Any of them may be put into a position of responsibility where wise expenditure or waste will result according to his ability and common sense or his absence of these qualities.

"In the Department report of the Public Works you will find the names of caretakers, stationary engineers and others, but not those of civil engineers. We are not looking for advertising, but I just wish to mention the fact. If there were proper organization, the civil engineering department would be one of the most profitable institutions in the country, considering the capabilities of engineers and the industrial advantages. I believe I may speak for the Society when I say that no civil engineer should be appointed to the civil service unless he is a member in good standing of this Society.

"Now as to enrolment. There are more or less temporary evils to be discarded. No provision is made for a corps of engineers in the Federal service. The Civil Service Act has always excluded civil engineers and it looks as if the exclusion were by design or intent. There is no reason why engineers should not enjoy security of tenure and the other privileges enjoyed by other officers for whom the Civil Service Act was passed. No engineer outside of Ottawa, whatever rank he holds, may be put on the civil list as an engineer. To determine just how the civil service stands would require an exhaustive study of nine acts, and I do not intend to weary you with them. Since the first act was passed in 1876, there has been discrimination against the profession. A man should be equally a servant of the Government, whether he is in Ottawa, Vancouver or Halifax.

"Why should an engineer with a salary of \$2,000 or \$3,000 in any of these places be excluded from the list, while a junior third class clerk in Ottawa getting \$300 a year is admitted? The whole Act should be swept from the statute books, the distinction between outside and inside service abolished, and all brought under one category and one harmonious system.

"In the Public Works Department, out of one hundred engineers, only three are on the civil list, and they appear not as engineers but as clerks. I thought the work of the Commission would have been of a reformative nature. When a bill was brought down in Parliament, I felt the fruit was on the bough. Respecting the distinction between the outside and the inside service, the latter is subjected to more obscurity than before. Perhaps our discussion may bring about the consummation devoutly to be wished or at any rate result in our being given a hearing.

"The third object is pensions and superannuation. Under existing conditions there is no provision for the widow or family of an engineer dying in the civil service. There are a number of engineers in the Public Works, and Railway and Canals Departments whose periods of office have been from fifteen to forty years. Any of them who have not made invest-

ments out of their salaries or taken out insurance, may not leave enough to keep their widows decently. Some will say that the engineer enters the service with his eyes open and therefore he should be thrifty and put aside what he can spare or a little more.

"The widows of others enjoy a pension when the bread winners are taken from them. Why should so much more be expected in the case of engineers? The only resource for Government engineers is to die in harness before they are stricken by illness, and thereby secure to those they leave behind two months' pay. Those who have been longest in the service should be retired at two-thirds' pay. I should have no complaint if other employees of the Government were in the same circumstances as Government engineers. It is because the discrimination is unjust, ungenerous and, to my mind, remedial, that I am disturbed. I do not see why something along actuarial lines could not be done for the purchase of annuities on the retirement of an engineer or for his widow on his death."

* Mr. Dodwell gave a hypothetical instance of where the government in the construction of a big work might while saving \$20,000 or \$24,000 in salaries in four years, pay one million dollars more for work badly done. He spoke of the achievements of the Public Works Department in India and Australia, and said that there was no reason why engineering should not be more successful in Canada, which was—or would be—the greatest country on the footstool. He urged that a committee be named to draft a memorial to Sir Wilfrid Laurier and the Cabinet, setting forth the claims of the Society. President Mountain promised that a committee should be named on Thursday. Mr. Leofred urged that delegations to the Government be composed, as far as possible, of civil engineers not in the service.

Mr. M. J. Butler, late Deputy Minister and Chief Engineer of Public Works, gave an interesting address dealing with the status of the engineer.

"The civil engineers," said Mr. Butler, "are the most important factor in modern civilization. The engineering profession is all-absorbing. No other profession possesses this quality as it does. The profession of law, though requiring much learning, is not so absorbing. The lawyer is not in such close communication with the laws of nature.

"The engineer goes out into the community to take an important part and the profession is worthy of more notice. I must say, though, that the engineer himself is much to blame. He is too liable to let the scientific take up his whole attention, to the exclusion of the practical. Sometimes when he comes to the crux of a situation he will pass it aside saying that it belongs to the financier or the lawyer.

"This will explain why the general community is not able to get into intimate communication with the profession. Men who have some important work to be done, realize that they must call on the engineer for the theoretical or technical operations, but look for a more practical man for the carrying out of the work to completion. A distinction has grown up between the theorist and the practical man. Young men sometimes come from college with a smattering of engineering, a pseudo-scientific knowledge, which throws discredit on the profession.

"Truly, the civil engineer should be practical as well as scientific. Those of the profession in Canada should be among the best in the world. We in Canada are in a peculiar geographical position. It would look, judging by this position, as if the Maritime Provinces should mark it with the New England States. There is separation from Quebec by a large barren territory. A long haul is involved and even after the fertile Province of Ontario is crossed there are thousand mile stretches to the Rockies. The transportation question requires a higher degree of skill on the part of the engineer in Canada than in any other country. If we fail to do our part, I dread what the political future of this country must be. It is essential that the transportation problem in Canada be worked out on east and west lines, and not north and south, if foreign territory is to be avoided.

"I hope the young men will take some of these ideas home and think them over. The lack of business acumen on the part of the engineer is something that I wish to emphasize. The late Mr. Wellington said that a good engineer could do for one dollar what another might do for 'some price.'"

President Mountain's Address

In closing my year as President of the Canadian Society of Civil Engineers, I desire to express my appreciation of the honour which has been conferred upon me and of the personal consideration of the members. My interest in the welfare and



An Interesting Group of Members and their Friends assembled in front of the City Hall on the First Day of the Convention.

future of the Society will always continue, and I shall be ready to add my efforts to those of the other members for its advancement.

I am pleased to be able to report the continued growth of the Society, in the ranks of which are now included practically all the engineers of the Dominion in every branch of engineering. During the past year we have added two hundred and forty members and students to our rolls; so that we now have a total membership of two thousand five hundred and sixty-nine, of which the Honorary Members, Members, Associate Members, and Associates number fourteen hundred and five, and Students eleven hundred and sixty-four. This must be very gratifying to the members of the Society, and is of interest to the country at large, in that it shows a marked advance in all branches of engineering, which are so closely connected with the development of Canada.

The Canadian Society of Civil Engineers is an organization national in character, aim, and outlook, and is of recognized high standing. It must grow and increase in influence. The Society, as you are aware, some years ago formed itself into four sections: General, Electrical, Mechanical, and Mining. The object in view was to centralize the interests of the different departments of engineering and enhance the attractiveness of the meetings to those especially concerned in only one branch of the profession. While the home of the Society is established in Montreal, where practically all the business is transacted, the occasional change of place for the Annual Meeting has, in my opinion, served to join the men of the far east and the far west with their brothers of the great middle country. The formation of our local branches, which extend from the Pacific Ocean to the tide-waters of the Atlantic Ocean, while preventing decentralization, has done much to reconcile diversified views. The prime reason for the organized existence of the Society is to afford an opportunity for interchange of views on matters of interest to the members, thereby facilitating the advancement of engineering knowledge and benefiting not only themselves but also the community at large.

In order to give effective assistance in the advancement of engineering practice, it is important that we contribute to the work of our committees, so that their reports may be exhaustive and conclusive. It is not expected that these reports shall be final, as this would leave no room for improvement and further development. The reports should express the combined judgment of the members of the committees with regard to the practice which it desires the Society to approve, keeping always in mind the fact that such approval is subject to revision as circumstances justify.

Canada's great problem to-day is transportation. While the possibilities and even the necessities of water transportation in Canada are great, the problem will, I think, be largely solved by the network of steel which is being rapidly spread over the country.

We have without doubt entered upon one of the greatest years, if not the greatest, of railway development in our country. This is noticeable not only in regard to additional mileage, but particularly in the tremendous increase of motive power now being applied in the operation of railroads. Locomotives have been designed and put into use of a size that a few years ago would not be thought of, and, in addition to this, railway gradients have been reduced at enormous expenditure. These grade reductions are such that they have more than doubled the haulage capacity for a given engine.

In the development of water power, Canada, from one end of the country to the other, has made phenomenal strides. We constantly read of new water power construction and the resulting increase in the industrial development of the country. There has also been great progress made in the electrical transmission of energy from the centres of our water powers. Only a few years ago high tension transmission power lines were operating at a maximum of 30,000 volts, while this year the Hydro-Electric Commission of Ontario is constructing lines carrying 110,000 volts. In the application of electrical construction to railroads, the great improvement and added comfort in travelling is very noticeable, especially in tunnels, where trains are not now detained on account of gases generated by the coal-burning of the locomotives.

In the mining industries of the Dominion great strides have been made by the mining engineer, particularly in the construction and installation of machinery designed to handle in the most economical manner the riches beneath the soil. These new appliances have made it possible to develop properties which, in the days when only the pick and shovel were used, were without value, owing to the great cost of these old methods. Civil engineers engaged in municipal works have shown great advancement in the construction of waterworks, the proper disposal of sewage, and notably in the construction of roadbeds and pavements of all descriptions of highways.

In bridge engineering the problems which now face us are stupendous. Members of the Society are engaged in the build-

ing and construction of bridges with spans of 1,800 feet, in which also occur some most complex problems in substructure. The strength of bridges has been largely increased; in my own experience, almost threefold. It was said some two years ago that nearly everything had been discovered or invented except the flying machine and the North Pole. Since that statement was made the North Pole has been explored and flying machine construction rapidly advanced. I venture to predict that the progress of scientific engineering will in the next fifty years exceed that of the past fifty, great as that has been. Problems in engineering at which we now stand aghast will come to be matters of every-day practice. The members of the Canadian Society of Civil Engineers have undoubtedly lived up to the motto of the Society, whereby the great sources of power in Nature are converted, adapted, and applied to the use and convenience of man. The world owes more to the profession of engineering than to all the other professions combined.

I now wish to say a few words on the subject which, at the present time, is most interesting to me in my professional work. I refer to my connection with the Engineering Department of the Board of Railway Commissioners for Canada, of which I have the honour to be the chief. You are no doubt aware that the Board of Railway Commissioners was formed for the purpose of dealing with matters relating to railway construction, maintenance, operation, and traffic. The Engineering Department of the Board has to deal with construction and maintenance, and it is in regard thereto that I wish to speak specially. After a great deal of care and research, rules and regulations of the Board, specifying the proper method of presenting and filing plans, profiles, and details of all works in connection with railway matters, were drafted and approved. Plans of location of railways are now coming to the Board in great and apparently increasing volume from all parts of the Dominion. The Engineering Department, in examining these plans, has in view the following: That no infringement on other locations are allowed; that the proper location of railways over all streams has been observed; and that there is no interference with adequate drainage of the country. In connection with bridge work, the strain sheets are checked to see that they are in accordance with the standard specifications. After the plans of the bridges have been approved, the completed structures are inspected on the ground to see that the plans have been carried out.

All plans, which are forwarded to the Board with applications of railways for the crossing of highways, are examined to see if the crossing is a proper one, and to endeavour to obtain grade separation in order to carry the railway over or under the highway, as the case may be. In addition to the above, many cases are also submitted, both by railway companies and municipalities, for the purpose of safeguarding the public by the application of grade separation to these thoroughfares. Scores of highway crossings are examined monthly by the engineers of this Department, and voluminous reports are made on the subject of eliminating grade crossings. In the older parts of the country, railway development in some places has reached a stage at which, on account of the great number of intersecting lines, care must be exercised in order to make these railway crossings separate by means of overhead or subway construction. Such construction is, of course, not yet possible in the prairie country of the west, where the ground does not lend itself to these conditions.

Great care is taken in the crossing of railways by high power electric transmission lines, in order to protect the public from dangers that might arise by breakage of these power lines. Such accidents are minimized by the construction of cables of reduced spans and greater tensile strength. The construction of all classes of conduits under the railway roadbeds for the conveyance of water, gas, and drainage is also a matter which demands close inspection. All plans of these are carefully looked into, so as not to impair the efficiency of the roadbed in the interests of the safety of the travelling public and trainmen.

The rules and regulations, after several minor amendments, have been thoroughly tested, and have apparently worked with equity to all whose cases have come before the Board for adjustment.

In closing my year of service in your cause, I desire to express my appreciation of the cordial assistance rendered by my colleagues on the Council and by your indefatigable Secretary. To this combined force I attribute whatever success in advancing your interests has fallen to the year of my administration.

Wednesday, January 26th

Wednesday, January 26th, was devoted to visiting various important industries and places of interest, under the guidance of members of the Ottawa branch. At 10 a.m. and 2 p.m. excursions conducted by Messrs. McRae, St. Laurent, Bruce and Stewart left the Russell House for the Chaudiere Dam, Parliament Buildings, Archives, Royal Mint and Dominion Observatory.

At the same hours parties under the direction of Messrs. Dion, Donaldson, Keefer and Ker made a trip to the power house of the Ottawa Electric Company, Mr. J. R. Booth's mills, the E. B. Eddy Manufacturing Company's plant and the city waterworks. These expeditions proved to be of the greatest interest to the visitors. Naturally the keenest interest was taken in the Chaudiere dam, the power house and the city waterworks, but the industrial plants were by no means overlooked. Indeed, the name of J. R. Booth, the "wonderful old gentleman" who personally conducted the visitors around his mills and explained with characteristic ability the operation of the various portions of the plant, was a household, or rather a hotel expression for the rest of the day.

The annual banquet of the Society was held in the Russell House, Ottawa, on Wednesday evening, January 26th. It was generally conceded that this function was one of the most successful of the kind in the history of the Society. Over two hundred members and guests were present. Among the latter were the Hon. G. P. Graham, Minister of Railways and Canals; Hon. William Pugsley, Minister of Public Works; Hon. Clifford Sifton, Chairman of the Conservation Commission; Dr. W. F. King, Chief of the Boundary Survey; Professor McLean, of the Railway Commission; Senator Edwards, Professor Adam Shortt, Controller Champagne, Mayor Hopewell and Mr. R. E. Young. Following the customary toasts to the King and Governor-General, Mr. W. F. Tye, Montreal, proposed "Canada and the Empire." Senator Edwards responded and paid a gratifying tribute to the work of the engineering profession in Canada. A similar compliment was paid by the Hon. Dr. Pugsley, who replied to the toast, "Our Guests." Dr. Pugsley bore testimony to the good work done by engineers. "It would be impossible," he said, "for a department to be served more faithfully than the Public Works are now being served by their engineers." Canada, he thought, was on the eve of exceptional development. Dr. Pugsley made some interesting remarks in connection with the question of transportation and that of the development of the water powers. The speaker dealt at some length with the progress in Western Canada and stated that a scheme was in formation to create a system of waterways which would connect Winnipeg with the sources of the Saskatchewan river at the Rocky Mountains, a distance of 1,500 miles. With reference to the proposed Canadian navy, a topic very much in the public mind just now, Dr. Pugsley stated that the Government's policy is in favor of the project. Whether this is wise or not is a question which will have to be answered by the people of the Dominion.

Hon. G. P. Graham, Minister of Railways, made a humorous address which was particularly well received. The speaker dealt at some length with the resignation of Mr. M. J. Butler. Mr. Graham declared that public works engineers were a philanthropic set of men working in the best interests of the country. The only reason he could assign for Mr. Butler's resignation was that Mr. Butler had come to the conclusion that he could serve his country better in another sphere. The speaker eulogized Mr. Butler as an engineer without a superior on the continent. "Mr. Butler knows a great deal," said Mr. Graham, "in fact, at times I have thought that he knew too much." The speaker commented upon the exclusiveness of the engineering profession and referred to the fact that not one of the delegates had applied for Mr. Butler's post. "It would have been all the same if you had applied," said Mr. Graham, "you would not have got it." The responsi-

bility of the engineer was emphasized by Mr. Graham, who cited the Quebec bridge disaster as an outstanding example. Speaking of the development of Canada's resources, he said that any government which committed the folly of being niggardly at this stage of the country's development would be recreant to its trust.

Hon. Clifford Sifton delivered a forcible address and requested the Canadian Society of Civil Engineers to appoint a committee to act in conjunction with the Conservation Committee in the matter of giving advice.

Prof. Adam Shortt defended civil service examinations, and stated that Canada's best natural resources were men who should receive and be required to have as broad an education as possible.

Mr. C. F. Baker, of New York, representing the "Engineering News," who replied to the Press, anticipated the day when all tariff barriers between Canada and the United States would be swept away.

The toast to the retiring president and council was proposed by Colonel Ruttan. President Mountain, in response, testified to the pleasure he had obtained in the fulfilment of his duties during the past year. The work of the council was especially to be commended. The retiring president stated that under the constitution, as a past president, he would remain on the council for a period of three years. After this he would join the rank and file of the Society and still continue to have its work at heart.

Report of Sub-Committee on Rails, Fastenings and Tie Plates

In the report of your Sub-Committee on Rails, Fastenings, and Tie-Plates, at the last Annual Meeting, consideration was given to a comparison of the various standard and proposed sections in use by the railways of North America.

It was hoped that, during the year, sufficient information would have been obtained from the reports of the various railways to enable the Sub-Committee to present at least a study of the comparative results from the use of the various sections, but it has been impossible to do so up to this time.

Naturally, there was much diversity of opinion among the users of rails with respect to the typical sections which might promise the best results, and there was some hesitancy upon the part of the majority of railways to abandon their past standards and experiment with any of the proposed types.

Some of the railways, however, have made use of new types. The Canadian Pacific Railway have a new section embodying features of both the sections "A" and "B" proposed by the American Railway Association; and some of the railways in the United States have made experimental rollings with both sections "A" and "B," drawings of which were shown in the last report of your Committee.

One difficulty in making a comparison of the tests of the different sections was apparent at the start, and consisted in the variety of designs for the different drop testing machines in use at the various mills.

To overcome this variation of conditions, some of the mills voluntarily offered to construct a machine upon uniform and scientific principles, with the result that most of the mills have now installed such a machine, from which the tests made at one mill become comparable with those made at any other mill.

The description or specification and a drawing of this machine accompany this report.

It has been found, from a series of tests with the new machine, that the deflections obtained upon the test rails at different heights of drop are greater and more uniform than the deflections obtained upon the old machine under the same conditions, and, therefore, give more accurate information upon which to base a study of the properties of the rails.

It is the opinion of your Sub-Committee, therefore, that new specifications for rails should embody a requirement to use the Standard Drop Testing Machine.

It is to be hoped that within the next year the records of use of the various new sections will have been sufficiently far advanced and tabulated to enable an opinion to be formed as to the merits of the suggestions and principles embodied in their design.

Description of Drop Testing Machine.

1. The machines shall be arranged to allow a 2,000 lb. tup to fall freely at least 25 ft. on the centre of a rail resting on sup-

ports that can be adjusted to spans varying from 3 ft. to 4 ft. 6 in.

2. The anvil shall be a solid casting, weighing, with the attachments that move with it, 20,000 lbs. It shall be free to move vertically independently of the lead columns, and shall be supported on twenty (20) springs known as the standard "C" spring, without centre coil, as employed by the Master Car Builders' Association (their figure 5614). This spring has a free length of 8 1-4 in., an outside diameter of 5 7-16 in., and is made from a bar having a diameter of 1 3-16 in. These springs are to be arranged in groups of five at each corner of the anvil, and are to be held in place by hubs raised on the top of the base-plate, and by circular pockets on the underside of the anvil. Removable finished steel wearing strips shall be secured to the anvil and the lead supports for guiding the vertical movement of the anvil.

3. The base-plate shall be of cast iron or cast steel, eight (8) inches thick in the area covered by the anvil. It shall be firmly

foot intervals. The zero of this gauge shall be 5 1-4 in. above the top of the rail supports, and the specified height of drop shall be measured from this zero, irrespective of the height of rail being tested. One of the guides shall have a removable section, six (6) feet long at the bottom, so that the tup or tripping block can be readily removed.

7. The tup shall weigh, with the accessories that drop with it, 2,000 lbs. The striking die shall be steel, having a cylindrical striking face, with radius of five (5) inches, and a length of twelve (12) inches. The guide grooves shall have finished surfaces. The tripping head shall allow a grip of the tongs that will release at the exact height for which the tripping device is set, and that will be safe from accidental release while the test is being shifted.

8. The tongs and tripping device shall be arranged to release the tup automatically only; no manual releasing will be allowed. The tripping device shall be easily adjustable at one-foot intervals.

Thursday, January 27th

The business session of the convention, which had been adjourned since Tuesday, was re-opened on Thursday morning for the reception of the scrutineers' reports and other work.

In connection with the work of the committee on cement, it was decided, after an interesting discussion, that the investigation of the qualities of sand and their effects on concrete should be left for separate consideration by a special committee appointed for the purpose, and that arrangements should be made with McGill University whereby experiments along this line might be carried out. The report of the committee on "Standard Methods of Testing and Specifications for Portland Cement" was adopted with this provision.

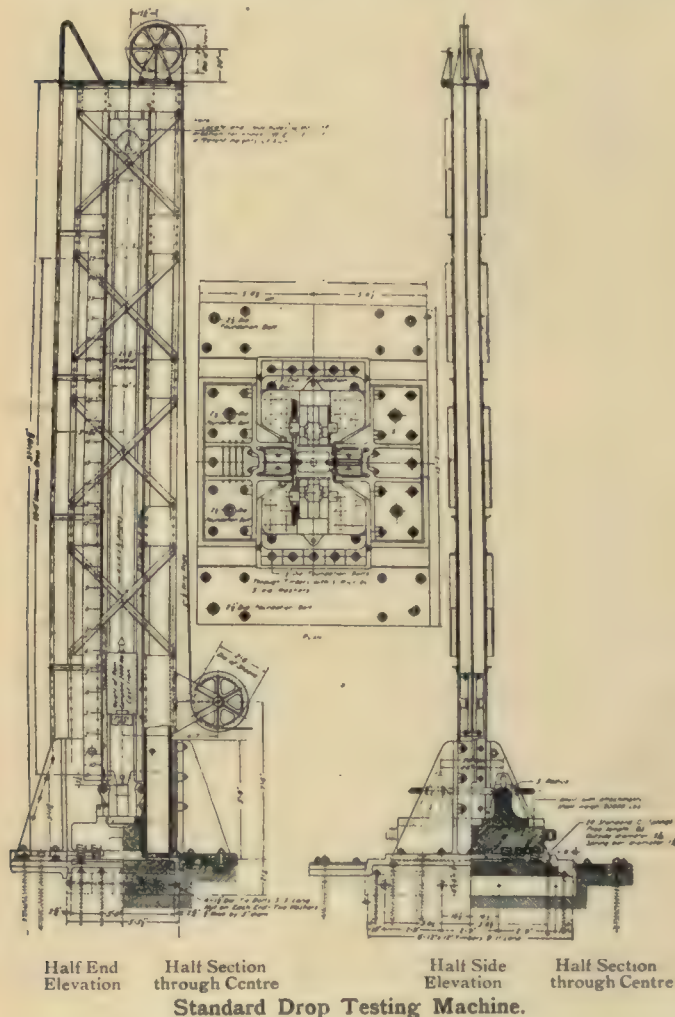
As an outcome of Hon. Clifford Sifton's able speech at the banquet, it was moved and unanimously adopted at this session that the council of the Society appoint members in each province to look into the matter of the conservation of natural resources of lands, forests, mines and waters, with a view to giving every aid to the Conservation Commission.

Announcement is made that the Ottawa staff of this commission is now busily engaged in getting together all the information as regards the recent meeting in the capital. When this has been done it will be printed as Bulletin No. 1 of the department. At present only a small staff is engaged locally, but this will have to be enlarged by the appointment of specialists in charge of mines, water powers, forests, and so on. The regular work of the commission also includes the gathering of much information as to conservation from outside sources.

The matter of a more complete organization of the engineering corps of the Dominion was brought before the meeting as an outcome of the address of Mr. Dodwell, of Halifax, on Tuesday. The question was referred to a special committee, of which Mr. H. Holgate, of Montreal, was appointed chairman, with instructions to memorialize the Government through the council of the Society.

Representatives were named as members of the proposed Canadian National Committee of the International Electro-Technical Commission, this committee also to include representatives of electrical companies and of the physical departments of the universities.

The election of officers, which marked the closing of the session, resulted as follows: President, Col. H. N. Ruttan, Winnipeg; vice-presidents, Messrs. W. F. Tye, Montreal; C. H. Rust, Toronto, and R. W. Leonard, St. Catharines. Council: Messrs. C. R. Coutlee, Phelps Johnson, H. J. Cambie, D. MacPherson, A. E. Doucet, L. A. Herdt, J. A. Bell, C. E. W. Dodwell, C. N. Monsarrat, J. G. Sullivan, A. W. Campbell, J. M. R. Fairbairn, J. M. Shanly, H. H. Vaughan, W. J. Francis, J. E.



secured to the substructure by four bolts, two (2) inches in diameter.

4. The substructure shall consist of a timber grillage, resting on a masonry foundation. The grillage shall project nine (9) inches beyond the ends of the base-plate, and clear the columns at the side. It shall consist of one course of 12 in. x 12 in. sound oak or southern yellow pine, preferably creosoted, laid close and well bolted together. The masonry, preferably concrete, shall be not less than five (5) feet deep below the grillage, and be suitably supported on the sub-soil.

5. The pedestals for supporting the test rail shall be substantial castings. The rail supports shall be removable pieces of steel, securely held in the pedestals, having an upper cylindrical surface, with a radius of five (5) inches. The pedestals shall be adjustable to spans varying from 3 ft. minimum to 4 ft. 6 in. maximum between centres. They shall be securely held together, and so fixed to the anvil as to insure that the centre of span shall always coincide with the centre between leads.

6. The leads shall be firmly connected to the base-plate, and well braced. They shall be long enough to provide the prescribed free fall of the tup. They shall be provided with a convenient ladder and a plainly marked gauge, divided into one-

Hardman, H. E. Haultain, H. G. Kelley, R. J. Durley and R. S. Kelsch.

The newly elected council held a meeting in the afternoon for the transaction of routine business and the appointment of special committees. This brought the convention to a close.

A Brief Definition of the Can. Soc. C.E.

The Society was incorporated by and holds its charter from the Dominion Parliament under date June 23, 1887. It was modelled after the Institution of Civil Engineers (Great Britain) and comprises engineers of all branches of the profession. Among the original incorporators were Mr. Thos. C. Keefer, Ottawa; Mr. Casimir S. Gzowski, Toronto; Mr. John Kennedy, Montreal; Dr. H. T. Bovey, Montreal, (late Dean of the Faculty of Applied Science); Mr. H. D. Lumsden, late Chief Engineer of the National Transcontinental Railway; Mr. H. N. Ruttan, Winnipeg, and Mr. Collingwood Schrieber, late Deputy Minister and Chief Engineer of Railways. The Society is governed by a council consisting of a president, three vice-presidents, twenty councillors, treasurer and secretary. Its annual meeting is held in the month of January at any convenient point. Of late years the practice has been in favor of holding the annual meeting at the home city of the retiring president.

The business meetings of the Society are held monthly. Meetings for the discussion of professional affairs are held in four sections, namely—general, mechanical, electrical and mining, designating the classification of the engineering subjects considered by the respective branches. Each of the sections has a chairman and vice-chairman, who are held responsible for the selection of papers read and discussed under their direction.

The object of the Society is defined in the charter as "to promote the acquisition of that species of knowledge which has special reference to the profession of engineering and to encourage investigation in connection with all branches and departments of knowledge connected with the profession." In pursuance of these objects, the Society, in addition to conducting papers, etc., has committees at work engaged in investigation along the several lines of engineering. The committees reporting at the annual meeting, detailed above, dealt with cement manufacture and specifications, questions relating to transportation, such as transportation routes, ties, road bed, etc., and other important matters.

A committee is at work on the question of establishing a government testing laboratory. From time to time the committee makes recommendation to the Government in regard to matters affecting the engineering profession. The headquarters of the Society are at 413 Dorchester street west, Montreal. Here there is an up-to-date technical library, which is not only available to resident, but also to non-resident members. Branches of the Society are established in Vancouver, Winnipeg, Toronto, Ottawa and Quebec. The membership at the last annual meeting was 2,626. The rate of increase during recent years has been about 300 per annum.

A Word About the Ottawa Branch

The Ottawa branch, upon whose shoulders fell a large share of the burden of the recent convention, is quite a youngster, having only been organized on January 18th, 1909. The prominent engineers of the federal capital are enthusiastic in the work of the Society. In the Ottawa branch there are now 51 members, 58 associate members, 55 students, and 14 associates. The offi-

cers for the current year are: Chairman, Mr. W. J. Stewart; managing committee, Messrs. A. Bruce, A. A. Dion, A. T. Phillips, M. Donaldson and N. N. Couchan. The secretary-treasurer is Mr. S. J. Chapleau. Mr. Coutlee, who is one of the most popular members of the Society and who has just been appointed to the council of the main body, was the first chairman of the Ottawa branch and was largely responsible for its inauguration. That the 24th annual convention passed off so successfully and that the smile of contentment was so much in evidence among the visiting members, was due largely to the painstaking work and the careful provisions of the special reception committees appointed by the Ottawa branch.

Contractor Walberg Wins Appeal Case

The long drawn out case of Walberg vs. the King in connection with settlement of the account of work done by Walberg in connection with the new car shops at Moncton for the Intercolonial Railway has been finally settled. Mr. Walberg's contract has been up several times before the Public Accounts Committee, where the Opposition endeavored to prove that there had been an overcharge in connection with the work. By the decision handed out last week Mr. Walberg will be allowed a considerably larger sum than was allowed him at first by the Registrar of the Court.

Mr. Justice Cassels finds that the amount due Mr. Walberg is in round numbers about \$90,000, whereas the sum fixed on by Mr. Audette as compensation for the contractor was \$53,000.

The case rose out of certain work done by Mr. Walberg in connection with the water and sewerage system for the Moncton shops. Although no written contract was let for such work it was done under the instruction of the Chief Engineer and was supervised by the railway officials. The contractor claimed \$105,940, and brought a claim in the Exchequer Court for that amount.

The Registrar of the Court, Mr. Audette, held that the value should be estimated upon the basis of work other than directed by the Chief Engineer, and fixed the round sum due at \$53,000. Walberg appealed from this report, claiming that under the reference he was entitled to the full value of the work executed by him.

Justice Cassels holds that this claim was well founded and accepts the prices fixed by the Government Engineer, which in round numbers amounts to \$90,000. Mr. Walberg gets the cost of this appeal.

New Pressed Brick Company

The organization of the Canadian Pressed Brick Company, Limited, of Hamilton, is announced. A charter was recently secured for its incorporation from the Ontario government. The capital is \$40,000, and the officers are as follows: A. M. Lewis, president; John H. Williams, vice-president; J. H. Salter, secretary-treasurer. The company's property is located on the line of the T. H. & B. Railway, east of Hamilton, and will have splendid shipping facilities to all points. The plant is now under construction, and is being rapidly completed with a view to starting the manufacture of pressed bricks about the middle of February. Kilns of the most approved type and the latest modern machinery are being installed. The plant will be under the practical supervision of Mr. David New, who has had wide experience in making pressed brick and other clay products. They will start with a capacity of about twenty thousand bricks daily, and it is the intention to build additional kilns very shortly and double the output. The officials of the company state that no pains will be spared to turn out a high class product.

We regret to record the death of Mr. C. Lynott, a prominent contractor of Hull, Que.

Two Recent Highway Bridge Problems

The Scarlett and Bradford Bridges, Near Toronto—Showing How the Nature of Foundations Affects Design and Cost

By FRANK BARBER*

The Scarlett Bridge spans the Humber river about a mile south of Weston, Ont. The river is 200 feet wide at this point and the bottom is shale rock. In the lay out of the bridge the question arose as to which would be more economical and otherwise advisable, a single span bridge or two spans with a centre pier. As to the available materials for the substructure, suitable gravel for concrete could not be obtained near the bridge site, so that concrete would be somewhat more expensive than in most situations, and abutments faced with Longford limestone and backed by riverstone, would cost little more than concrete and would better resist the abrasion of ice. However, a centre pier faced on all sides with limestone would be considerably more expensive than concrete, and for the sake of appearance, abutments and pier must be of the same material. Thus economy demanded that if a centre pier were used the whole substructure should be of concrete, but if two abutments alone were required limestone would be used.

An estimate was prepared by the engineers indicating that the cost would be about the same for either plan. It was considered that the accidents of bidding might throw the balance of favor either way, so that bids were called for according to both plans, with the result that the preliminary estimates were confirmed. The estimates follow:

Single Span.

Steel truss bridge 203 feet, c. to c. of bearings, including concrete floor	\$10,700
Two limestone abutments	4,450
Filling approaches	300
Temporary bridge and removal of old bridge..	250
	\$15,700

Double Span.

Two steel truss spans, including concrete floor	\$8,300
Concrete abutments and centre pier	6,750
Filling approaches	300
Temporary bridge and removal of old bridge ...	250
	\$15,600

The cost being practically the same for either method, the single span was adopted for the following reasons: Because of the undermining effect of freshets on piers and the abrasion of ice, it was considered that a pier, especially in the middle of a river, should be avoided when possible. Secondly, the improved waterway, if no centre pier was used, might be required during a possible exceptionally severe flood. Thirdly, the much heavier steel structure required for a single span would be more permanent than lighter structures on account of the greater thickness of metal.

The diagram shows the form of truss adopted, the fourteen panelled Baltimore truss, with the principal measurements. The top chord members and end posts had faced ends and the holes for field rivets were sub-punched and afterwards reamed true while the parts were temporarily assembled at the shops. The parts consequently fitted perfectly in the field and drifting

to enlarge unfair holes had never to be resorted to. The rivets were driven by air.

The contractors for the superstructure were the Ontario Bridge Company, of Toronto, and for the substructure O. L. Hicks & Son, of Humber Bay. The reinforcing for the floor was "No. 1 Heavy" expanded metal, manufactured by the Expanded Metal & Fireproofing Company of Toronto. The mill and shop inspection was handled by the Canadian Inspection Company. The county commissioners were: Warden Geo. S. Henry, W. D. Annis and J. E. Harris.

The bridge was opened for traffic in November. It is



Scarlett Bridge, Near Weston, Ont.

at present the longest single span highway bridge with a concrete floor in the province.

Bradford Bridge.

Bradford bridge, half a mile from Bradford, Simcoe County, connects the Counties of York and Peel across the Holland River. The width of the river is 200 feet. It is sluggish and deep (14 feet) and never rises above the level of Lake Simcoe. The nature of the banks and bed is such as to present an interesting problem to the bridge engineer. On the York side hardpan lies nearly seventy feet below the surface of the river and on the Simcoe side 45 feet, and the intervening soil is much too soft to give proper lateral support to piles. On account of the very soft soil, spliced piles were looked upon with disfavor. With some trouble very heavy Norway pine piles, about 70 feet long, were procured from Northern Ontario. The pile driver was erected on a raft in the river and operated by a steam hoisting engine. All piles were driven to refusal. The plan of the abutments and wing walls is nearly square. After the piles were driven and capped the inside of the square was first filled with stone and afterwards the outside to the surface of the water. The stone was allowed to settle for a month, when more was added. After this practically no settlement occurred. Upon these foundations the concrete was built.

* Of Barber & Young, Bridge and Structural Engineers, Toronto

As to whether a single span bridge or a double span with centre pier should be adopted, the following considerations decided in favor of the latter. The double span was somewhat cheaper. Here a centre pier including piling could be built for about \$500 less than one for the Scarlett bridge on account of the much smaller distance from water to bridge floor. The river at this point is nearly dead water, so that no harm to a centre



Bridge near Bradford, Ont., over the Holland River

pier was anticipated from undermining or ice. Moreover a concrete and paving brick floor, weighing 120 lbs. per square foot, could be adopted on a double span bridge without heavy first cost, but a concrete floor, weighing 75 lbs. per square foot, would have to be used for the single span, and a brick floor was considered most desirable for this bridge. The difference in dead load between the two kinds of floor would only slightly affect the weight of steel required in a two span bridge but would have a considerable effect upon a long single span.

The bridge was completed in April, 1909. The contractors for the substructure were Barret & Scott, and for the superstructure the Dickson Bridge Works Company. The commissioners for Peel County were T. J. Simpson, A. E. Scanlon and W. Woods, and for York

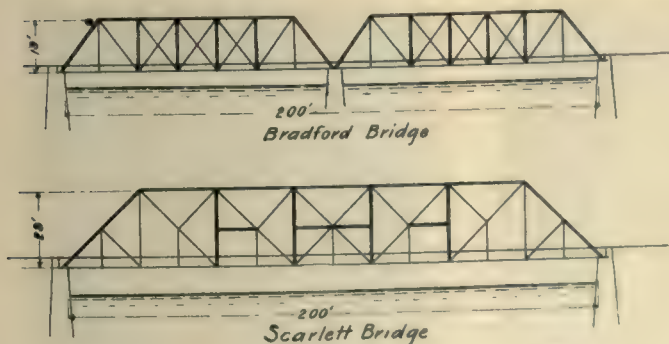


Diagram Showing Forms and Dimensions of Trusses

County, Wm. Keith, A. E. Pugsley and Isaac Devins. The total cost was \$18,000.

The engineers for both bridges were Barber & Young, of Toronto.

Building Inspector Jarrett, of Vancouver, has requested the City Council to appoint a committee of practical builders to make draft amendments to the building by-law.

Mr. Mathew Joseph Butler

M. CAN. SOC. C. E.

Mr. Matthew Joseph Butler, who recently resigned his position as Deputy Minister and Chief Engineer of the Department of Railways and Canals in order to become general manager of the Dominion Iron & Steel, and Dominion Coal Companies, was born at Deseronto, Ont., in 1856, and is the son of Irish parents.

Educated first of all at a public school, he afterwards proceeded to the De La Salle Institute, then to the Toronto University, and, eventually to the Kent College of Law, where, in 1897, he graduated LL.B.

For three years he served as an apprentice to engineering and surveying with Messrs. Evans & Bolger, of Belleville, Ontario. He was admitted Ontario Land Surveyor in 1878, and the following year was admitted a Dominion land surveyor.

Mr. Butler practised as a surveyor from 1878 to 1883, in which year he took up the position of transit man on location survey on the Kingston & Pembroke



Mr. M. J. Butler, the retiring Deputy Minister and Chief Engineer of Railways and Canals

Railway. During the year 1884 he was engaged upon the construction of the Thousand Islands Railway, of which system, in 1885, he became chief engineer.

Mr. Butler's next appointment was that of chief engineer of the Napanee, Tamworth & Quebec Railway. From 1886 to 1887 he was engineer of the buildings and water service of the Atchison, Topeka & Santa Fe Railway. For a couple of years following 1888 he was in Quebec, where he built a ground wood pulp mill and operated the same as a partner.

From 1890 to 1896 he was chief engineer of the Bay of Quinte Railway, Thousand Islands Railway, Oshana Railway, and various other industrial enterprises, owned and controlled by the Rathbun Company, including lumber manufacture, brick and terra cotta and Portland cement. During 1896-7 Mr. Butler was attending the law school in Chicago. At the end of the course he graduated and was admitted to the bar of Illinois.

Returning to Canada in July, 1897, he resumed engineering practice, and engaged in general consulting work, being retained as consulting engineer in Canada for the Engineering Contract Company of New York.

By the city of Brantford his services were requisitioned in connection with a scheme for preventing floods, and eventually, after carrying out a number of important works in various parts of the country, he became chief engineer for Mr. M. J. Haney, contractor for the Hillsborough bridge, Charlottetown. This was a work of considerable importance, involving the use of five pneumatic caissons, sunk 97 1-2 feet below the tide. Difficult as the undertaking was, however, it was carried to completion without a hitch.

In 1903 Mr. Butler became chief engineer to the Locomotive & Machine Company of Montreal. For this concern he prepared the plans, organized the forces, and supervised the construction of the works. When the works were finished Mr. Butler was responsible for the erection of the structural steel plant, which has since turned out a large quantity of structural steel work for bridges and other buildings.

The Dominion Government first acquired his services in 1905, when, as assistant chief engineer, he was engaged in organising the work and preparing the specifications for the construction of the National Trans-Continental Railway. In the autumn of the same year he was appointed to the office which he has just resigned.

Among the more recent undertakings that have claimed his attention, mention may be made of the management of the Government system of railways; the construction of the Trent canal system, and the surveys of the proposed Hudson Bay Railway. The reconstruction of the ill-fated Quebec bridge has also been entrusted to the Department of Railways and Canals.

Mr. Butler is a member of the Canadian and American Societies of Civil Engineers, and of the British Institute of Civil Engineers.

Montreal Builders are Well Organized

The History, Personnel and Work of their Exchange—What the Association has Accomplished in Recent Years

The record of the Montreal Builders' Exchange since its inauguration a little more than twelve years ago, is one of which any association would be justly proud. Time and again the Exchange has proven its value to the building and contracting trade in Montreal. To their judicious handling of labor matters must be credited largely the fact that building construction in this city has been practically free from strikes, while other Canadian centres have met with a heavy share of industrial trouble.

Through the efforts of the Association, legislation has been enacted from time to time which has been extremely beneficial to the contracting trade. In 1907 an important judgment was obtained in the Superior Court justifying the action of contractors in making trade agreements jointly and severally in self defence when unjustly assailed by a labor combine or "collective demand" for an excessive increase in wage, and the right to enforce a penalty or fine for any breach of such agreement by a fellow contractor.

In 1907 and in 1908 two successful exhibitions, devoted entirely to building material and supplies, the first of their kind in Canada, were held, and did much to stimulate the general public's interest in the building trade.

During the past year the Exchange has moved into new and commodious quarters, occupying the entire top flat in the recently constructed Eastern Townships Bank. In their new premises they have at their disposal 5,000 square feet of floor space, and portions are allotted to members of the Exchange at a reasonable rental.

The chief feature of interest centres around the department of permanent exhibits. On December 9th of last year this exposition was officially opened and the occasion fittingly commemorated. A large number of Canadian supply houses have made creditable exhibits in the Exchange, and practically all the available space for this purpose has been utilized.

The history of the Builders' Exchange dated from 1897, when at a representative gathering of the leading



Mr. J. N. Arcand,
President of the Montreal Builders' Exchange



Mr. T. A. Morrison,
A Member of the Executive



Mr. James Ballantyne,
Vice-President Montreal Builders' Exchange



Mr. Frank Pauze.



Mr. E. G. M. Cape



Mr. Wm. Rutherford.



Mr. Alex. Bremner.



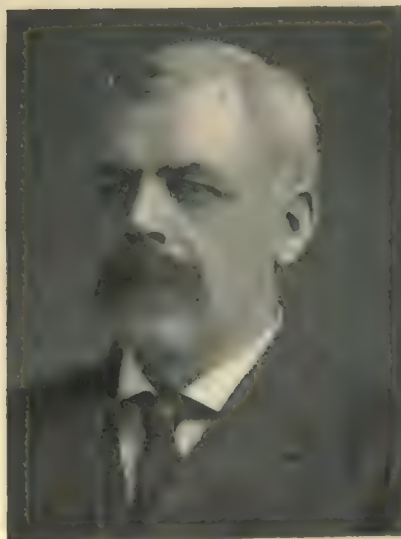
Mr. J. H. Lauer (Secretary).



Mr. Joseph Brunet.



Mr. W. T. Castle.



Mr. K. D. Church.



Mr. Thos. Gilday.

firms in the building industry, the Association was formed. It was not until two years after, however, that a charter of incorporation was sought and obtained from the Quebec Legislature; and it is interesting to know that the charter members, Messrs. Jas. Simpson, C. T. Williams, Peter Lyall, John Maclean, Frank Fournier and Walter P. Scott, are still active members of the organization.

The first president of the Exchange was Mr. James Simpson, who was succeeded, in the order named, by Messrs. C. T. Williams, J. H. Hutchison, N. T. Gagnon and R. George Hood, but for the first few years of its existence the career of the Association was a somewhat chequered one. Starting with a membership of about thirty, it grew to one hundred in the second year, but then gradually fell off until 1905, when the low water mark was reached. It was at this time that the accession to office, of the now past-president, Mr. N. T. Gagnon, and the appointment of a permanent secretary, Mr. J. Herbert Lauer, instilled new life into the organi-



Mr. E. W. Sayer,
A Director of the Montreal Builders' Exchange

zation. To-day the Exchange is the largest in Canada and with the exception of perhaps half a dozen in the United States, the largest on the continent, with a membership of approximately three hundred.

On the 12th of January the annual business meeting was held and a satisfactory general report and financial statement was received from the retiring executive. The list of new officers is composed of a number of the most energetic members of the Exchange, and it is a fair inference to suppose that 1910, under their able guidance, will be a banner year in the history of the Exchange.

Mr. Alex. Bremner.—Was one of the charter members of the Montreal Builders' Exchange, and has since been constantly identified with its interests. Has been in the builders' and contractors' supply business in Montreal since 1877, and through his integrity and fair methods of dealing has built up a splendid business. At the close of the present year he undertook the extension of his business by the organization of a joint stock company with a capital of \$200,000. One of Montreal's largest property owners.

Mr. Thos. Gilday.—Another member of the new executive. Has been a member of Campbell & Gilday, roofers, for the past twenty-five years. This firm has been identified with some of

the largest roofing contracts in Canada, including the C. P. R. Angus shops, and the works of the Montreal Cotton Company, at Valleyfield, Que. Last year they were incorporated as a joint stock company under the name of Campbell & Gilday Company, Limited.

Mr. J. N. Arcand.—Re-elected to serve a second term as President. Is a representative of the painters' and decorators' section of the exchange. Has been in business in Montreal for twenty-three years, and is widely known throughout Canada. Is a past-president of the Master House Painters' Association of Canada, and of the Master Painters' and Decorators' Association of Montreal.

Mr. Wm. T. Castle.—Senior member of the firm of Castle & Son. Has been a partner in the present firm for twenty-five years. During that period they have established a first class reputation as decorative artists and dealers in antiques of various kinds. In addition to the St. Catherine street west sales room they have a large factory on Mountain street for the manufacture of antique furniture and electric fixtures. Finds time to devote to art and literature, and is now president of St. James Literary Society, and of the St. Antoine Liberal Club.

Mr. James Ballantyne.—Vice-president of the Montreal Exchange, and one of the largest plumbing and steam heating contractors in Canada. His Montreal business was established in 1891 and has grown very extensively since that date. About four years ago he organized the James Ballantyne Company, Limited, with headquarters in Winnipeg, and was himself made president of the company. The record of that business shows it to have been equally as successful as its eastern confrere. Has it to have been equally as successful as the eastern one. Has been an earnest worker in furthering the interests of the Builders' Exchange.

J. Herbert Lauer.—Became associated with the Montreal Builders' Exchange as general secretary in 1905, at a time when the Exchange had reached its lowest ebb. To his earnest efforts much of the success, which the Builders' Exchange has attained to-day, must be attributed. He was indefatigable in promoting the interests of the Association at every turn, and to his efforts must be largely placed the credit of the two successful exhibitions held in 1907 and 1908, and the establishment of the permanent exposition in the Eastern Townships Bank Building.

Mr. J. W. Hughes.—A representative from the plumbers' and steamfitters' section of the Exchange. One of Montreal's older business citizens who has grown up with the city. Perhaps one of the best known residents of the city of Montreal.

Mr. F. Pauze.—Manager of the old established business of U. Pauze & Sons, contractors and manufacturers. Is a representative of the younger business element, but is very progressive in his methods, and has been notably successful.

Mr. Jos. Brunet.—President and managing director of the Laurentian Granite Company, Limited. Has been eminently successful in business, his company operating one of the largest Canadian granite quarries. Has taken an interest in local municipal affairs. For fifteen years was mayor of the town of Cotes des Neiges, of which place he is a resident.

Mr. K. T. Church.—Represents the cement and reinforced concrete interests on the executive of the Builders' Exchange. Was a member of the firm of Swan, Church & Company, and with them achieved splendid success. The new firm of Church, Ross, Limited, was formed a year ago, Mr. Church taking as his partner, Mr. D. W. Ross, a graduate of McGill, and formerly with the Phoenix Bridge Company.

Mr. E. W. Sayer.—Represents the interests of the electrical members of the Exchange. Is one of Montreal's younger business men, and has built up a very successful business. Is the owner and manager of the Sayer Electric Company, electrical supply dealers and contractors, and is president and manager of the King Electrical Works, Limited, manufacturers of fixtures and electrical specialties. Was largely instrumental in the formation of the Electrical Association of the Province of Quebec, of which he is now the president. Finds time to devote to sport, and is an active worker on the executive of the Montreal Amateur Athletic Association.

The annual banquet of the Edmonton Builders' Exchange held recently was attended by over one hundred prominent contractors, architects and others. President C. C. Batson gave an interesting address and sketched the development of the Builders' Exchange during the last five years. In this period the membership increased from 20 to 100. Mr. J. C. Dowsett, president of the Board of Trade, complimented the Builders' Exchange upon their organization and said that he considered the building trade the most important of the commercial and business interests of the city. The outlook for the coming season is exceptionally bright at Edmonton. Excellent harmony prevails generally, and plenty of work is in sight.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.

Twenty miles of water mains will be laid here this year, the pipe already having been purchased. Water Commissioner Graves favors metering the supply.

Halifax, N.S.

The city council has voted a sum of \$20,000 for sewer works in order to give work to the unemployed.

Moose Jaw, Sask.

J. Darlington Whitmore, city engineer, in his annual report urges the construction of a covered reservoir, with a capacity of two million gallons, at an estimated cost of \$36,000, which includes the cost of a pump. The construction of another septic tank to cost \$25,000 is also recommended, as well as storm sewers estimated to cost \$20,000.

Ottawa, Ont.

Plans for a big drainage project in the southwestern part of the city are being prepared by City Engineer Ker. About 200 acres of land now without sewage facilities will be drained. Cost, about \$75,000.

Sarnia, Ont.

J. D. Stewart, town clerk, is calling for tenders for waterworks supplies.

Stratford, Ont.

At a meeting of the Board of Works, Engineer Ferguson recommended the calling of tenders for paving a number of the streets.

Toronto, Ont.

At a cost of \$52,619 the City Engineer has recommended the construction of an asphalt block pavement in College street, from Manning avenue to the west side of Dovercourt road.

Tenders will be received until Tuesday, February 15th, for one ten inch water meter. G. R. Geary (Mayor), Chairman, Board of Control. C. H. Rust, City Engineer.

Vancouver, B.C.

In their report on the water supply, Messrs. Hermon & Burwell, consulting engineers, suggest an alternative of a tunnel under or a bridge over the First Narrows for the water mains.

The board decided to call for tenders for the laying of ten miles, more or less, of cement walk. It is possible the work may be divided among several contractors if satisfactory arrangements covering price, etc., can be made.

Winnipeg, Man.

The city are calling for tenders for the supply of asphalt until February 25th. M. Peterson, secretary. For further information see advertisement in this issue.

AWARDED.

Winnipeg, Man.

The contract for city plumbing and sewer connection (list 24) was awarded to

G. L. Stephenson for \$358.50. T. Ball tendered at \$360.25, and another tender was \$360.40.

Railroads, Bridges and Wharves

Edmonton, Alta.

It is stated that fifty miles of the railroad by which it is proposed to open up the coal fields of the Yellow Head Pass Coal & Coke Company, west of Edmonton, will be built this year, and the contract awarded within a few weeks. W. O'Brien, of Renfrew, Ont., is interested.

Tenders addressed to John Stocks, Deputy Minister of Public Works, Edmonton, Alta., will be received until March 12th for the manufacture of all steel highway bridges required for the year 1910. Specifications, etc., at the Structural Engineer's office, Department of Public Works, Edmonton.

Fort William, Ont.

The Fort William C. P. R. bridge across the Kaministiquia river will be a lift structure, double deck and will cost approximately \$750,000. The construction of it is to be completed on or before October 15, according to the agreement between the city and the C. P. R. The Fort William C. P. R. bridge across the McKellar river will be a lift structure and will cost approximately \$300,000. W. P. Merriek, Government engineer. F. W. Peters, assistant to 2nd vice-president, C. P. R.

Fredericton, N.B.

The Department of Public Works is calling for tenders until February 28th for the construction of the metal superstructure of the Shediac river mouth bridge, Parish of Shediac, Westmorland County. Plans, etc., at Public Works Department, Fredericton, N.B. J. Morrissey, Chief Commissioner, Fredericton, N.B.

Montreal, Que.

At the G. T. P. offices figures have been given showing that 923 miles of steel are now down on the main line west of Winnipeg. This is more than half way from Winnipeg to the coast. Taking off a hundred miles on the west end, where steel is being laid now, and adding it to the finished line, would make 1,023 miles of track down, out of 1,750 miles west of Winnipeg, leaving only a little over 700 miles of road to be completed to open the way to Prince Rupert.

St. John, N.B.

The Harbour Board recommended the calling of tenders for the construction of a wharf for the Eastern Steamship Company, 300 feet long by 30 feet wide. Cost not to exceed \$40,000.

St. Catharines, Ont.

It is understood that the much discussed high level bridge over the old Welland Canal here will be commenced. Among the members of the company in charge of the enterprise are D. Woodruff, president of the Lincoln Paper Mills Company; Dr. W. H. Merritt, president of the St. Catharines Gas Company, and Capt. Leonard, president of the Coniagas Mines Company.

Toronto, Ont. . .

The work of abolishing grade crossings between Bathurst street and the Harbour will begin on May 1st and will be completed within two years, at an estimated cost of \$2,000,000. The Grand Trunk Railway has decided to elevate four tracks and the city will pay one third of the cost of elevating two tracks, the railway bearing the cost of the rest. The C. P. R. only possesses running rights over the G. T. R. tracks.

Vancouver, B.C.

At a meeting of property owners the plans for the widening of Bridge street from Fifth avenue, etc., were approved and a committee appointed to push the matter. Estimated cost, from \$80,000 to \$10,000.

Windsor, Ont.

Announcement has been made to the effect that the Michigan Central Railway will build another line of track from Buffalo to this city, paralleling the present double track. Construction work will be commenced in June, directly after the opening of the new tunnel.

Winnipeg, Man.

A programme of construction amounting to about \$30,000,000 has been announced by General Manager Bury of the Canadian Pacific western lines. Two large bridges, one at Edmonton, included in the list of new undertakings, and a line from Weyburn to Lethbridge. Details to be determined later.

In discussing the Brown-Brant street bridge it was decided to proceed with the piers according to the specifications and form of tender, but it has not been definitely decided as to when the structure will be erected.

AWARDED.

Cummings Cove, N.B.

The contract for the construction of a wharf at Cumming's Cove, Deer Island, Charlotte county, New Brunswick, has been awarded to Thomas P. Charleson, of Ottawa, at \$16,890.

Fort Frances, Ont.

P. P. Elliott, timber contractor, has a contract to take out 250,000 ties for the C. N. R. Company. The Northern Construction Company have also a contract for the same company to take out 250,000 ties. Camps are situated near Manning.

Outlook, Sask.

Hill & Sons have taken over the contract for the construction of the pedestals of the steel viaduct which the C. P. R. intends constructing across the South Saskatchewan river. Length of bridge, 3,000 feet; number of piers, 110. The shore piers will be carried on nests of concrete piles, 40 in number, while 100,000 linear feet of wooden piles, each 50 feet in length, will be driven to carry the river piers. One of the features of the bridge will be a traffic deck, which is suspended half way up the towers, which gives a roadway 29 feet in width with 16 feet of head room.

Toronto, Ont.

The Temiskaming & Northern Ontario Railway Commission has awarded a contract to the Canadian Car & Foundry Company, of Montreal, for three cafe cars of the most modern type.

Public Buildings, Churches, Schools, etc.

Aylmer, Ont.

At a meeting of the Ladies' Institute a new hospital was discussed, and a movement will be started for its erection. Dr. A. Backus, this place, is interested.

Dunboyne, Ont.

Tenders are being received by Dr. Brown until February 19th for the erection of a new brick Methodist church. Plans, etc., at residence of Dr. L. A. Brown, Water street, Aylmer. Irvin McTaggart, secretary.

Edmonton, Alta.

Tenders are being called for the new \$100,000 twelve roomed school to be erected by the Public School Board on Seventeenth street north of Jasper avenue. It is the intention to have the school ready for occupation in September.

Falls View, Ont.

The ratepayers have decided to purchase a site on Dunn street for a 4-room school house. Mr. Marshall, school inspector. Mr. Borter, Niagara Falls, architect.

Gilbert Plains, Man.

Tenders are being called until February 19th for the erection of a six-room school building for the trustees of Brickburn S. D. Plans, etc., at the office of the secretary-treasurer, this place, or at the office of the architect, J. H. Bossons, Dauphin, Man.

Goderich, Ont.

The Masonic Temple Association are calling for tenders until February 21st for the different trades for the erection of a Temple. For further particulars see advertisement in this issue.

Killarney, Man.

A town hall to cost \$12,000 will be built. A heating plant to cost \$3,000 is being considered.

New Westminster, B.C.

It is stated that the congregation of St. Andrew's are contemplating the erection of a new church in a year or so.

Outlook, Sask.

A new \$20,000 school will be erected here this spring.

Ottawa, Ont.

It is stated that the new Ottawa Masonic Temple will be started early in the summer and will cost about \$60,000. Noted in issue of January 12th.

At the meeting of the public school board it was decided to build a new eight roomed school on Breeze Hill. Trustee Fairbairn, chairman.

Perth, Ont.

Wm. Dawson, county clerk, is advertising in this issue for competitive plans for the new registry office.

Portage la Prairie, Man.

It is stated that an engineer will shortly undertake the work of laying out the grounds for the proposed new armory. Tenders will be called shortly. The Industrial Exhibition Association has secured a drafted outline of plans for the proposed new

grand stand. Estimated expenditure, \$4,000 to \$5,000. Date of completion, about May 24th.

Peterboro, Ont.

A Presbyterian church will likely be built at Buckhorn this summer.

Port Colborne, Ont.

It is expected that a lighthouse will be built off Point Abino east of here for the protection of shipping at that point. It is estimated that it will cost \$75,000.

Port Arthur, Ont.

The Y. M. C. A. and city have reached an agreement for placing a fine new Y. M. C. A. building in Waverly Park, construction to commence in the spring. The Carnegie library will also be commenced in the park in the spring. John Whallen, owner of the Lyceum theatre, recently opened here, will build an equally good \$75,000 theatre in Fort William.

Regina, Sask.

Nay & James, investment bankers, have purchased the following school debentures issued for building purposes: Harris School District, Harris, Sask., \$14,000; Belton School District, Unity, Sask., \$1,600; Merry Home School District, Petrofka, Sask., \$800; Elphinstone School District, Elphinstone, Man., \$2,800; Aylesbury School District, Aylesbury, Sask., \$500; London School District, Winnipeg, Man., \$2,000; Ridgeway School District, Carman, Alta., \$1,500.

Saskatoon, Sask.

The University of Saskatchewan is calling for tenders for the College building, students' residence, etc. For further particulars see information in this issue.

St. John, N.B.

The St. Andrew's Society have the matter of a new building under consideration. Dr. J. R. McIntosh, president.

It is stated that property on the northern side of Paradise Row between Wall and Harris streets has been bought by J. W. V. Lawlor, who, it is said, is acting for Bishop Casey. Rumors have it that a Catholic school may be erected there at some future date.

The Elks of this city are considering the erection of a building of their own.

Toronto, Ont.

At the annual meeting of the County of York Law Society it was resolved that a committee be authorized to deal with the question of a new registry office.

Sherbourne Street Methodist Church has secured an option on the northwest corner of Elm avenue and Dunbar road, where when the need occurs they may build a new church. In the meantime it is stated that a Sunday school may be erected on the property. Some changes on their present edifice are also planned.

At a recent meeting of the Board of Education a motion was put by Trustee Levee to build a new school on Manning avenue site. Rough plans for the Technical School have been prepared by Superintendent Bishop. Mr. Simpson, Chairman.

It is reported that the Provincial Government has been negotiating for the property on Bloor street east owned by the Board of Education, as a site for the new Government House. Other sites also are under consideration. In this connection it is stated that the railroads have offered to purchase the present Government House.

Toronto Rowing Club's new Iseland headquarters, it is stated, will be ready for occupation by 1st of June.

Tenders addressed to J. O. Beaume, Minister of Public Works, will be received until March 1st for masonry, cut stone, etc., required in connection with the extension to the Ontario Government Buildings, Queen's Park. Plans, etc., at office of G. W. Gouinlock, architect, 1108 Temple Building, Toronto. See advertisement in this issue.

Victoria, B.C.

The residence of Oak Bay are feeling the necessity of a new school.

Vancouver, B.C.

The Vancouver Rowing Club at their annual meeting to be held in March will consider the proposition of the erection of a new club house and quarters.

Watford, Ont.

Tenders for remodelling the school building in S. S. No. 17, Warwick, 2nd line, S. F. R., will be received up to March 1st, 1910. For particulars apply to E. Doan, secretary, Watford P. O.

Winnipeg, Man.

Plans are being prepared for the First English Lutheran Church to be built corner Ellie avenue and Furby street.

The Manitoba Fishing & Hunting Club will erect a club house and pavilion costing \$10,000 at Pointe du Bois.

The Dominion Government are to expend \$50,000 in the refitting of the old post office for customs parcels office.

At a meeting of the Riverview Presbyterian congregation it was decided to enlarge and practically reconstruct the present building at a cost of about \$3,000. Rev. J. Irvine Walker, pastor.

Two collegiate institute buildings, each to cost not less than \$125,000 and to contain from twenty to twenty-five rooms, and one or two public schools of modern type will be built in Winnipeg this year. The money for these buildings is in hand, having been voted by the people last fall.

Yorkton, Sask.

Architect La Chance, of Saskatoon, has completed plans for a collegiate institute.

Tenders for post office fittings, this place, will be received until February 16. Plans and specifications on application to James Christie, clerk of works, Yorkton, and Napoleon Tessier, secretary, Department of Public Works, Ottawa.

AWARDED.**Kingston, Ont.**

W. J. Chapman, of Kingston, has been awarded the contract for fittings in the ordnance stores, this city, at \$2,165.

Victoria, B.C.

The Y. M. C. A. have awarded the contract for the removing of houses on site to Oliver Johnson; that for excavation work to John Haggerty. R. L. Drury, chairman, building committee.

Residences

Brandon, Man.

A. E. Bullock, contractor, has taken out a permit for the construction of an apartment block on Fourteenth street, to cost \$25,000. Plans are being prepared for two other apartment blocks, to cost about \$75,000 each.

Montreal, Que.

Recent building permits include: Theo. Menard, 342A Laurier avenue, two houses containing four dwellings, cost \$5,000; Jos. Girard, 566 St. Germain street, house containing three dwellings, cost \$3,000; L. Labute, 16 Robillard street, house containing three dwellings, cost \$2,900; Theo. Da-

vid, 374 Amherst street, repairs to house containing four dwellings and one store, cost \$2,800.

MacVicar & Heriot, architects, 104 Union avenue, have prepared plans and specifications for the erection of seven houses for Geo. Durnford, Esq. Tenders close February 11th at noon.

Saskatoon, Sask.

Architect W. W. La Chance has completed plans for a new residence for Mayor Wm. Hopkins.

Toronto, Ont.

Architects' plans have been prepared for the erection of a \$200,000 apartment house on the southwest corner of Bloor and North streets. It has a frontage on Bloor of 92 feet by a depth of 114 feet.

It is stated the large apartment house will be erected on Sherbourne street north of the bridge on the west side. C. J. Gibson is at present working on the plans.

Building forecasts for Rosedale are as follows: Mr. J. D. Ivey, 152 Carlton street, plans building on the east side of Castle Frank avenue a large residence; Mr. G. B. Strathy will build on the south side of Highland avenue, it is stated, this spring; east of that point, Mr. H. Ryrie will build his large mansion, excavation of which has started, and which is estimated to cost about \$60,000; Mr. H. C. Schofield, of Guelph, is preparing to build a \$30,000 home; Mr. Joshua Donovan will build on the northwest corner of Schofield and Highland avenues, and Mr. W. H. Plant will also build on the south side of East Roxborough street.

Vancouver, B.C.

Plans have been completed by E. E. Blackmore and S. B. Birds for a handsome frame four storey apartment house for G. W. and S. C. Mortimore on the northeast corner of Robson and Bidwell streets. Estimated cost, \$20,000.

Building permits have been issued as follows: C. T. Moore, 3035 Yukon street, \$3,000; J. Hopps, 2253 Fifth avenue west, two houses, \$4,000; S. Harris, 2456 Seventh avenue west, \$2,500; J. Hopps, 716 Tenth avenue east, two houses, \$5,000; W. P. Inkster, 557 Thirteenth avenue east, \$2,100; J. L. McKenzie, 1046 Odium drive, \$2,000; Miller & Anderson, 2530 Howard street, \$4,000; A. Radlett, 345 Fourteenth avenue west, \$2,600; J. Dryden, 1714 Park drive, \$5,000; J. Kennedy, 1411 Tenth avenue east, \$2,000.

Winnipeg, Man.

It is stated that G. C. Brown, who has purchased the property at the corner of River avenue and Lewis street, frontage 100 feet, where he will erect an apartment block next season.

P. Calighan, contractor, intends to build about thirty houses this summer near the park, in Elmwood, ranging in price from \$1,200 to \$2,500. Worswick Bros. are starting four cottages on Johnson avenue, costing about \$1,600. Grant & Simmers intend building twenty houses, mostly on Harbison avenue, which will run about \$2,500 each.

AWARDED.

Montreal, Que.

Mr. C. Dufort, architect, La Patrie Building, has awarded the contract for the erection of flats for Mr. Joseph Grenier, on Atwater avenue, to A. Mongeau & Company. T. A. Morrison & Company have the contract for the supply of Roman stone.

Mr. E. Montgomery Roden, Beaver Hall Hill, has awarded the contract for the supply of leaded glass for three houses on Roslyn avenue to Messrs. Castle & Son, St.

Catharines street west. The mantle work has been awarded to Mr. V. E. Traversy, Josephat Lane, Montreal.

The contract for the architectural iron-work required for the house being erected for Dr. Oliver on Park avenue has been awarded to Paul Beau & Company. R. Montgomery Roden, architect, Beaver Hall Hill.

Business Buildings and Industrial Plants

Andover, N.B.

The factory and foundry owned by A. E. Kupkey were destroyed by fire. Estimated loss about \$3,000.

Brandon, Man.

It is announced that Clement Bros. will build a steel and concrete block at the corner of Rosser and Ninth. Estimated expenditure, \$150,000. Building is stated to commence shortly.

Calgary, Alta.

H. L. Stevens & Company, of Winnipeg, have purchased four lots for \$36,000 upon which to erect a large building.

Edmonton, Alta.

Construction will be commenced on April 1 on the new three storey building to be erected on Jasper avenue by the Molsons Bank.

Fort William, Ont.

The E. B. Eddy Company, of Hull, will erect a warehouse and branch here, it is stated.

Halifax, N.S.

The Fairview Laundry, owned by John Gough, at the Three Mile House, was destroyed by fire on the 1st inst. Estimated loss, \$10,000.

London, Ont.

It is stated that the Hobbs Manufacturing Company, 304 Ridout, have decided to build a new plant next spring. Estimated cost about \$25,000.

The building occupied by Forsythe, Fraser & Weir was damaged by fire on the 5th inst. Estimated loss on building, \$8,000.

Lachine, Que.

After considering a number of sites, the Lidgerwood Manufacturing Company, of New York (logging machinery, etc.), has made arrangements to locate their Canadian branch here.

Moose Jaw, Sask.

Work starts March 25 on the Imperial Oil Company's warehouse. Noted in issue of January 19th.

A member of the Board of Trade who recently interviewed F. W. Thompson in Montreal, states that decisions re locating Ogilvie mills in the west had been indefinitely postponed, owing to the question of government ownership of elevators being under consideration.

Merritton, Ont.

The Hough Block, occupied by Mrs. Hunniford and others, was badly damaged on the 3rd inst. Estimated loss, \$5,000.

Montreal, Que.

The Canadian Northern Railway will have an uptown station in Montreal. A terminal will be built at Osborne street, adjoining the Canadian Pacific Railway's Windsor street station.

It is reported that the Barlow property

on Peel street has been purchased by Douglas and Robert J. Inglis for some \$50,000 and that they intend to erect a fine modern building on the property.

Outlook, Sask.

M. Jules, of Minneapolis, will erect a flour mill here, costing \$40,000.

Port Arthur, Ont.

The Wagon & Steel Works will be commenced March 1st. W. J. Lindsay, manager. Noted in issue of January 12th. Quebec, Que.

Mr. Lorenzo Auger, of Quebec, is at work preparing plans of a fifteen storey hotel to be erected at the foot of Mountain Hill. Estimated expenditure, \$1,000,000, subscribed mainly by Americans. According to rumor it will be the National Transcontinental Hotel in Quebec.

Salisbury, N.B.

The general store and warehouse of H. C. Barnes & Sons here was destroyed by fire on the 4th inst. Estimated loss, \$11,000.

Rainy River, Ont.

John Stinson, of Norwood Grove, Man., is to erect a stave factory here in March.

Ryley, Alta.

Excavation has been commenced on the site for the new Aliberta Hotel.

Finsith Bros. will have a large store building erected.

Rapid City, Man.

W. J. Lindsay & Company will have a large oatmeal mill erected here.

Regina, Sask.

B. F. Ackman Sons Company, of Peterboro, Ont., will erect a large warehouse and office here this coming spring.

The building for the International Harvester Company will be a 3 storey brick, 100 x 200 feet.

It is reported that the plans filed by the C. P. R. for the proposed new union station for Regina call for a building costing between \$500,000 and \$600,000. The length of the new depot is to be 480 feet and a portion of it will be four storeys high, affording accommodation for the necessary executive offices at this point of three railways using the station, viz., C. P. R., G. T. P. and C. N. R.

Saskatoon, Sask.

Plans for the Wilson Bros. building are completed. W. W. La Chance, architect.

The Kennick Sand & Stone Company, Limited, will put up a \$60,000 brick manufacturing plant here.

Salisbury, N.B.

The general store and warehouse of H. C. Barnes & Son, here, was destroyed by fire on the 3rd inst. Estimated loss, \$11,000.

Stratford, Ont.

Vice-president Fitzhugh, of the G. T. R., states that a new station, most modern in design, will be erected in Stratford this year. Regarding the expected addition to the local shops, plans are now under consideration. It is understood from other sources that the plans include a new foundry and a road department equipment shop.

Sidney, Man.

The Sidney Hotel and general store of A. Higgins were destroyed by fire on the 6th inst. Estimated loss, \$10,000.

St. John, N.B.

The brick block occupied by the Linton & Sinclair Company, wholesale glass and

(Continued on page 25)

Tenders and For Sale Department

TO CONTRACTORS

Sealed bids will be received by the undersigned up to noon on FEBRUARY 25TH, 1910, for all trades required in the erection of a residence in Chestnut Park, Toronto.

The lowest or any bid not necessarily accepted.

F. S. BAKER, Architect.

Traders Bank Building, Toronto.

Proposals

Tenders are wanted for a supply of UNDERGROUND CABLE.

For information apply at once to HYDRO ELECTRIC SYSTEM, City Hall, Toronto.

Tenders for Church

Tenders will be received by the undersigned until noon on SATURDAY, FEBRUARY 19, 1910, for the work of the various trades required in the erection of a church building on the corner of Queen Street West, and Beaty Avenue, Toronto, for the Church of the Epiphany.

The lowest or any tender not necessarily accepted.

GORDON & HELLIWELL, Architects,
Confederation Life Building, Toronto.

Tenders for Gaul Heating

Tenders will be received by the undersigned up to noon on WEDNESDAY, the 16TH DAY OF FEBRUARY, 1910, for the heating of the County Jail at the Town of Barrie, according to plans and specifications which may be seen on application to A. W. Beardsley, County Clerk's Office, Court House, Barrie. All tenders to be sealed and marked "Tenders for Gaul Heating" and addressed to

C. J. PICOTTE,

Chairman County Property Committee
Box 128, Penetanguishene, Ont.

City of Moose Jaw

Notice

Tenders will be received for two (2), two-horse street sprinklers, steel tanks.

Tenders stating capacity and weight, giving prices f.o.b. Moose Jaw, to be laid on the council table not later than 8.30 p.m., on MONDAY, FEBRUARY 21ST., 1910.

THE CITY OF MOOSE JAW
W. F. Heal, City Clerk.

Tenders

The University of Saskatchewan will shortly call for tenders for the

**College Building, Students' Residence
Power House, Live Stock Pavilion,
Agricultural Engineering
Building, Horse Barn
and Cattle Barn**

Those interested should communicate with the Architects, BROWN & VALLANCE, Canada Life Building, St. James St., Montreal, or PRESIDENT MURRAY, University of Saskatchewan, Saskatoon, Sask.

Tenders for Plastering

Tenders will be received by the undersigned for plastering a large house in Gravenhurst (labor only), the owners supplying all material on job. For particulars apply at once to BISHOP CONSTRUCTION CO., LTD., 19 Wellington St. West, Toronto.

Tenders Wanted

Tenders will be received up to noon of FEBRUARY 21ST, 1910, from the different trades for the erection of a Masonic Temple, 58 x 70 feet, three stories and basement, in the town of Goderich; building to be of concrete, brick and stone. Plans and specifications may be seen at Andrew Porter's office, North Street, Goderich. The lowest or any tender not necessarily accepted. A marked cheque for five per cent. of the amount must accompany each tender.

MASONIC TEMPLE ASSOCIATION
OF GODERICH, LIMITED.

ANDREW PORTER,

Secretary-Treasurer.

Notice to Contractors

Tenders for 42 inch Steel Intake Pipe

Sealed tenders addressed to the Chairman of the Water Works Committee will be received by registered post only, up to 5 p.m., TUESDAY, FEBRUARY 15TH, 1910, for the supply and delivery of 3,000 lineal feet of 42 inch steel intake pipe.

Specifications, form of tender and full particulars may be obtained on application to the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, January 24th, 1910.

County of Perth

Competitive Designs for New Registry Office.

Competitive Designs for a new Registry Office in the City of Stratford, will be received by Wm. Davidson, County Clerk, on behalf of the County Property Committee, up to one o'clock p.m., MARCH 1ST, 1910.

The building to be 34 x 50 feet, one story with basement. Outside walls to be of white stock brick basement of best St. Marys stone. Cost not to exceed \$10,000.00, including steam heating.

The plans showing the greatest efficiency in fire-proof construction and general design will be accepted when approved by Government Inspector. Plans not accepted will be returned. The architect whose plans are accepted will be required to prepare specifications, detail drawings, etc. A short description of general construction of the building to accompany plan.

Any further information can be obtained by communicating with the County Clerk

WM. DAVIDSON,

County Clerk,

Stratford P.O.

ROBERT ARMSTRONG,

Chairman of Committee.

Stratford, February 1st, 1910.

Tenders for Supply of Asphalt

Sealed tenders, addressed to the Chairman, Board of Control, for the supply of from 2,500 to 3,500 tons of Asphalt for street paving for the City of Winnipeg, will be received at the office of the undersigned up to 11 a.m. on FRIDAY, FEBRUARY 25TH, 1910.

Specifications and forms of tender, together with conditions governing tenders as prescribed by By-law may be obtained at the office of the City Engineer, James Street Winnipeg. The Board reserves the right to reject any or all tenders or to accept any bid which appears advantageous to the City.

M. PETERSON,
Secretary.

Board of Control Office, Winnipeg, Jan. 31st, 1910.



To Contractors

Sealed bulk or separate tenders endorsed "Tender for addition to Ontario Parliament Buildings" addressed to the undersigned, will be received at this department until noon on

Tuesday, the first day of March, 1910

for the following works, viz.: Masonry, bricklayer, cut stone, carving, fireproofing, etc.; structural steel; steam heating; plumbing and gasfitting; iron armored conduit and electric wiring; vault doors; roofing, copper and sheet metal; carpenter work; ornamental iron and grille work; elevators; lathing and plastering; painting and glazing; marble and tile; metallic fire-proof doors, base and trim; hardware; iron-founders work; required in connection with the extension to the Ontario Government Buildings, Queen's Park. Plans and specifications may be seen at the office of Geo. W. Gouinlock, Architect, 1108 Temple Building, Toronto.

An accepted bank cheque payable to the order of the Honorable, the Minister of Public Works for five per cent. of the amount of the tender and the bona-fide signatures and addresses of two sureties or the bond of a Guarantee Company approved by this Department prepared to give a bond for the due fulfillment of the contract must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance. The Department will not be bound to accept the lowest or any tender.

J. O. REAUME,

Minister of Public Works, Ontario

Department of Public Works, Ontario,
Toronto, February 4th, 1910.

(Newspapers publishing this advertisement without authority will not be paid for it.)

Miscellaneous

TILLSONBURG, ONT.—Good opening for an Engineer and P.L.S. Town of Tillsonburg. Population 3,000. Town would require part of his services for Public Works. Apply to A. E. RAYNES, Town Clerk.

Fine Factory Site—New Westminster, B. C., the coming factory city. Lot 7, Block 30; corner 198 x 132, three frontages; close to tracks and waterfront. Right in city, and already surrounded by industries. \$15,000. Snap. Will bring double this inside two years. Investigate. Address P. O. Box 516, Vancouver—on paper

For Sale

A 60,000 gallon Water Tank on Steel Trestle, 90 ft. high.

Sealed tenders addressed to the Chairman of the Water Works Committee, endorsed "Tender for Water Tank", will be received by registered post only up to 5 p.m. TUESDAY, MARCH 1ST, 1910, for the purchase removal of a 60,000 Imperial Gallon Wooden Tank and mounted on a steel trestle, 90 ft. high, at the Ottawa East Pumping Station.

Particulars may be obtained on application to the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the highest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, January 25th, 1910.

Business Buildings and Industrial Plants

(Continued from page 23)

crockery merchants, and others, was gutted by fire on the 22nd ult. Estimated loss, \$20,000.

Swan Lake, Man.

The branch of the Bank of Hamilton here was destroyed by fire on the 1st inst. at an estimated loss of \$10,000. Manager, Mr. Lusteed.

Toronto, Ont.

The Lowndes Company, Limited, has purchased property No. 129 Wellington street, for \$20,000, where they will shortly erect a large warehouse. The deal was put through by Mr. Harton Walker.

It is stated that Sir William Mulock's property on the northwest corner of Yonge and Grenville streets, has been purchased by the Burgess Powell Drug Company for \$80,000. The property is 100 feet by 100. The buyers will put a fine drug store on the corner.

Victoria, N.B.

It is stated that the Cowper property on Fort street, lying between the Times corner and D. E. Campbell's, was purchased by His Honor the Lieut.-Governor. It is understood to be the intention of the new owner to improve the property, and to erect a substantial building for stores and other purposes.

Vancouver, B.C.

A pork packing house are seeking a location in this city. Messrs. H. Gains & Sons of Dewdney are interested.

A company, known as the Metropolitan Building Company, it is stated, will build a ten storey block on the north side of Hastings street west. As soon as plans are completed work will be started.

Welland, Ont.

The officials of the Hedlay Shaw Milling Company state that the construction of their big mill at Port Colborne will be commenced in the spring.

Wetaskiwin, Alta.

Several business buildings were destroyed by fire on the 30th ult. Those who suffered loss: Lee Wing, \$1,400; Kainser & Bleiler, \$4,000, and others.

Winnipeg, Man.

The Lewis Furniture block was damaged by fire on the 3rd inst. Estimated loss, \$15,000. W. B. Paine, manager.

It has been announced that the T. Eaton Company has secured 325 feet on the east

side of Hargrave street with a depth of 120 feet. Ultimately this site will be used for a large factory. Mr. Gilroy, local manager.

Mr. Geveart, a Belgian woollen manufacturer, is quoted as having stated that sufficient capital has been raised towards the projected site for a mill. Amount of capital involved, about \$350,000. Noted in issue of December 22nd.

It is rumored that a new garage will be built for the Winnipeg Taxicab Company this spring.

The Munro Steel & Wire Works, Limited, will rebuild at a cost of \$30,000.

Frank Lindsay, proprietor of the Oxford Hotel, will have a large store and apartment block built, on Garry street and Notre Dame avenue.

The lot adjoining the warehouse of the Winnipeg Paint & Glass Company has been sold to a representative of foreign capital. The purchasers will build on the property. Montagu Aldous & Laing made the sale.

The Berna Motor & Taxicab Company will build a 4-storey building corner of McDermot and Princess streets. Kilgour-Rimer Company are interested.

Tenders are being taken on the Paulin-Chambers building, Ross avenue, cost \$85,000. Noted in issue of January 19th.

R. R. Pattinson and W. W. Fraser will have a store and apartment block built, corner Corydon avenue and John street.

The Northern Foundry & Machine Company will put up a foundry at Point Douglas to cost \$10,000.

The Canadian Bank of Commerce are having plans prepared for a building on their old site with a frontage of 105 feet.

AWARDED.

Edmonton, Alta.

The general contract for the building of the new Senate hotel on the corner of Clara street and Fraser avenue has been awarded to G. C. Porter, of this city, at \$50,000. Plans call for a three storey building of pressed brick with Roman stone trimmings.

St. John, Nfld.

The contract for the elevator enclosures for the Bank of Montreal building has been awarded to Messrs. Hutch & Sticht. Messrs. Peden & McLaren, architects, Montreal.

Power Plants, Electricity and Telephones

Cranbrook, B.C.

The Cranbrook Electric Light Company, it is stated, purpose erecting a power plant on the St. Mary's river at an early date, when the present steam power station will be used as an auxiliary in case of an emergency.

Dunnville, Ont.

On the 14th of February the ratepayers will be asked to vote on a by-law to authorize the issue of debentures to the amount of \$10,000 for the purpose of granting a bonus to the Wilhelm Telephone Manufacturing Company, of Buffalo, N.Y.

Fort William, Ont.

Rapid progress is being made by the Kakabeka Falls & Mount McKay Electric Railway Company on the construction of its rural lines. It is expected to have the railway to Kakabeka Falls, 18 miles distant, finished during the coming summer. As soon as warranted the railway will be extended so as to form a belt line.

It is stated that the Kaministiquia Power Company has under construction over 10 miles of transmission lines to supply the demands of its new customers. The present plant is laid out for 50,000 h.p.; the present output is 15,000 h.p. It is expected that another 10,000 h.p. unit will be installed in the near future to meet the rapidly increasing demands. W. L. Bird is secretary and manager.

The Allis-Chalmers Bullock Company has completed the installation of a 1,000 h.p. motor generating set in the power station of the Kaministiquia Power Company at Port William to supply electricity for the street railway between Port Arthur and Port William, which is owned jointly by the two cities. Four new cars have been received and eight more have been ordered. Double tracking of the system throughout will be completed during the coming summer. N. C. Pilcher is general manager of the street railway.

Hope, B.C.

The Fraser River Land Company, a corporation just formed, is planning to erect an electric power plant here and has applied to Water Commissioner Fletcher for a record of 1600 cubic feet of water from the Coquahalla river.

Montreal, Que.

The Allis-Chalmers Bullock, Limited, have been awarded contracts for the mining machinery as follows: Northern Customs Concentrators, Cobalt, Ont., one No. 4 Gates "K" Breakers, fitted with short head, concaves, chilled iron, cast iron gears, steel pinions, etc.; Jacobs Asbestos Company, Thetford Mines, Que., four No. 4 Gates "K" Breakers, fitted with short head, concaves, chilled iron, cast iron gears, steel pinions, etc.; Black Lake Consolidated Asbestos Company, Black Lake, Que., four No. 4 Gates "K" Breakers, fitted with short head, concaves, chilled iron, cast iron gears, steel pinions, etc.

Ottawa, Ont.

Five or six years ago, it is stated, Hon. Mr. Denville secured a charter for the Northern Commercial Telegraph Company, Limited, which charter enables the company to run telegraph and telephone lines from and to Quebec, Montreal, Ottawa, Toronto, Niagara Falls, Hamilton, Detroit and a section between Emerson and Winnipeg, and also from Quebec and Montreal to the Maritime Provinces. The capital is £750,000 (sterling), and a company has been organized and it is now stated that the contract for one thousand miles of the work has been given to M. Connolly, the well-known contractor. Roblings, the great copper wire manufacturers, are said to be practically the company.

Port Arthur, Ont.

The city of Port Arthur has closed a contract with the Hydro-Electric Power Commission for from 5,000 to 10,000 h.p. The power is to be supplied from the plant of the Kaministiquia Power Company at Kakabeka Falls. Work will commence at once on the construction of the transmission lines and substation. W. L. Bird, of Port William, Ont., is secretary and manager of the Kaministiquia Power Company.

St. John, N.B.

The St. John Railway Company are planning to construct a new building, which with the use of the old power house for a repair shop will add to their present equipment considerably.

Toronto, Ont.

The city is calling for tenders for supply of underground cables for the Hydro-Elec

tric system. For further particulars see advertisement in this issue.

Winnipeg, Man.

The court has handed down a decision that the Winnipeg Electric Railway Company cannot legally transmit electricity from its hydro-electric power plant at Lac du Bonnet, on the Winnipeg river, 60 miles distant, into this city for commercial purposes. Action was brought by the city against the railway company in 1906, arising out of the distribution of electrical energy generated outside of the city limits, which the city claimed was in violation of the company's franchise.

Tenders addressed to the Chairman of the Board of Control will be received until February 21st for the supply and installation of a cooling tower for the terminal station. Instructions, etc., at office of the power engineers, Carnegie library. M. Peterson, secretary.

AWARDED.

Edmonton, Alta.

The Canadian Carbon Company, Limited, 12-14 Shuter street, Toronto, have been awarded the Government of Alberta contract for the supply of cell batteries for their telephone system for the year 1910.

Nelson, B.C.

It is stated that the contract has been let by the Nelson Street Railway Company to the Allis-Chalmers Company of Montreal for a motor generator set of 250 kilowatt capacity. Two cars have been ordered from the Ottawa Car Company, each equipped with four 40 horse-power Allis-Chalmers motors and each seating 40 passengers. A substation and a car barn in accordance with the requirements of the system are now under construction and will be ready for service at the time specified in the contracts.

Vancouver, B.C.

It is stated that the contract for the initial hydro-electric equipment of the new power plant which the B. C. E. R. Company is constructing on the Jordan river has been awarded to the John McDougall Caledonian Ironworks, 512 William street, Montreal, Que., the equipment to be ready for operation by October 1. The ultimate plans for the plant contemplate the installation of four electrical units. The present contract covers the first unit, which will be operated by a Doble impulse water-wheel of 10,000 horse-power, the surplus energy being available when future electrical units are provided. The development plans on the river call for the construction of a pipe line nearly two miles in length, the water being delivered at the power house at tidewater at a head of 1180 feet. Contracts involve an expenditure of \$53,000. G. M. Breed, local manager for Caledonian Ironworks.

Miscellaneous

Armow, Ont.

Tenders are being called by the council of the Township of Kincardine for timber and cement tile, same material to be delivered on or before the first of June. R. E. Campbell, clerk.

Brockville, Ont.

The county council recently decided to expend \$200,000 on the construction of roads, and a commission was appointed to engage an engineer. Write Warden Morris.

Como, Que.

A bylaw will come before the ratepayers to issue \$30,000 5 per cent. 30-year road

and bridge debentures. A. W. Mullan, secretary-treasurer.

Fort William, Ont.

Tenders are being called by the city until February 10th for the supply of 440 cords of flat rock of 3 1-2 to 5 inches in thickness and to be delivered before May 1. A. L. Farquharson, construction superintendent.

Kingston, Ont.

Tenders addressed to W. W. Sands, city clerk, will be received until February 11th for one steam fire engine, 600 gallons capacity. Specifications on application to the chief of the fire department.

Port Arthur, Ont.

A committee of the City Council has been appointed to develop a scheme for instituting a gas plant here, and an inducement will be offered several companies with whom the city has been in communication.

Peterboro, Ont.

Chairman Morgan of the Fire, Light and Water Committee, is considering the advisability of purchasing a new chemical engine. The committee recently decided what supplies they will purchase for this year.

St. John, N.B.

The Common Council decided to call for tenders for a new boiler for No. 3 fire engine. Mayor Bullock, Ald. Hayes, members.

South March, Ont.

Tenders addressed to Thos. Richardson, clerk of the township of March, will be received until March 1st for dredging work on the Carp river in the townships of March and Huntley. Plans, etc., at office of Messrs. Beament & Armstrong, 25 Sparks street, Ottawa. J. H. Moore, civil engineer.

Toronto, Ont.

Recent building permits include: J. Bryant, pair semi-detached two storey brick dwellings, Delaware avenue, \$4,500; G. Constable & Son, pair semi-detached two storey brick stores and dwellings, Bloor street west, \$6,000; A. H. Garrett, one storey brick theatorium, on 622 Bloor street west, \$3,500; G. Phillips, pair semi-detached two and a half storey brick dwellings, Winchester and Sackville, \$4,800; Dundas Building Company, three attached two storey brick buildings, Maria and St. John street brick dwellings, corner Maria and St. John's Place, \$5,500; H. Carter, pair semi-detached two storey brick dwellings, Yarmouth, \$4,000; H. Pickering, pair semi-detached two storey roughcast dwellings, brick fronts, Rhodes, \$3,000; A. J. Miller, two and a half storey brick dwelling, Hewitt, \$3,700; J. Isolsky, pair semi-detached two storey brick dwellings, Eastern, \$4,000; H. S. Mara, three attached one storey brick stores, corner College and Beatrice, \$3,700; Prof. Owen, two storey brick dwelling, on Wychwood park, \$5,700; W. Green, 6 pair semi-detached two storey roughcast dwellings, brick fronts, Frizell, \$18,000; T. Weber, pair semi-detached two storey brick dwellings, Simcoe, \$4,000; R. C. Bustard, six attached two storey brick stores and dwellings, corner Yong and De Lisle streets \$15,000; F. W. Halls, two storey and attic brick dwelling, near Ridoubt, Indian road, \$4,500; Deeth & Sons, two and a half storey brick dwelling, corner Indian road and Thorold street, \$3,000; R. W. Tuthill, three attached two and a half storey brick dwellings, and garage, King street west, \$13,000; A. Russell, pair semi-detached two storey brick dwellings, Delaware, \$5,000; L. E. Price, pair semi-detached two storey brick dwellings, Salem, \$3,900; Canning &

Curry, pair semi-detached two storey roughcast dwellings, brick fronts, Shaw street, \$3,400; Harry Ryrie, two storey brick dwelling, Highlands avenue, \$22,000; Deeth & Sons, two and a half storey brick dwelling, Indian road, \$3,000; T. Eaton Company, alterations to store, 190 Yonge, \$4,500; Lever Bros., one storey brick factory Eastern avenue and Don roadway, \$27,000.

Victoria, B.C.

Estimates of the fire department have been passed, including hose \$2,500; hydrants, \$5,000; fire alarm system, \$2,500; apparatus, \$3,000.

Tenders are invited for 75 hydrants required by the first department.

Tenders will shortly be called for a motor chemical wagon for the fire department to cost about \$2,000.

The city is calling for tenders for 150,000 gallons of creosote, and until the receipts of bids Acting City Engineer Bryson will purchase what creosote he requires for treating wood blocks. A rigid inspection of the material will be made, as last year it was found to be of inferior quality.

Permits have been issued recently to S. White for a brick stable on View street to cost \$8,000; to S. Rowe for a dwelling on Suffolk street to cost \$2,000; to Mrs. M. M. Sprinkling for a house on Grant street to cost \$400; to Hon. Abraham Smith, U. S. consul, for a dwelling on McClure street to cost \$4,000.

Vancouver, B.C.

Engineer Clement will shortly ask for tenders for 10 miles of cement sidewalk. He will also call for tenders for block paving on Westminster avenue from Broadway to the city limit and for two gravel scows of about 125 tons capacity, to cost in the neighborhood of \$3,000 each.

The following is City Engineer Clement's estimates for the year 1910: New plank walks, \$22,000; street improvements (not under by-law), \$40,000; other construction and improvements including the reconstruction of the old Granville street bridge at \$23,500, will reach \$50,460, and some \$45,000 odd will be needed for the scavenging maintenance after an estimated revenue of \$12,000 has been subtracted.

Winnipeg, Man.

The appropriations for the city's expenditures are itemized as follows:—Power works, \$850,000; water works, \$161,978.62; new police stations, \$75,000; alteration of old police stations, \$20,000; Louise bridge, 107,395; electrical works, \$28,125; fire alarm system, \$35,000; parks, \$150,000; conduits, \$50,000; local improvements, \$955,834.71.

Tenders addressed to the chairman of the Board of Control will be received until February 21st for the supply of 25,000 barrels of cement, delivered f. o. b. Winnipeg. Specifications, etc., at office of city engineer. M. Peterson, Secretary.

AWARDED.

Brandon, Man.

The Brandon Gas Company has let a contract for the laying of thirteen miles of mains during the coming season.

Halifax, N.S.

The contract for building a boat for the quarantine service at Halifax has been awarded to Philip & Son, Dartmouth Eng., for \$22,600. The highest tender was that of Toronto Shipyard, Toronto, \$39,850; the Burrell-Johnson Iron Company, \$32,750. The others ranged from \$28,000 to \$35,000.

Strathcona, Alta.

The contract for city house numbering has been awarded to Mr. J. M. Eaton.

Contract Record

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24 Toronto February 9, 1910 No. 6

Utility and Art

It is an unfortunate circumstance that the design of many important buildings is influenced by those who have the most warped ideas on the subject. In many quarters there is a gross misconception of the architectural profession and there is an altogether too prevalent impression that the successful combination of utility and artistic appearance is impossible. Some idea of this misunderstanding is suggested by recent communications addressed to the Toronto Board of Education by the Canadian Manufacturers' Association and the Board of Trade. The last two named bodies, it would seem, had been consulted in regard to the plans for the new technical school on College street. Their views are interesting.

In the course of his letter, Mr. F. G. Morley, secretary of the Board of Trade, says: "Money should not be spent upon buildings with expensive elaborate exterior appearance but upon solid structures with sufficient available space. . . . Some of the most famous technical schools in Germany are in buildings of a very unpretentious kind. . . . The school is not the building, it is the staff who teach, the spirit communicated, the ambition awakened, that will influence the industrial and scientific life of our country. This is the side we desire to urge and we are opposed to the erection of

unnecessarily expensive buildings, which in a few years owing to changes in industrial methods, may be found unsuitable."

These sentiments are rather strongly developed on the utilitarian side, but it is not likely that any serious objection will be made to any of the views expressed therein. What these people do not realize, however, is that the solution of the problem lies in the plan. Neither do they appreciate the fact that the architectural profession stands for taste and not for unnecessary embellishment. While we would not presume to criticize the ability of the city officials, we do not hesitate to express the opinion that in this instance a better purpose would have been served, and a more satisfactory result obtained, in all probability, by calling for competitive plans. There would have been more chance of obtaining the proper, economic solution. There would have been a greater likelihood of some regard being had for the artistic as well as for the utilitarian, without any sacrifice of the latter—and at no additional expense.

We learn from the Board that plans for the new technical school are now under preparation, but have been unable to learn any particulars in connection with the design. There is an evident reluctance on the part of the authorities to impart any information of this kind just now. Whatever shape the plans are assuming, it is to be hoped that some regard will be had for the outward appearance of the building as well as for its general utility. It can only be admitted that such a building as a technical institute does not call for any elaborate architectural treatment; indeed, in this case, it would be almost impossible by reason of the site and limited amount of frontage on College street; but, at the same time, the Board of Education should not be persuaded, or coerced, into the erection of a barn. It will be interesting to see how they arrive at the solution of the plan for this new school. Certainly, it would have been more to our liking had the architectural profession been consulted.

Incidentally, it is gratifying to note that the Board of Trade has a certain anxiety for the ratepayers' pocket. Mr. Morley concludes by saying: "It is well to remember that we have . . . only the taxpayers of our city to furnish the needed funds, etc." This anxiety is very pleasing to note, but we are afraid that the average Toronto ratepayer has become inured by this time. Anyway, he can afford to pay for what is necessary in the best interests of the city.

The mechanics' lien action of the Engineering Contracting Company, Baltimore, against the Canadian Birkbeck Company, arising out of the contract for the building of the defendant company's offices on Adelaide street, Toronto, is now being heard. Evidence has already been taken by commission at Baltimore, the president and secretary having been examined there. The contract was \$131,000, and a lien has been filed for \$80,000, as a result of a comparatively minor disagreement between the contractors and architect.

G. T. R. Construction at Ottawa, Ontario

The Story of Progress in the Erection of the New Depot and the Chateau Laurier—Interesting Views of the Work

The new G. T. R. depôt at Ottawa, now in course of construction, will cover an area of approximately 25,000 square feet, and will involve an expenditure, in round figures, of \$1,000,000.

The structure was designed by Messrs. Ross & MacFarlane, architects, Montreal and Ottawa, and the general contract was awarded to Peter Lyall & Sons, of



(Fig. 1) 1st October, 1909—Commencement of Steel Work

Montreal. The Dominion Bridge Company, of Lachine, Que., are erecting the steel work, and John Watson & Son, Montreal, have the contract for the ornamental iron work.

Excavations were commenced on July 12th last, and from the progress views, published herewith, it will be seen that remarkably good progress has been made dur-

ing the six months that operations have been underway. The story of the work, up to its present stage, will doubtless be of interest to many of our readers.

In fig. 1 it will be observed that the demolition of the old station is incomplete and that a small portion of steel has been erected. Seven rock drills were employed in the work and at this stage these are in operation. (About 5,000 cubic yards of rock were excavated.)

The next picture, fig. 2, shows the demolition of the old station completed and the debris removed. That portion of the site formerly covered by the old building is now being used as a stone cutting yard. The masonry has been carried up to the ground floor level on the west side, and the steel for the head house up to the fourth floor level. On the first and second floors the concrete floor slabs are completed. Form work is in course of erection on the third floor. Note the rock drills at work in the pipe trench. This trench runs through from the power house at the extreme south end of the baggage annex, (seen on right of picture), to the Chateau Laurier, situated in Major's Hill Park, across Rideau street and the Dufferin bridge. The pipe trench has a total length of about half a mile. Directly over the baggage annex will be seen a pile of rock, a portion of that excavated from the station site. The balance of the rock was crushed on the site and used in the concrete. Some of the stones in the base course were exceptionally heavy, weighing in some cases as much as 10½ tons. There are excellent facilities for the expeditious handling of material. By means of tracks extending into the building, the various supplies are deposited right at the base of operations. Underneath the main wall there is a track from which the cut stone is



(Fig. 2) 5th, November, 1909—Masonry in Progress—Steel Carried up to Fourth Floor Level



(Fig. 3) 10th December, 1909—Steel up to Roof Level—Concrete Floor Slabs Completed—Falsework for Waiting Room Under Way

lifted and placed directly in position, by means of a derrick erected on the uppermost tier of steel.

In the next picture, fig. 3, the steel is shown carried up to the roof level. All the concrete floor slabs are completed at this stage. The scaffolding for the waiting room is now partly constructed. This falsework is necessitated by the structure having a plaster barrelled

vaulted ceiling, 70 feet in height. The masonry has been completed as far as the base course on the west side and front, and a portion of the columns set. The drums of these columns, it is interesting to note, weigh rather more than 8 tons.

The next photo, fig. 4, which was taken as recently as the 21st. ult., marks the final completion of the steel



(Fig. 4) 21st January, 1910—Steelwork Completed—Stone Masonry up to 3rd floor—Main Scaffolding for Waiting Room Finished

work, including the dome on the main building and over waiting room. The steel work represents about 700 tons. At this stage the finished stone masonry has advanced to the third floor, four of the columns being completed and ready for capitals. The main scaffolding for the waiting room is up and stone derricks are erected on top. On either side of the waiting room the mason work is carried up to the base course.

Figs. 5 and 6 are supplementary views taken from the south side and convey further ideas of the nature



(Fig. 5) 17th December, 1909—South View of Construction on the New Depot, Showing Waiting Room and Cut Stone Yards

and progress of the work. In these pictures the south wall of the waiting room and the cut stone yards are in evidence. The main scaffolding is shown in course of erection, also the prosecution of work in the duct.

Equally as important as the ability to figure correctly on important works such as these and to obtain the contract at the right figure are the practical knowledge and experience required to handle every department of the work to the best advantage, and a competent,



(Fig. 6) 7th January, 1910—Continued Progress owing to Mild Winter

well-organized staff co-operating for the best results with good workmanship and economy. In these respects the G. T. R. projects at Ottawa are particularly well favored, and with a continuation of the present conditions their completion cannot but bring a full measure of satisfaction to all concerned.

At a later date we hope to publish further views showing the final stages of the work. In the compilation of this data we are indebted to Mr. H. K. Ferguson, superintendent of construction for Messrs. Ross & MacFarlane.

Tests of Concrete Beams

The mechanical engineering department of the Massachusetts Institute of Technology is carrying on an investigation of the breaking strength and methods of failure of reinforced concrete beams of unusual proportions.

The form of beam which has been most frequently tested and regarding which the most information has been obtained in the past is what may be called the typical floor beam as it is used in the ordinary type of reinforced concrete building. The usual span of such a beam is about 16 feet and its depth from 18 to 20 inches.

In engineering structures, however, the loads are often so great that it becomes necessary to use beams and girders of less than half the above length and twice their depth. With such proportions, engineers know very little about the nature of the stresses in reinforced concrete, and there is considerable doubt as to whether the beam acts like an ordinary type in deflecting or whether it supports its load in the manner that an arch does. A set of twelve specimens, 30 inches deep and varying in length from six to twelve feet, and a like set of just half the linear dimensions, have been furnished by the Ambursen Hydraulic Company. The results will be valuable, not only for themselves, but as showing the relative merits of small and large sized test specimens.

The laboratories contain machines capable of breaking columns up to one foot square by crushing, two beam machines, the larger of which applies and measures loads up to 100,000 pounds, and a 400,000 pound arch testing machine of special design, which is at present being used for beam tests.

The work of the department in concrete testing extends over a period of seven years, during which time there has always been some series of tests in progress.

One of the most interesting of the series was that in which reinforced concrete columns were subjected to fire conditions, the entire column being treated to a high temperature under load and then one side of it suddenly cooled by the application of a stream of water.

The beam tests, too, are not only valuable for the engineering data they afford, but are highly interesting to the contractor. The natural axis, or unstressed longitudinal section, of theoretical determination, and experimental data are necessary for the successful use of these beams in structures.

To obtain accurate and useful data of this kind, many tests must be made, and measurements of the most delicate character taken. The work includes, for instance, the measurement of the strain, elongation or compression of the beam at five or six points from top to bottom, when the load is applied, and at regular intervals for some time thereafter.

All tests made in the department are carefully tabulated, and many of the standard figures for the strength of materials which engineers use throughout the country were determined in this laboratory.

City Engineer Macallum, of Hamilton, Ont., will probably make application for the appointment of two additional engineers in his department during the busy season in prospect.



Chateau Laurier, Ottawa—At present about two-fifths of the steel-work is in place. This photograph was taken on January 21st, 1910

Erection of the Chateau Laurier

The Chateau Laurier and the new depot at Ottawa are twin projects of the G.T.R. The accompanying photographs give some idea of the work and rate of progress on the Chateau Laurier. The general contractors for this structure are the George A. Fuller Company,



Chateau Laurier—The scene of operations on Dec. 10th last

of New York. Sub-contracts have been awarded for the iron work to the Canada Foundry Company, and for the steel work to the Dominion Bridge Company. The architects are Messrs. Ross & MacFarlane, Montreal. At the time the larger view was taken, about 1,000 tons of steel had been erected. About 2,600 tons will be used in all.

Cement Roughcast for Walls

The following is a specification clause for this work: All external surfaces of walls, except where otherwise shown on the drawings or described in this specification, to be rendered with a coat of Portland cement and sand in the proportions of one of cement to two of clean sand. The rendering coat is to be at least $\frac{3}{4}$ -inch thick, it is to have a rough surface, and before it is set a mixture of hot lime and fine washed shingle is to be evenly thrown on. The brickwork is to be thoroughly wetted, and the joints raked out before the rendering coat is applied.

It is absolutely necessary that, when carrying out this work, there shall not be the slightest chance of frost; for this would take hold of the hot lime, the shingle would shell off, and the whole be discolored and unsatisfactory, involving the renewal of everything, including the cement rendering. It is therefore better to leave any building ready for rough-casting late in the year to stand through the winter, and do this part of the work the following May or June.

The cement rendering to be left rough means that it is not to be trowelled, and it is advisable for the shingle to be dashed on by the same man or men, as changing the men about will tend to its uneven application. Small gravel is used, none larger than would pass a $\frac{1}{2}$ -inch ring, and, unless it is very clean, it should be carefully washed. It is mixed with the unslaked lime and water in a pail, and turned out fairly sloppy on a banker near the work or on the scaffold. A board held in the workman's hand shields window frames and such like, and the shingle is dashed on from a plasterer's trowel. The result is a creamy white, and is very pleasing, the rough surface of the pebbles breaking up the light. If a more creamy color is desired, it may be obtained by the addition of the requisite quantity, found by trial, of ochre or other dry pigment when mixing the dashing.

It need hardly be said that with the very greatest care a certain amount of splashing takes place upon adjoining woodwork, which should be then cleaned and have its final coat of paint after the rough-casting is finished.

Cement rough-casting without the hot lime has a very sombre appearance, but if such has been executed, and it is desired to finish it with appearance as above, there is no better method than to mix up a hot lime wash tinted as before mentioned, if so desired, and splash it on, not paint it on, with an ordinary whitewash brush.

Rough-casting in this description may be much improved by preparing cement screeds in imitation of half-timbering. These should be first marked out on the wall and put on in cement and sand, one to two, say 6 inches wide and $1\frac{1}{4}$ inches thick, and when quite hard and set, intervening spaces filled in with the rough-cast cement coat and shingle. When setting out the half-timbering, remember what it is intended to represent and do not put the timbers in impossible positions. The cement screeds, or "timbers," should be cleaned down and some time afterwards painted dark brown or black.

Municipal Work at the Federal Capital

Description of the New Waterworks Aqueduct and Wellington Street Viaduct — Level Crossings Unpopular in the Federal Capital

The work now being carried on by the city of Ottawa for the purpose of enlarging its water supply affords several interesting examples of skilful engineering work. For its water supply the city is dependent entirely upon pumps operated by water power. In the suburbs of Ottawa East and Hintonburg, which have recently been added to the city there are small plants



New Waterworks Aqueduct, Ottawa—Rock Excavation.

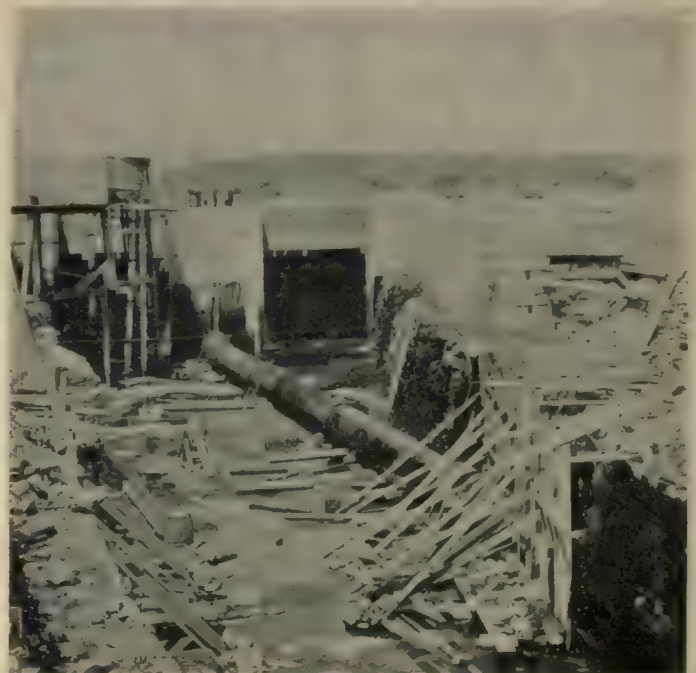
operated, the former by electricity and the latter by steam, which have a capacity of 1,400,000 imperial gallons and 1,600,000 imperial gallons per 24 hours respectively. These plants are held in reserve in case of serious trouble at the main pumping station. A new aqueduct is now being constructed to convey the water from the Nepean Bay to the pumping house, which is to take the place of the old aqueduct, the capacity of which has been outgrown. In the main pumping house there is now installed machinery capable of pumping over 30,000,000 imperial gallons per 24 hours. On account of the growth of the city and also as a result of the construction of the new dam across the Ottawa river above the Chaudiere Falls, which will permanently raise the water levels in Nepean Bay, and thus make the work in the river section more difficult and costly, it was decided to estimate the cost of a new aqueduct and clear water pipe. The estimated cost of the new aqueduct is \$227,700, and that of the clear water intake pipe, \$89,500. The work consists of a cut through solid rock from Nepean Bay, in the Ottawa river, a distance of 2,500 feet to the pumping station, passing under the Canadian Pacific Railway yard, the Sawyer Massey storage building and Ottawa street. The aqueduct is covered and the various tracks, buildings and roadways are upheld by a concrete arch, 2 feet in thickness at the crown. The arch is reinforced by 1-inch square steel bars, spaced 6 inches centre to centre and No. 10 gauge 3-inch mesh expanded metal. There are two sets of stoplogs to control the water at the head, as well as a concrete valve pier to control the water in the intake pipe.

In the lower corner of the aqueduct the clear water pipe is being constructed of reinforced concrete. The pipe is 43 inches in diameter, and extends from the pumping station to the lower set of stoplogs. From there up and across the Ottawa river a 42-inch steel pipe of $\frac{3}{8}$ -inch metal is to be laid to the intake crib. The total length of the clear water pipe from the pump house to the intake crib is 5,500 feet.

A large quantity of rock is at present being removed from the bed of the river in order to lay the pipe. Flexible ball joints will be used where necessitated by the confirmation of the river bed. The work has been under way since September, 1907, and is about one-third complete. The new aqueduct under a 30-foot head, will provide 3,000 horse power. It is 27 feet in width with an average depth of 25 feet. The present aqueduct was built in 1873-74, and owing to the gradual expansion of the city, is too small to furnish power to operate the water works pumps. While the present 40-inch steel intake pipe will supply 16,000,000 imperial gallons every day with safety at low stages of water, that is at present the daily consumption of water.

Wellington Street Viaduct

In the matter of doing away with level crossings the city of Ottawa is well to the front. Wellington street, which is the main thoroughfare leading into the city of Ottawa, is crossed by four railway tracks within less than 1,000 feet, and is the main thoroughfare into the city from the west. The tracks were formerly protected by gates, but owing to teams being caught in between the various gates, accidents were frequent, and on the order of the Board of Railway Commissioners, a steel viaduct 522 feet in length, over the tracks has



Waterworks Aqueduct and Intake Pipe—Showing Concrete Retaining Walls, etc.

Distribution of Sewage in Percolating Filters

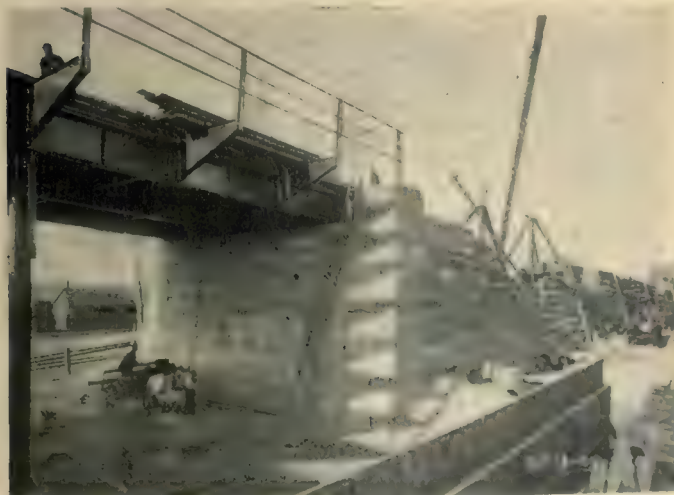
Very little definite information has hitherto been available as to the effect of distribution on filters by different methods, and particularly as to what takes place below the surface of the filter. On this subject we are again indebted to the experts in U.S.A. for details of the results of experiments. Mr. W. G. Taylor, M.Am.Soc.C.E., resident engineer at the sewage disposal works at Waterbury, Conn., contributes a paper to a recent number of the "Engineering Record," in which he shows by graphic diagrams the amount of lateral distribution which takes place below the surface of a filter as a result of the discharge on the surface of a single jet or drop of liquid. It was found that the liquids were more widely diffused in the fine material than in the coarse, and that the area of diffusion did not exceed a circle of 7 inches in diameter with 2-inch stone or 12 inches in diameter with $\frac{1}{2}$ -inch stone. These remarks apply to the discharge from a single fixed jet and they are qualified by a subsequent statement that the normal diffusion is restricted and often annihilated by the inter-action of the diffusion from adjacent jets which causes two or many liquid films to unite into minute streams; and these interrupt to a considerable



Waterworks Aqueduct—Construction under C. P. R. and Sawyer-Massey Building.

been constructed, while the approaches, which comprise masonry retaining walls with earth filling 565 feet in length, are near completion. The steel portion of the work was constructed by the C. P. R. The city built the retaining walls and approaches, as well as laying the creosote wood block paving on tarred plank foundation, and the sidewalks and metal railing. The width of the road is 30 feet, with 8-foot sidewalk on the south side, there being little or no pedestrian traffic on the north side. The cost of the work has been well within the estimate of \$60,000. Land damages estimated at some \$15,000, are still to be settled. The abutments and pedestals supporting the steel viaduct are all in concrete. The cost of the work was divided between the C. P. R., G. T. R., county of Carleton and city of Ottawa.

Mr. Newton J. Ker, city engineer, of Ottawa, is in charge of all the above-mentioned work.



Wellington Street Viaduct, Ottawa—Retaining Wall and Abutment.



Wellington Street Viaduct—Steel Structure.

degree the continuance of diffusion and tend to descend through the remaining material at a higher velocity and along lines of least resistance. Further, it was noticed that this streaming tendency increased as the rates of application were made greater. Among the conclusions the most important is that the desideratum in the application of sewage to percolating filters is to attain perfection in aerial distribution, and that a high efficiency in sub-surface distribution is fostered by a slow continuous rate of application rather than by an intermittent application at a higher rate. This last observation has an important bearing on the opinions of those who consider it desirable to use dosing apparatus on all filters, even when it is not required for the purely mechanical purpose of equalizing the variations in the flow of the sewage.

Mr. Henry Beaumont, architectural sculptor, Montreal, Que., died last week in that city. He was born in 1853 and was the son of Mr. W. M. Beaumont, a prominent contractor of Manchester, England.

The Morrisburg Steel & Plate Company, Morrisburg, Ont., are reported to have assigned with liabilities of about \$500,000. It is expected that the assets will be quite equal to this sum. Efforts are being made to reorganize the company.

Methods and Cost of Concrete Pavement Construction

At the last annual meeting of the American Society of Municipal Improvements, Mr. J. B. Marcellus, City Engineer of Boise, Idaho, gave an account of concrete paving work which his city is carrying out on rather a large scale.

The city had had some previous experience with this type of pavement, as two years before the street commissioner had built a number of concrete sidewalks, and a year ago an alley had also been paved with concrete. The sidewalks had plain surfaces without marks or creases. The crossings were 6 inches to 8 inches thick, 5 feet wide, of a 1:8 river run mixture, and the top was smoothed off with a shovel. These crossings were built exceptionally high, and as a consequence they receive the thumping of everything that crosses them. These crossings show no mark or sign of wear at the present time. The alley was paved in a manner similar to the crossings, except that the concrete was placed in two layers, the bottom layer being a 1:10 mixture and the top a 1:7 mixture. This pavement also has shown no signs of wear. This year it was decided to lay 8½ blocks of concrete pavement on Front street. The street now being paved is parallel to the railway freight yards, where warehouses and the freight depot face the street, as also do the hay market and electric interurban freight depot. As a result, the traffic is slow, but heavy.

The width of pavement is 69½ feet, the reason for this being that on the south side no sidewalk or curb is required because teams drive directly up to the warehouses, and, the street car tracks being laid in the centre, the north sidewalk and curb are narrowed to 10½ feet.

The work is being done by contract and the usual bond for performance and quality of work was entered into, but no guarantee or maintenance agreement was required. The bidder, however, is to protect the city against any claims for infringement of any patented article, invention, arrangement or appurtenance that may be used in connection with this work. The work at the present time is about half completed. The subgrade so far has been good. All of it is being rolled thoroughly with a 16-ton roller. The specifications require all spongy places to be refilled with sand.

All tests of the cement are made by the standard method of the American Society for Testing Materials. A good quality of river sand is being used, very clean, although a little fine, and having 30 per cent. of voids as determined by a number of tests. The gravel is excellent. It consists of crushed granite boulders, up to 6 inches in diameter, porphyry, rhyolite and various other forms of river wash in a mountainous country. These are screened through a 2½-inch mesh screen and grade up well in size. The gravel is obtained from the bed of the Boise river, and is all passed through a jaw crusher to crush the oversize, but, as in all jaw crushers, "flats" or "pumpkin seeds" over 2½ inches in longest diameter will come through. These are easily broken with a 7-pound hammer, and one man, working only a part of the time, keeps most of the pumpkin seeds broken. A number of tests shows the gravel to contain about 40 per cent. of voids.

These materials are mixed in the proportion of 1:3:7, and give a concrete that fills well and which, after thorough tamping, can be smoothed off with a wooden

float. No topping or special mixture is required for the top, the specifications requiring only a uniform surface with no stones larger than ½-inch in diameter to show. Sometimes a mixture of sand and cement is used to level up with if the concrete does not tamp down level, or an unusual number of large stones appear on the surface. The final thickness of the pavement is 8 inches. Two mixers are being used, one run by a gasoline engine and the other by a motor, at a cost of \$22 per month, including moving of connections. Both mixers are small size, but turn out from 30 to 40 cubic yards per day.

Expansion joints of ½-inch are provided at the curbing and at every 25 feet at right angles to centre line of street. These joints are to be filled with paving pitch. At present they are filled with ½-inch dressed boards. After the concrete is set sufficiently it is covered with 2 inches of dirt and kept wet for seven days.

The bid accepted by the Board of Public Works was as follows:

Concrete	per cu. yd.	\$5.29
Excavation	"	.48
Excavation below subgrade	"	.55
Refill below subgrade	"	.85

The gravel and sand cost 80 cents per cubic yard delivered. The cement costs about \$2.75 per barrel f.o.b. Boise. Labor is \$2.50 for eight hours, and teams \$5, although the contractor has sublet the hauling of the gravel and sand at 60 cents per cubic yard. At the contract prices the cost of the pavement will be about \$1.51 per square yard. The other pavements have cost \$2.50 per square yard and upward, so with this difference in price the city can afford to do considerable maintenance.

Each year the Canadian Society of Civil Engineers offers for competition among its student members a number of prizes for the best papers on subjects in any department of engineering. In 1909 all the prizes awarded were taken by students of McGill University, Montreal. Only two were awarded this year, the first being won by Mr. E. S. Heurtley, a student in the Faculty of Applied Science, for a paper entitled "Discussion on One of the Problems of Submarine Cable Telegraphy," and the other by Mr. A. S. C. Trench, a third year student in Applied Science, for a paper entitled "Some Consideration on the Theories Governing Elastic, the Breakdown of Members Subjected to a Compound System of Stresses." In addition to these prizes, the Gzowski Medal was awarded to Ernest Brown, M.Sc., associate professor of Applied Mechanics in McGill, for his paper on "Tests of Reinforced Concrete Beams."

On the National Transcontinental, the G.T.P. east of Winnipeg, 623 miles were added during 1909. The Canadian Pacific built 395 miles and the Canadian Northern, 344 miles. On the western section, the Grand Trunk Pacific has work under way on 438 miles, and surveys have been made for 516 miles additional. East from Winnipeg, Man., work is under way on 1,244 miles. The Canadian Pacific and the Canadian Northern also have a large amount of work projected or under way.

The city of Edmonton, Alta., is facing the best building season in its history. Practically all the trade unions are signed up on agreements covering three years—the carpenters are signed up until 1912; bricklayers until 1912, and laborers until 1914. A total of nearly \$1,000,000, in three-storey buildings alone, is in sight for the season. Several larger buildings will also be erected.

The New Pemberton Block, Victoria, B. C.

A Sample of the Modern and Substantial Buildings now being erected in Western Canada—Interesting Details of Construction

The accompanying illustration conveys some idea of the up-to-date methods employed in the construction of the new Pemberton block, at Victoria, B.C. The structure will occupy an area of 88 feet on Fort street, 188 feet on Broad street and 88 feet on Brougham. It will have basement and six storeys and will occupy 107,575 square feet of floor space. The accommodation provides for 11 stores and 170 offices, 40 of which con-

tion of 1-32 of an inch, and on the second a deflection of less than 1-4 of an inch. Columns were also tested by being subjected to a load of 60 tons. Under it there was not the least indication of settlement.

The owners, Messrs. Pemberton & Son, will be provided with spacious offices on the ground floor on the corner of Fort street and Broad street, in which there will be two specially constructed safety deposit vaults



The Pemberton Block, Victoria, B. C., now in course of construction.

tain large fire and burglar proof vaults. The top floor and part of the fifth will be used solely for the purpose of the Pacific Club. Three elevators are installed in the building which is accessible by two entrances. The substantial construction of this building is a noteworthy feature. The Kahn system of trussed steel and concrete is employed. In this, at the time of writing, 250 tons of steel have been used, 3,700 yards of rock, 1,700 yards of sand and 20,400 sacks of cement. In the construction of the forms, 600,000 feet of lumber have been employed. The excavation for the basement was 12,000 yards.

An interesting test was made of the strength of the building. On a space 19 feet square, were piled 21,707 bricks, giving a total weight of 108,535 pounds, a load of 300 pounds to the square foot. A further test was made by covering another area of the same size with sand to a depth of six feet, giving a load of 550 pounds to the square foot. On the first test there was a deflec-

tion of 1-32 of an inch, and on the second a deflection of less than 1-4 of an inch. Columns were also tested by being subjected to a load of 60 tons. Under it there was not the least indication of settlement.

Mr. C. H. Topp, the retiring city engineer of Victoria, B.C., was recently presented by his staff with a Prussian leather Morris chair and an illuminated address. The latter, which was engrossed by Mr. R. C. Flitton, was quite a work of art. The border included reproductions of the Point Ellice bridge and the Causeway, the two public works which began and ended Mr. Topp's connection with the city which extended over eleven years.

Acting City Engineer Latournell, of Edmonton, has been permanently appointed to the position.

Selecting a Scheme of Sewage Treatment

Principal Factors Outlined by an English Expert—Facilities for Disposal an Important Consideration—The Question of Management

At the annual meeting of the Managers of Sewage Disposal Works (Eng.), Mr. Sidney R. Lowcock, M.I.C.E., contributed a paper on the above subject. Among the factors to be taken into consideration, the author laid down the following:—What was the population producing the sewage and what were their habits and occupations; what was the probable increase in the population to be provided for by the scheme during the period over which the money for its construction could be borrowed; how many baths and w.c.'s there were, or were likely to be in the district, the quantity and quality of the water supply; was there any considerable amount of laundry work done in the district; what proportion did the maximum and minimum rates of flow of the dry weather sewage bear to the average rate of flow, and at what hours did those rates of flow occur; were the works close to the contributing area and was the area hilly or flat; was the sewage brought to the works by simple gravitation or through any parts of the system by inverted siphons in which at periods of minimum flow it became more or less stagnant, or was it pumped; what was the condition of the sewers with reference to subsoil water; was the sewerage of the district on the separate, partially separate, or combined systems; if rain water was admitted to the sewers, did storm water overflows exist?

It was also important to ascertain whether manufacturing waste was admitted to the sewers and if so what was its nature; what proportion it bore to the whole dry weather flow of sewage; whether it was treated at all by the manufacturers, and whether it was discharged at a uniform rate or intermittently. The answers to these questions would probably decide as to whether chemical treatment would be necessary, and also as to the necessity or otherwise of providing equalizing tanks at the works. Then they had to decide how much treatment was necessary, and this depended on the ultimate destination of the effluent. Was it to be passed into the sea or tidal waters, into a large river, a lake, or into a small inland stream, and what was the condition of the water in the river or stream at the point where the effluent was to be turned in, and for what subsequent purposes was such water used? Whatever scheme was adopted the sewage would be screened on entering the works, unless it had been pumped, when, of course, the screens would be at the pumping station, and then passed through detritus tanks. The fall available through the works did not affect these except in so far as emptying was concerned, but for the subsequent treatment it was an important factor.

Discussing the land factors involved, the author said they included the available area and the nature of the surface and subsoil and the question of fall. Broad irrigation demanded a large area of suitable surface with a small fall, while intermittent downward filtration required a suitable surface and subsoil and a fall slightly in excess of the depth to which the land was drained, and in either case the site must not be liable to be flooded by river water. If artificial filters or contact beds were adopted the area available became of less importance and the fall was the dominating factor. If percolating filters were to be used the fall available must

be somewhat in excess of the total depths of the filters, the excess depending on the type of distributor adopted. Where the distribution was by means of surface channels the extra fall required was very small, but the distribution was very bad. With dripping distributors the fall must be somewhat greater. With rotary distributors of a moderate size the head required to work them was about 12 inches for each set of filters, travelling distributors on rectangular filters required about 27 inches head, and fixed spray distributors about 42 inches. If distributors were to be used intermittently the depth of the storage provided for in the dosing tank must be added. The nature of the sewage and the kind and efficiency of the preliminary tank treatment and also the proximity or otherwise of dwellings, factories or roads to the works were factors influencing the type of distribution which could be adopted. The nature of the sewage and the quality of the tank effluent also governed the size of the material to be used in the filters, and in some cases rendered desirable the combination of contact beds with percolating filters or land, or the combination of all three.

The available fall was also a factor in deciding whether humus tanks, sand filters or land could be used as a final treatment after the main filters or contact beds. A factor which very frequently received very little or no consideration at all until the works were in operation and serious nuisance arose was as to the facilities that existed for dealing with and disposing of the sludge. Would the works be in an agricultural district and could they induce farmers to take and dispose of it, or would they have to trench it into the ground, or press it and send it away, or disintegrate it and mix it with refuse and burn it, or dispose of it in some other way? There was also the question of what kind of sludge they would get.

The last and one of the most important factors of all, and one which would appeal to the members of the Association was—what was the supervision and management going to be like when the works were completed? A poorly selected and designed scheme might be made to work somehow by good management, but the most carefully and best designed could be easily ruined by bad management.

Mr. R. McKay Fripp, architect, Vancouver, B.C., recently gave an illustrated lecture in that city under the auspices of the Art, Historical and Scientific Association. His subject was "Architecture, Ancient and Modern." Mr. Fripp dealt with architecture from the earliest history down to the present time. The Egyptian, Grecian and Roman styles were described and the principal features of each described, as well as the origin of some of the leading points. The speaker passed on through the changes and renaissances to the present time and showed the debt of modern architecture to the builders of the past. The lecture was illustrated by a number of interesting slides.

Mr. R. S. Kelsch, Montreal, has been appointed consulting engineer for the Quebec Railway, Light & Power Company.

Trade News from Montreal

Architects a month late on their work—But the Building Trades losing no time—Better Outlook for Civic Contracts

Office of the "Contract Record."
Montreal, February 7th, 1910.

The ordinary quiet mid-winter tone pervades the building supply market in Montreal.

Cement is quoted at from \$1.65 to \$1.75, in small quantities, while the wholesale price remains at \$1.40 per bag f.o.b. cars Montreal. There is practically no movement in cement, and dealers are called upon to fill only small orders. The prices for 1910 delivery are expected to remain at the present figure.

Bricks are not in heavy demand. No. 1 reds, pressed, are worth \$18.50 per M., and red and buff flash bricks are quoted at \$20 per M. Scotch fire bricks remain unchanged at \$23, and English fire bricks are quoted at \$20 to \$21 per M., with the ordinary winter demand.

Dealers make the complaint that architects are more than a month behind on their plans, as compared to a year ago, which means that building operations will be delayed in the fall. Here and there contractors have proceeded steadily with exterior construction work and they have been greatly assisted by the frequent mild spells of weather which have characterized our winter to date.

The joint contractors on the new Windsor street station foundations, have worked continually day and night and as a result have their contract well in hand. The exterior work on the Banque Nationale has been practically completed by the contractors, Messrs. J. B. Pauze & Company, and presents a fine appearance.

The erection of an eight storey building at the corner of St. Gabriel and St. Paul street for Messrs. Duchesneau & Duchesneau, was commenced the last week in December and excellent progress has been made. The building is a reinforced concrete structure with steel frame, and has been rapidly pushed forward by the various contractors. Mr. Joseph Faille has the contract for the stone and brick work; and E. D. Hofeller has the contract for the reinforced concrete work. The Riebling Construction Company had the contract for the fireproofing, while the Dominion Bridge Company supplied and erected the steel work. The building is fireproof throughout, and was designed by Mr. C. D. Dufort, architect, La Patrie Building. It is faced with Roman stone and Milton buffed brick, supplied by T. A. Morrison & Company.

Superintendent Janin, of the Waterworks Department, states that satisfactory progress is being made in the widening of the aqueduct by the contractors Messrs. Quinlan & Robertson. The cofferdam was completed about two months ago, and a portion of the aqueduct drained. The contractors have one steam shovel at work and have excavated about 25,000 yards of earth. They expect to place an additional shovel in operation shortly.

January Building Figures

The figures from the Building Inspector's office for the first month of the year are very encouraging. Seventy-three permits were issued for contemplated buildings or alterations, the registered cost totalling in round numbers \$160,000. In the same period of the previous year 50 permits were taken out, and their value

reached \$120,000, showing an increase of 33 per cent for January, 1910.

Montreal Speaks Plainly

The result of the recent civic elections in Montreal is being received with general satisfaction. The searching investigation of the Royal Commission, completed a short time ago, revealed a condition of maladministration of the city's public works almost incredible, and the sweeping victory of the reform element, headed by the Citizens' Committee, came as an emphatic expression of the citizens' disapproval of such unfaithfulness to public trust.

The new council is composed almost to a man of the choice of the Citizens' Committee, and the famous "23" have been ousted completely. The corrupt dealings of this section of the late council known as the "28," uncovered by the Royal Commission, are perhaps without a parallel in municipal administration. Contracts were unscrupulously let to the various friends of the clique and little regard was paid to the methods of carrying out of these same contracts. To the highest tenderer frequently fell the richest plums. In the construction of public buildings, ordinary building practice was but loosely, if at all, considered. Specifications were not adhered to, and the work was performed in a manner that enabled the grafters to fatten at the expense of the city. The amount of money illegally taken every year by these men from the city treasury was estimated by Judge Cannon in his report at \$1,250,000.

As a monument to the character of work that was carried through under the old regime may be pointed out our No. "18" fire station, a structure that, when completed, hardly complied in any respect with the architect's specifications.

Speaking to the "Contract Record," Mr. Peter Lyall, a prominent worker in the citizens' reform movement, said: "The election has been a great victory and our citizens have responded more heartily than even the most sanguine hoped. The men elected are all good business men and honest citizens, and in their hands I feel that the affairs of the city will be safe. Their efforts for a time will be handicapped. The appropriations for the coming year have practically been arranged for by the outgoing council, but in time a great change will be effected. Proprietors," continued Mr. Lyall, "will reap the largest benefit, but in the general improvement in municipal government, contractors will find their place."

In the future, contractors will be able to submit their tenders on municipal work with the reasonable certainty that they will receive every consideration without the necessity of "buying off" the favor of a member or members of the various committees. Under the old methods, such as have been mentioned, an honest contractor did not feel that there were any inducements for him to tender on the city's contracts. In the future, all transactions will be conducted up and above board and the contractor will have a fair field and no favors. He will find that specifications must be rigidly adhered to, and he will also enter a field where the competition will be keen, but above reproach.

It must not be inferred that every department in the city hall was involved in the recent investigation, for this is far from being the case. There are certain departments in that institution that, in spite of their unhealthy surroundings, have been operated by careful painstaking officials, who have successfully protected the citizens' interests.

Glancing through the work of the sewer department we obtain the following interesting figures concerning the

operation of that section of the city's civic work: From 1905 to 1908 this department, under the direction of Mr. Stuart Howard, laid in all 41,240 lineal yards of sewers. For the carrying out of this work, \$948,400 was appropriated by the council, but the work was completed at a cost of \$827,000, showing a gain to the city of \$121,400. These sewers were completed partly by day labor and partly by contract, and it is interesting to note that in almost every instance the sewers constructed by contract were completed below the engineer's estimated cost of construction.

Our Winnipeg Letter

Office of the "Contract Record."

Winnipeg, Man., Feb. 4th.

Spring work is rapidly opening out and the many plans matured call for an early start—as soon as weather conditions permit. Indications are stronger than ever that the building and contracting lines will have a big year.

Many contractors fear either a shortage of building supplies, or labor, but we believe Eastern Canada and the States can readily fill up any wants we may lack in the West.

Up to the first of the month there was not much building, consequently very little movement in lumber or other material. Whilst the stocks are up to the average, they are not large. Wholesale travellers are just beginning to get out and supply men are ready to buy.

The outlook for the building trade is brighter than ever. There are almost numberless towns in which there is a dearth of houses, and these houses, owing to the urgent demand, will be built the coming season. In these towns the population is ahead of the housing capacity—a condition that speaks highly for the prospective retail trade, as with scores of houses unoccupied the lumberman knows that population must increase before there can be a lively demand for building material in the residential line.

In the older agricultural districts the farmers have not kept pace with their wealth in building, but the newer settlements have done much better.

In many towns the bulk of building has been for large jobs—court houses, school houses, churches, store buildings, public halls and the like—a class of work in which, as a rule, there is small profit to the local builder. In many instances the work is done by outside contractors, and in this case the competition is so sharp that a reasonable profit to the man who sells the building material is rarely expected.

The outlook is very bright and we are on the eve of pronounced prosperity. Our estimate for the year's work in and around Winnipeg is over \$15,000,000 in construction work. In fact, we have prepared a list of over \$20,000,000 worth of proposed and prospected work in Winnipeg alone.

Forecast of Building Inspector Rogers

More men are working on construction at the present time in Winnipeg than in any previous year in the mid-winter season. This is the statement of Building Inspector Rogers. Building operations went on steadily all through January. The permits granted last month were much more numerous than those issued in January, 1906, the banner building year in Winni-

peg's annals. However, the total value of the permits issued in January, 1906, was slightly greater than the value of the permits issued last month, the respective totals being \$203,650 and \$180,900.

"It looks like the biggest building year Winnipeg has ever had," states Mr. Rodgers. "January passed expectations and would easily have beaten January, 1906, but for the fact that I had to turn down several applications for tenements which did not comply with the new by-law. These will come in next month, and the rush will get under way in March."

An Expensive Bit of Folly

A quarrel between two employees of the Winnipeg city asphalt plant, which took place in the year 1900, has since cost the city approximately \$60,000 to straighten out. This has been for repairs on work improperly done at that time. In the year 1900, there was a quarrel between the foreman in charge of the asphalt plant and the man who was in charge of the street gang. In order to discredit the man who was looking after the laying of the material in the streets, the man in charge at the plant overheated the asphalt to such an extent as to destroy its adhesive qualities. The result has been that the pavement will not wear properly, and each year the city has been put to a heavy bill of expense for repairs. The surfacing material would crumble under the impact of the shoes of horses, and would then wash or be swept off, leaving nothing but the binding coat or concrete base. Thousands of square yards of asphalt have been relaid, and there is still a considerable area to be looked after.

Engineer of Construction Astley presented a recommendation to the board regarding repairs to asphalt. He pointed out that wherever any defect in the roadway, due to the sinking of the curb or sub-base of the roadway was discovered, it was most economical to attend to the repairs at once, rather than wait till trouble developed. Frequently the washing away of the earth from beneath the curb had caused a considerable sinking, in which the concrete road base had been broken off.

Mr. M. J. Butler's Successor

Mr. A. W. Campbell, Deputy Minister of Public Works for the Province of Ontario, has been appointed to the position of Deputy Minister of the Department of Railways and Canals to fill the vacancy caused by the resignation of Mr. M. J. Butler. The new deputy minister will assume his duties on February 5th. Mr. Butler will continue for a short time in an advisory capacity. Mr. Campbell will also be chairman of the Board of Management of the Intercolonial Railway. The salary he will receive will be the same as that of other deputy ministers, namely, \$5,000. No appointment has yet been made to the position of Chief Engineer of the Department of Public Works, which Mr. Butler also filled. A biographical sketch of Mr. A. W. Campbell appeared in our issue of January 19th.

The steel work on the legislative wing of the new Parliament Buildings at Edmonton, Alta., has just been completed. During the past few weeks the steel construction gang has been rushing the beams into place, with the result that the skeleton of the entire building is now almost completed. The last beam on the dome of the legislative wing was placed in position ten days ago. It is the expectation that this wing will be completed in time for occupation by the Provincial Legislature in January of next year.

Ottawa Exchange Doing Excellent Work

The Ottawa Builders' Exchange held their second annual meeting on Jan. 27th, in their rooms at 201 Sparks street. It was a very successful and enthusiastic meeting, and was well attended. Various matters pertaining to the building trade, and to the city generally, were referred to in the report of the directors and by the president in his address. The past season having been such a busy one for the builders, contractors and supply men, a lively interest prevailed. The directors



Mr. George A. Crain, who was re-elected President of the Ottawa Exchange.

were pleased to report the absence of strike or labor troubles during the year just ended. The Uniform Form of Contract, which was framed last season for general use in the city, has been put in printed form, and is receiving the attention of the builders and architects.

The election of officers for the ensuing year resulted as follows: President, Geo. A. Crain (re-elected); 1st Vice-President, August Boehmer; 2nd Vice-President, J. Thorpe Blyth (re-elected); Treasurer, James Ritchie. The directors will elect their secretary at their first meeting.

The annual meeting of the Canadian National Association of Builders, which will be held in London, Ont., on the 8th and 9th prox., will be attended by the following representatives of the Ottawa Exchange: Geo. A. Crain, president of the Association; T. D. MacFarlane, director for the Ottawa Builders' Exchange; August Boehmer, Hugh Pell, W. G. Adamson and D. J. MacKenzie, secretary.

The second annual meeting of the Builders' and Contractors' Association of Essex, held in Windsor, Ont., on Feb. 1st, disclosed, generally, a most satisfactory state of affairs. The Association is doing good work in this section of the country and is developing in a most gratifying manner. Regular meetings are held on the first and third Tuesdays of each month, and much interest is taken in the work. The election of officers resulted as follows: President, L. B. West; Vice-President, U. J. Doumachille; Financial Secretary, Geo. C. Haugh; Recording Secretary, Geo. W. Freeman; Treasurer, Robt. Parker. The executive board is composed of these officers with the addition of Messrs. Robert Paddon and A. A. Little.

Canadian City Engineers

MR. T. HARRY JONES, Brantford, Ont.

The subject of this sketch is an old Brantford boy, having been born in that city in the year 1856. In 1853, when the County of Brant was divided from the Gore district, his father, Stephen James Jones, was appointed judge of the county, holding that position for over 40 years.

Mr. Jones graduated in civil engineering at McGill University in 1877. Among his classmates at that time were Messrs. P. D. Ross, R. B. Rogers, Willis Chipman and the late W. McLea Walbank.

In 1878, Mr. Jones was admitted to practice as a Provincial and Dominion Land Surveyor. In 1880 he formed a partnership with F. H. Lynch-Staunton, of Hamilton, and for two years was engaged in Government surveys in the Northwest. In 1883 he began the practice of surveying and engineering in the city of Brantford, acting as city engineer, and as engineer for several townships in the County of Brant. In 1893 he was appointed City Engineer of the city of Brantford, which position he still fills.

As City Engineer, Mr. Jones had charge of the construction and extension of the Brantford waterworks and sewerage systems. Some 12 years ago, Mr. Jones designed and constructed extensive flood prevention works in the city of Brantford, including the widening and



Mr. T. Harry Jones, B. A. Sc., Mem. Can. Soc. C.E., City Engineer of Brantford, Ont.

deepening of the river channel, the lengthening of the bridges, the construction of a sluiceway dam, and the building of about three miles of dykes. Mr. M. J. Butler, C.M.G., the retiring Deputy Minister and Chief Engineer of Railways and Canals, was consulting engineer on this work.

The work in the City Engineer's department last year amounted to \$230,000. During the past two years the city has expended \$300,000 on pavements and sewers. For the past 20 years the city has constructed its sewers and concrete sidewalks by day labor, and at the present time the concrete foundations and curbs for the pavements are constructed by the city at a much

lower rate than they have been able to secure by tender. (This should provide some of our contracting friends with food for reflection.)

Mr. Jones has been engaged as engineer in arbitrations for the corporations of Brockville, Peterborough, Guelph and Stratford, and by the Ontario Government as commissioner for the purpose of making a survey of Burlington Beach and the adjustment of the respective rights of the settlers and the city of Hamilton. He is a member of the Canadian Society of Civil Engineers and one of the charter members and past presidents of the Association of Ontario Land Surveyors.

That the City Engineer of Brantford is imbued with the military spirit is not surprising, his grandfather having fought at Queenston Heights and his father having been adjutant in the Gore Militia. While at McGill, Mr. Jones was a member of the University Company of the Prince of Wales' Rifles. In 1883 he took a three months' course in the military school at London, Ont., there obtaining a first class certificate. He joined the Dufferin Rifles of Canada during the same year, and rose to the rank of senior major in that battalion, retiring in 1894 with this rank. On the organization of the Corps of Guides, Mr. Jones was appointed Sub-District Intelligence Officer, serving for five years in that corps with the rank of captain.

Sixty Years an Architect

Mr. F. X. Berlinguet, who, by reason of his extended association with the architectural profession, was the guest of honor at the banquet held in connection with the Nineteenth Annual Convention of the P.Q.A.A., was born in 1827, and was a son of Thos. Berlinguet, an architect and sculptor. He served his apprenticeship



Mr. F. X. Berlinguet, the Father of the Architectural Profession in Canada.

under his father, in collaboration with whom he designed many fine churches and public buildings. On the occasion of the visit of H.R.H. the Prince of Wales, in 1860, he received a prize and medal for a wooden statue prepared for the Church of Beauport. In 1869 he obtained the contract for the construction of four divisions of the

I.C.R., a distance of eighty miles, the largest contract given in this undertaking.

In 1874 his plans for the Quebec harbor attracted much notice. Mr. Berlinguet afterwards served in the capacity of executive architect for the Federal Government and as official arbitrator for the province of Quebec. In 1880 he prepared plans for the Hotel Dieu at St. Basil, N.B. Later on he was awarded second prize for a plan for the Provincial Parliament Buildings at Toronto. In 1881 he submitted designs for the new Quebec bridge. In 1890 he was one of the promoters of the A.A.P.Q. It is interesting to note that Mr. Berlinguet was one of the first men connected with the construction of the Quebec bridge. In 1896 he associated himself with Mr. R. P. Lemay and continued with him for seven years.

In spite of his four score years, Mr. Berlinguet still takes an active interest in the work of the profession. At the banquet recently held in his honor, he expressed himself deeply sensible of the honor paid him and appeared to be much moved by the demonstration of his younger confreres.

Principles of Plumbing Ventilation

Nature makes a wonderful provision for creating a constant circulation of the air, which is natural ventilation. To this, plumbing supplies a number of important aids, by the adoption of which one is enabled to materially guard against the evils which flow from the lack of proper ventilation. Plumbing ventilation is that part of the general drainage system whose duty is to carry off to the outer atmosphere any gases of putrefaction formed or confined within the system, to prevent back pressure, or vacuum on the trap seals, or the entrance of sewer air into the building, says "Shoppell's."

Many scientific examinations of the air found in sewers has established the fact that no distinct gas which can be properly called "sewer gas" exists. The gases found in sewers vary with the quality of the matter confined within them and fermenting. The most dangerous of these gases is sulphuretted hydrogen, which is a product of the putrefaction of organic substance containing sulphur, and is one of the causes of the sickening odor of drains. Its gaseous state is not permanent.

Although a drainage system is usually open to the atmosphere it may not always follow that the normal pressure of the atmosphere is maintained. When fluids are in motion, or the flooding of a sewer causes back resistance, the pressure in the various parts of the system will vary. Any part of a system subject to pressure greater than the atmosphere is called a plenum, and any part subject to a pressure less than that of the atmosphere is called a vacuum. In house ventilation it is quite as necessary to secure thorough distribution of fresh air as to provide an outlet and inlet, and foul air should be well mixed with that which is pure. Three general results follow the changes in atmospheric pressure, the increase in the draft of the chimney, a back draft, or the reversal of currents, and the increase of evaporation, all of which are a menace to health. It is to obviate these that plumbing ventilation is resorted to.

In plumbing ventilation there are two methods of producing circulation of the air, called the natural and the forced draft systems. The natural method is caused by the difference of temperature between inlet and outlet, and the currents move at very moderate velocities. The forced draft method is placed in operation by mechanical means, and any direction or required velocity

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can be obtained for the currents. Heat is the great moving power of air, and the heat from the fireplace or heater is utilized. Usually a chimney is used for the duct, and its construction is of great importance. It should be smooth, preferably of vitrified pipe, circular and of the same diameter throughout its entire length. A separate flue, made of vitrified pipe, should be used for seat or local ventilation, as its interior is smooth and frictional resistance is less than when laid with brick or square flues. Even when no fire is burning, a chimney plays an important part in ventilation, as the air in an inhabited building is usually warmer than that outside, and it will generally be found that an upward current is moving.

With drainage ventilation, the object is to prevent the foul sewer air from entering the building through traps, by preventing back pressure and deodorizing the drain currents by allowing fresh air to flow through the entire system. One system is to disconnect the sewer from the building by inserting a trap on the main drain, with an inlet pipe near it opening to the outer air near the ground level. This will allow the heavier, or cooler air, to enter and crowd out the lighter, producing a continuous inward and upward air current, and deodor-



"A new arrival Your Majesty, who says he was a building contractor on earth."
"Ha! ha! Put him in one of the cells marked 'absolutely fireproof' and let it burn slowly."

izing the entire pipe system. Another method provides the intercepting trap, but takes the fresh air from near the eaves, or below the outlet of the soil pipe extension, and well away from windows, skylights or ventilating shafts. The natural method emits the trap on the house drain, allowing the current of warm air to rise from the sewer and discharge above the building.

Foul drain air will not always flow in the same direction, as the density of the air in the system, compared with that of the outer atmosphere, may differ to such an extent as to cause a reversal of currents, or water flowing down the vertical stacks or through the drains, may force it into the sewer or through the fresh air inlet. To prevent either vacuum or back pressure, an auxiliary pipe is attached to the branch pipe, just in front of the trap outlet. This will prevent air being forced through the trap seal in either direction. With this arrangement there is no compression of air, but a natural and simple circulation throughout the whole system.

When practicable, ventilation pipes or soil and waste pipe extension should run beside a heated flue. The result of being placed in this position will be the rarification of the drain air, causing it to rise and assist naturally in ventilating the entire system.



LEGAL DEPARTMENT

Information for this Department is requested from Architects, Engineers, Contractors and Builders. Send in the particulars of recent cases in which you were interested giving the main facts tersely.

Finality of Architect's Certificate—Judgment for \$1,470, the full amount of their claim, was recently given Charles and George Smallwood, contractors, Toronto, against one Charles W. Powell. The defendant owns lots 32 and 33 on St. George street, Toronto, and signed a contract with the plaintiffs to do the excavating, masonry, brick and concrete work on a house and stable he wanted erected on the property. The contract called for \$5,895. Mr. C. J. Gibson, the architect, was to supervise the work. Mr. Gibson, the plaintiffs claim, had the power to order extra work, which he did, to the amount of \$105. He also issued a final certificate on December 18, 1908, stating that there was a balance due the contractors of \$1,270, and on April 30th a progress certificate, entitling them to \$200 more. The defence claimed that the architect had no right to order the extra work or issue the certificate, and also entered a counter-claim asking that the work be done over again, as most of it was done poorly. His Lordship thought that the architect was perfectly within his rights, and gave judgment for plaintiffs accordingly.

Mechanics' Lien Case—A judgment of some interest in a mechanic's lien case has just been rendered in the British Columbia court by Judge Lampman in *Sheritt v. McCallum*. One, John Young, agreed to build a house for the defendant at Foul Bay, the plasterer "to make good all defects and make good after other tradesmen have finished." Plaintiff was sub-contractor for the plastering and completed his work on July 14th last. On applying to Young for his money, \$160, the latter told him he had thrown up the job. Becoming unable to complete his contract, Young had abandoned it, and McCallum finished it by day labor. On July 30th, Sheritt gave notice of a lien, but did not file it within 31 days after the completion of his work, as required. Instead, he endeavored to get on the premises to do some touching up after the other tradesmen, but plaintiff's foreman would not allow him on. On August 25th he got in and did four or five hours' work, and subsequently took the present action. Judge Lampman held that plaintiff was a trespasser on August 25th, and had express notice that he was not wanted to do any more work. The circumstances showed plainly that he was not making a bona fide attempt to complete his contract, but was instead trying to manufacture a lien, and his action must, therefore, be dismissed with costs.

Mr. Victor D. Horsburgh, A.R.I.B.A., of Edinburgh, Scotland, who has been appointed supervising architect to the Dominion Realty Company, Limited, has arrived at Toronto, the headquarters of the company. Mr. Horsburgh was the successful candidate out of over 500 applicants for the position.

Building permits issued at Strathecona, Alta., during 1909 amounted to \$572,330, as against \$121,525 for 1908. City Engineer McLean looks for a large increase this year.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.

Tenders will be received until February 25th for cast iron pipe, valves, hydrants, specials, etc., for the proposed waterworks extension. H. E. Gillis, City Clerk.

City Engineer Childs is preparing plans for a trunk sewer and septic tanks to cost \$800,000.

Edmonton, Alta.

Tenders will be received by the City Commissioners until February 19th for the supply of lead pipe, galvanized iron pipe, black iron pipe and brass goods for the year 1910. Specifications at Waterworks Department, corner Rice street and McDougall avenue.

Kingston, Ont.

Owing to the discovery of leaks in the intake pipe at the Kingston waterworks the municipal committee is taking steps to install a new pipe.

Moose Jaw, Sask.

At the meeting of ratepayers on the 3rd inst., it was decided to take up the matter of street paving.

New Glasgow, N.S.

The city council is again considering plans for increased water supply at an estimated cost of \$175,000.

Nanaimo, B.C.

Tenders will be received up to the end of the current month for the supply of vitrified clay pipes required in connection with the sewerage of the city. Specifications and particulars can be obtained of Allan Waters, City Engineer.

Point Grey, B.C.

The municipal council are advertising for tenders until March 9th for the purchase of roads and sidewalks bonds. For road purposes \$300,000 of five per cent. 50-year are to be issued, and for sidewalks, \$25,000 of five per cent. 25-year.

Quebec, Que.

The civic committee has recommended the issue of \$235,000 debentures: \$200,000 for permanent walks and \$20,000 for waterworks extensions.

Sweetsburg, Que.

A bylaw was passed recently to raise \$9,000 debentures for the purpose of installing a water system or aqueduct and reservoir.

Toronto, Ont.

Tenders are being called until February 22nd by the Board of Control for a 42-inch hydraulically operated stop valve. For further particulars see advertisement in this issue.

Vancouver, B.C.

Tenders addressed to W. McQueen, city clerk, will be received until February 23 for supply of galvanized iron pipe and

brass for waterworks department. Specifications at waterworks office, city hall.

AWARDED.

Hamilton, Ont.

The Board of Control has awarded to the London Brass Company the contract for the brass work for water mains at \$3,000. Chadwick Bros., a local firm, tendered at \$3,447.

Toronto, Ont.

The following contracts for sewers have been awarded by the city council: Algonquin avenue, Keele street to Indian road, John F. Connolly, \$687; Baker street, Clinton avenue to west end, John F. Connolly, \$1,439; Breadalbane street, St. Vincent street to first lane east of Surrey Place, Page & Britnell, \$496; Clinton avenue, Lawton avenue to 588 feet east of Oriole road, John F. Connolly, \$1,257, the lowest; Duggan avenue, Lawton avenue to west end, John F. Connolly, \$1,531, the lowest; Garden avenue, Keele street to Sunnyside avenue, John F. Connolly, \$1,697, the lowest; Geoffrey street, Keele street to Indian road, John Maguire, \$948, the lowest; Glendale avenue, Garden avenue to Wright avenue, John Maguire, \$1,054, the lowest; Gordon avenue, Clarence avenue to north end, J. H. McKnight Construction Company, \$199, the lowest; Gormley avenue, Lawton avenue to west end, Page & Britnell, \$2,000, the lowest; High Park Boulevard, Keele street to Sunnyside avenue, John F. Connolly, \$1,435, the lowest; Indian road, G. T. R. to Geoffrey street, John F. Connolly, \$4,487, the lowest; Keele street, G. T. R. to Geoffrey street, John F. Connolly, \$6,787, the lowest; Lawton avenue, Heath street to north city limit, John F. Connolly, \$3,582, the lowest; Westminster avenue, Keele street to Indian road, John F. Connolly, \$1,124, the lowest; Wright avenue, John F. Connolly, \$1,258, the lowest.

Weston, Ont.

The Canada Foundry Company have, by this municipality, been awarded the contract for hydrants, steam nozzles, street sprinklers, cranes, and gate valves for the new waterworks.

Railroads, Bridges and Wharves

Como, Que.

The ratepayers will vote on a by-law to issue \$30,000 road and bridge debentures.

Edmonton, Alta.

It is stated that no provision has been made in supplementary estimates for East End bridge.

Montreal, Que.

As a result of a conference between Mr. William Whyte, second vice-president C. P. R., and Sir Thomas Shaughnessy re appropriations for Western Canada, the following projected lines and mileage are reported: Regina to Griffin, 73; Regina to Bullock, 50; Outlook to Macklin, 147; Regina to Colonsay, 110; Weyburn branch west, 25; from Langdon into irrigation belt, 62; addition to extension north from Kipp, 30; Kootenay Valley line, 20; total, 517; this

with bridges at Outlook and Edmonton constitute the year's policy. Noted previously.

Ottawa, Ont.

The Ottawa, Montreal & Eastern Railway Company has been incorporated to build a line from Lake Megantic through the intervening counties, crossing the St. Lawrence to Montreal at Longueuil, thence to Ottawa. The company is also given power to construct a bridge or tunnel across the St. Lawrence at Longueuil. The work must be started within three and completed within seven years.

Palmerston, Ont.

It is understood that the Grand Trunk intend to erect a new roundhouse of a permanent character here.

Port Arthur, Ont.

It is stated that the work will be begun in the immediate future on the construction of a new bridge across the Neebing river.

St. Catharines, Ont.

Plans for the high level bridge over the old Welland canal were submitted by the promoter of the company, Ald. Dr. Merritt, at a meeting of the Board of Trade on the 9th inst. Cost, \$150,000. The bridge will be built this year. Estimates from contractors and bridge builders have been obtained, and all the preliminaries arranged. Noted in issue of February 9th.

Strathcona, Alta.

Ratepayers of this city voted in favor of giving \$50,000 as their share of the C. P. R. high level bridge connecting the city with Edmonton.

Sydney Mines, N.S.

Tenders addressed to A. W. Campbell, Chairman, Government Railways Managing Board, Ottawa, Ont., will be received until March 15th for the construction of a line of railway between George's River and Sydney Mines, N.S., a distance of 9.00 miles. Plans, etc., at the Station Master's office, Sydney Mines, N.S., and at the Chief Engineer's office, Moncton, N.B.

The I. C. R. is also calling for tenders for a line of eight miles between Chatham and Nelson, N.B., and for the construction of buildings on the Elmira branch, P.E.I.

Toronto, Ont.

The Temiskaming & Northern Ontario Railway Commission are calling for tenders for grading of their railway between M.P. 60 and M.P. 61. For further particulars see advertisement in this issue.

Weyburn, Sask.

Work is expected to begin on the enlarged shops on April 1st.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until February 21st for supply of labor and materials required in the erection of pile trestle bridge over Omand's creek, Portage avenue. Plans, etc., at office of City Engineer. M. Peterson, secretary.

Walkerton, Ont.

The County of Bruce have sold \$20,000 bridge debentures.

York Mills, Ont.

Tenders will be received at the Department of Public Works, Fredericton, N.B., for rebuilding York Mills Bridge. Plans, etc., at office of above and at office of T. Robison, M.P.P., Harvey station, York Co., N.B., and at Local Government Rooms, 4 Church street, St. John, N.B. John Morrissey, Chief Commissioner.

AWARDED.**Fort William, Ont.**

J. J. Flanagan has started construction on the new city dock which is to be constructed on the Kaministiquia river at the foot of McVicar street. Contract price, \$8,000, while the city will spend an additional \$4,000 in permanent improvements. The dock is to be completed by the opening of navigation.

Toronto, Ont.

The contract for the double tracking of the Temiskaming & Northern Ontario Railway between Cobalt and North Cobalt has been awarded to Mr. R. J. McGarr. The work will be commenced at once.

Public Buildings, Churches, Schools, etc.

Eurnaby, B.C.

The parishioners of St. Alban's church (Anglican), have decided to undertake the building of a rectory. P. R. Brown, Edmonds street, is interested. Rector, Rev. David Dunlop.

Chatham, Ont.

Tenders have been called for all trades in the erection of a stone, brick and frame school building on 4th concession. J. L. Wilson & Son, architects, this city.

The Y. M. C. A. have an option on a central location for a building here. When the required \$2,000 has been raised the work on the construction will be started.

Edmonton, Alta.

It is stated that the Salvation Army will shortly close on the purchase of a large block, where the intention is to erect an armory during the summer, their headquarters for Northern Alberta. Mr. Travis Barker, of this city, is interested.

Fort William, Ont.

A movement has been inaugurated to build a general hospital for this district on the Canadian Northern Railway.

Hull, Que.

Plans and specifications have been prepared by the city engineer for the two new fire stations. They will be considered by the council next week.

Hamilton, Ont.

The Joint Court House Committee has approved the plans for the new registry office and instructed County Clerk Jardine to advertise for tenders at once.

Kenora, Ont.

We have been informed that the completion of the Court House will be performed by day labor. Noted in issue of January 19th.

Kildonan, Man.

A bylaw will be submitted to the ratepayers on March 12th on the question of a new school building.

London, Ont.

City Architect Nutter has submitted plans for the Colborne street school, which were approved in the main.

Ladysmith, B.C.

The plans for a new lodge building for the society of the Knights of Pythias of New Westminster, are under way. The area to be covered will be probably 60 by 100 feet, and the building will be two, and perhaps three storeys in height. It is hoped with government aid, to start work on the building of the new hospital this spring.

Montreal, Que.

The Montreal Art Association has decided to take over the Holton property on Sherbrooke street, where in the near future large galleries will be erected. Annual meeting in a few days. Dr. F. J. Shepherd, 152 Mansfield street, president. J. Abbott, secretary. Competition in plans is said to be favored.

The Board of Protestant School Commissioners have accepted the plans submitted by Architect A. F. Dunlop, for the William Dawson School, which is to replace the Berri Street School. In all seventeen designs were submitted. The new school will be fireproof throughout and will be heated from a separate building erected for that purpose. Mr. Dunlop is also instructed to prepare plans for a new school building to be erected on Sanguinet street to replace the Belmont street school.

It is understood that in the near future the sisters of the Hotel Dieu will undertake the erection of a new hospital. Estimated expenditure \$100,000.

A. F. Dunlop, Lindsay Building, is preparing plans for the extension of the Earl Grey school building, to double its present capacity.

The trustees of the public school board of Rosemount, Que., will erect a school building during the present season. Mr. A. F. Dunlop, architect, Lindsay Building, is preparing the plans, for same. The building will be approximately 65 feet by 65 feet and provision will be made for extensions at a later date.

Nakusp, B.C.

The Masons, here, intend to erect a hall, towards the cost of which \$1,000 have already been subscribed.

New Westminster, B.C.

The erection of a \$25,000 Y. M. C. A. building will be started shortly.

New Liskeard, Ont.

A new opera house is to be built here on Armstrong street by Mr. M. Abraham at a cost of about \$9,000.

North Sydney, N.S.

Tenders for the construction of the new Catholic church on Archibald avenue, will be received until February 22nd. Plans, etc., at the house of the parish priest, W. F. Kiely.

North Vancouver, B.C.

The foundation for the proposed Knights of Pythias' Hall, to be built at the corner of 4th street and Chesterfield avenue will, it is expected, be commenced by the first of April.

Owen Sound, Ont.

Mr. J. S. Russell, of Stratford, is the architect for the West Side Methodist Church, and he has designed a very handsome and commodious building. The church will be built of brick, with stone trimmings.

Ottawa, Ont.

The Library Committee of Parliament is considering the erection of a second library building for the Government Library, at this city. Plans have been prepared by Public Works Department.

It is probable that a new Roman Catho-

lic church will be erected in the Glebe, and also a mission in the southern portion.

It is announced that work will likely be started in the early summer on the new Government block, on Sussex street.

Peterborough, Ont.

Dr. R. Bruce Smith, the provincial inspector, has condemned the Protestant home.

Prince Albert, Sask.

It is reported that Superintendent Dickinson, of the Penitentiary Binder Twine Department, will, with a number of convicts, assist in the construction of the new penitentiary here.

Phoenix, B.C.

The School Board is sending a largely signed petition to the provincial government asking for a grant of \$10,000 toward the building of a new school.

Prince Rupert, B.C.

The new post office building will be begun this summer with a preliminary appropriation of \$50,000.

Portage la Prairie, Man.

The ratepayers will be asked to vote on a bylaw authorizing the borrowing of \$20,000 for 25 years, at 5 per cent. for the purpose of paying for the erection and furnishing of a new four room solid brick school, with full basement, in the north ward of the city.

Revelstoke, B.C.

It is reported that the Sisters' hospital will be commenced this year. There will be a convent and school associated with it. Seventy thousand dollars are said to be available for the building.

Sinclair, Man.

W. A. Elliott, architect, Brandon, has completed arrangements for drawing plans for a new school here.

St. Catharines, Ont.

Tenders will be received until February 21st for all trades required for the erection of a public school building for school section No. 3, Niagara Township. James Craise, secretary-treasurer, Niagara-on-the-Lake. A. E. Nicholson, this place, architect.

Smith's Falls, Ont.

Plans have been prepared for a new hospital, which when completed will cost \$30,000.

Stratford, Ont.

Tenders have been called for the different trades required for the erection of an addition to the General Hospital. T. J. Hepburn, architect. W. Preston, Chairman Hospital Board.

Sudbury, Ont.

Tenders are being received until February 22nd for painting, tinting and decorating the interior of the Presbyterian church. S. E. Wright, secretary.

Saskatoon, Sask.

Tenders will be received by J. D. Ferguson, this city, for the complete erection of a business block. Plans, etc., at Builders' Exchange, Winnipeg, after 14th inst., and also at the office of the architect, W. W. LeChance, of this place.

Trill, B.C.

The Board of Trade is asking the provincial government for a \$10,000 appropriation for a new school building.

Toronto, Ont.

An extension to cost approximately \$65,000 will be made to the Church of Our Lad

of Lourdes, Sherbourne street. Plans have been prepared by Architect J. P. Hynes, 199 Yonge street. Tenders will be called for in March.

The announcement has been made that a new Roman Catholic seminary is to be erected in Toronto archdiocese for the final training of young priests. The donation of \$150,000 by Mr. Eugene O'Keefe, for this purpose, leaves an additional \$100,000 to be raised. Rev. Father Whelan, rector of St. Michael's Cathedral. Mr. Holmes, architect.

Having passed the plans for the new wing at the Isolation hospital, the Board of Control have decided to advertise for tenders for its construction. The estimated cost is \$102,000.

An amount will be placed in the estimates of the Superintendent of Buildings for the enlarging of the Humber College Institute. The Property Committee of the Board of Education decided also to recommend the erection of a new building on the Manning avenue site. The advisability of making changes in York Street school, or of building a new school on that site, was referred to Mr. Bishop.

Tenders are being called for the various works on Bonar Presbyterian Church. Architect, A. M. McKenzie Brydon, 30 Toront street.

Dr. George H. Locke, Chief Librarian of the Toronto Public Library, is in favor of establishing a branch library down town. He says if the city gave the site, the Library Board could finance the building. His proposition is to have a plain four-storey building.

The Canadian Order of Foresters have obtained a building permit for their hall at 20 and 24 College street, \$50,000.

E. J. Lennox, Bay street, has submitted his plans for the west wing of the Parliament Buildings. By them, it is proposed to raise the walls of the west wing of the building four feet, which, with the wall already in place, will provide another storey in the building, where forty offices can be provided. It is understood that directly that work is finished the east wing will be remodelled, made fireproof, and probably raised four feet to conform with the west wing. The cost of providing the forty additional offices in the west wing would be thirty or forty thousand dollars.

Victoria, B.C.

Ratepayers have passed a \$184,000 school bylaw.

Time for receiving tenders for the new Y. M. C. A. building is extended to the 18th day of February, 1910. H. S. Griffiths, architect, 1006 Government street, Victoria.

The James Bay Athletic Association Club at their annual meeting discussed the proposition for a new building. President, H. D. Helmecken, K.C.; secretary-treasurer, V. K. Gray.

Vancouver, B.C.

It is stated that the Metropolitan Building Company have on hand the construction of new club premises. The Terminal City Club, of which R. L. Reid, K.C., is a member, is interested.

The Victoria Order of Nurses are planning to erect a new home if a suitable site can be secured. Mrs. Burnett, secretary, 801 Burrard street.

Watford, Ont.

Tenders for remodelling school buildings in S.S. No. 17, Warwick, will be received until March 1st. For further particulars address E. Doan, secretary, this place.

Welland, Ont.

Tenders addressed to A. Asher, secretary Board of Managers, will be received until March 4th for the erection and completion of a Sabbath school building in connection with the Presbyterian church, and also certain modifications in the present church.

Winnipeg, Man.

The addition to the Anglican church, at Fort Rouge, will be rushed to completion with all possible speed when spring opens. The foundation has been already laid and some other work done. Estimated cost, \$10,000.

It is stated that two, instead of five, fire halls will be constructed this year; one at the corner of Burnell street and Sargent avenue, and one at the corner of Pritchard avenue and Sinclair street.

Yorkton, Sask.

R. H. Lock, secretary-treasurer, offers for sale \$40,000 school debentures.

AWARDED.

Hamilton, Ont.

The Board of Education have awarded to the J. Hoodless Furniture Company the contract for the seating of Barton street school, \$2,100.

Montreal, Que.

Eugene Payette, architect, 15 St. James street, has awarded the general contract for the erection of a Roman Catholic cathedral at Haileybury, Ont., to V. Ladouceur, general contractor, Ottawa, for the sum of \$90,000.

Sydney, N.S.

The contract for the new St. Andrew's Presbyterian Church has been awarded to Rhodes, Curry & Company, Amherst, N.S., the price being \$42,000. This figure is exclusive of the seating and other fittings. The church will be of either pressed brick or Scotch fire brick, with stone trimmings, and will seat 1,200 people. Total cost when completed, will be in excess of \$50,000. Curry, & Sparling, 9 Yonge street, Toronto, architects. Noted in issue of December 29th.

Toronto, Ont.

Hall & Dillery Electric Company, Toronto, have been awarded the contract for the electric fixtures and wiring in the additions and alterations to the Toronto Armories.

Residences

Brandon, Man.

Architect Sinclair is preparing plans for Contractor Bullock for the large apartment on Lorne avenue, corner of Seventh street. Building operations will commence as soon as spring opens. Estimated expenditure, \$100,000.

Hamilton, Ont.

M. Webb has a building permit for ten brick houses at the corner of Burlington and Hughson streets, for E. Kent, to cost \$15,000.

Montreal, Que.

Eugene Paquette, architect, 15 St. James street, is preparing plans and specifications for alterations to house on St. Denis street for Dr. L. Masson. Tenders will be invited in about two weeks' time.

Ottawa, Ont.

The residence of Mr. A. F. Darnell, 243 Flora street, was damaged to the extent of about \$2,000 on the 8th inst.

Oakville, Ont.

The residence of W. V. Anderson was destroyed by fire recently. Estimated loss, \$2,500.

Toronto, Ont.

The W. C. T. U. have bought property on Gerrard street as a building site for their new residence for working girls, the construction of which will probably be started within the year. Estimated expenditure, \$30,000.

Victoria, B.C.

Commander Harrison, R. N., is erecting a handsome residence on his estate at Crawford Bay.

AWARDED.

Macduff & Lemieux, architects, 212 Merchants Bank Building, have awarded the contract for the erection of a residence in Cartier Park for Doctor Letourneau, to E. F. Laberge.

Business Buildings and Industrial Plants

Arrowhead, B.C.

It is stated that the C. P. R. will build a large hotel on the northern end of Arrow Lake. Plans for the building are complete, and work on the new building will be commenced shortly. The structure will be similar in some respects to the Chateau at Lake Louise, and will cost \$100,000.

Clearwater, Man.

The International grain elevator was burned on February 6th. Loss not stated.

Edmonton, Alta.

C. C. Snowden, of Calgary, Canadian representative of the Independent Oil Company of Pennsylvania, is authority for the statement that a large warehouse will be built here in the near future.

Five Islands, N.S.

It is understood that Bayne & Soley Bros., backed by some leading firms of Canada and the United States, will build mill warehouses, and offices in connection with the mining industry here.

Goderich, Ont.

The bylaws to grant fixed assessments to the Western Canada Flour Mills on the erection of a modern concrete elevator, capacity 500,000 bushels, and also to the Goderich Elevator & Transit Company on the erection of a 500,000 bushel concrete storage in addition to their present plant were passed by the ratepayers. Building will commence as soon as weather permits.

Huntsville, Ont.

It is stated the work will start shortly on rebuilding the planing mill here, which was badly damaged on the 31st ulto.

Humboldt, Sask.

The Union Bank branch building was destroyed by fire on the 27th ult.

Knowlton, Que.

Mr. A. F. Dunlop, architect, Lindsay Building, is preparing plans for the erection of a bank building to be erected at this place for the Molsons Bank.

Kingston, Ont.

Henry Corby, a wealthy distiller of Belleville, will shortly discuss with the Board of Trade a scheme for the erection here of a first class hotel.

London, Ont.

Puron College here was badly damaged by fire on the 8th inst. Estimated loss, \$5,000.

Lloydminster, Sask.

Messrs. Barker and Johnson, of Edmonton, have completed final arrangements for the new flour mill to be erected here. Noted in issue of December 22nd.

Lethbridge, Alta.

The A. Macdonald Company, Market

street east, Winnipeg, Man., will erect a wholesale warehouse and office building, 50 by 120 feet. Estimated cost, \$25,000.

Moose Jaw, Sask.

W. A. Elliott, Brandon, Man., has been instructed to prepare plans for a \$20,000 warehouse for Ald. Welch. The building will be three storeys high, with a frontage of 55 feet.

Montreal, Que.

Fire caused \$5,000 damage on the 10th inst. to the spice mills of Herron, Leblanc & Company, St. Paul street.

C. F. Hastings & Company, architects, 1140 Columbus avenue, Boston, Mass., have prepared plans for an extensive cold storage plant to be erected for the Molsons Brewery. The Dominion Bridge Company have the contract for the steel work. The plans can shortly be seen at the Molsons Company's office, 906 Notre Dame street east.

The land and premises of the Lafontaine Club, corner Dorchester and St. Hubert, have been sold to Mr. J. H. Maher at a price of \$21,000. The present building will be torn down and in its place an up-to-date apartment house will be erected.

It is stated that Mr. George Gales, of Cales & Company, 481 St. Catherine street west, will erect a large trunk, boot and shoe factory.

It is stated that Hirsch & Sons, 62 McGill street, have bought the corner of St. James and Desrivieres streets, on which, it is understood that they will eventually erect a large building.

It is also reported that H. Kellert & Sons, 351 St. James street, will erect on the corner of St. Catherine and St. Urbain streets, property recently purchased by them, a large wholesale clothing factory.

The plans for the new Windsor station are undergoing final revision, and it is expected that contracts for the superstructure will be awarded in ample time to allow of the steel and masonry work being started early in March.

An additional hundred rooms are to be added to the Place Viger Hotel, at a cost of about \$150,000, while the building of a St. Louis street wing to the Chateau Frontenac at Quebec is also under contemplation. At Lake Louise chalet fifty bedrooms are to be added, and the dining rooms remodelled at a cost of \$65,000, while at Glacier, B.C., a new power fire-proof wing is to be added, and a new power plant installed, at a cost of about \$97,000. Twenty-five rooms are to be added to the Sicamous hotel, at a cost of about \$20,000.

It is reported that Montreal and New York capitalists are behind the purchase of the property at Peel and St. Catherine streets. It is understood a large departmental store will be erected there. Robins, Limited, Toronto, effected the sale.

Messrs. Saxe & Archibald, architects, 59 Beaver Hall Hill, are preparing plans for the erection of a ten storey office building to be erected on St. James street, adjoining the G. T. R. offices, for the Yorkshire Insurance Company, Limited, 55 St. Francois Xavier street.

Tenders close February 16th at the office of Architect David Ogilvie for the construction of the Blumenthal Building, to be erected at the corner of Balmoral and St. Catherine streets.

It is stated that the land and buildings at and near the corner of St. Catherine and Victoria streets, and on McGill College avenue, have been purchased for the purpose of enlarging and extending the Savoy hotel and constructing one of the

largest hosteleries in the city. The cost will be about \$200,000. Mr. Guile, manager.

Nakusp, B.C.

The Canadian Bank of Commerce is building a new branch. Estimated expenditure, \$5,000.

North Bay, Ont.

Brunty's large hotel at South River was destroyed by fire on the 7th inst. Estimated loss, \$15,000.

Nicolet, Que.

The Hotel Rochette, with stables and sheds, were burned on the 8th inst. Estimated loss, \$30,000.

Ottawa, Ont.

The premises of Hugh Carson, leather goods manufacturer, Rideau street, were damaged on the 13th inst. Messrs. Charleson & Duford, owners. Estimated loss on building, \$10,000.

Preston, Ont.

It is stated that the Solid Leather Shoe Company, Limited, will locate here. H. Gale Legg is preparing plans for the factory which call for a building 40 by 100 feet, with two storeys. C. E. Hurlbut, manager; Mr. H. Erb, secretary.

Point Edward, Ont.

It is stated that work on the new cement addition to the grain elevator here will commence shortly. Estimated expenditure, \$75,000.

Peterboro, Ont.

It is reported that the Canadian General Electric Company contemplate building an extension to either their plant at Toronto, or here. Estimated expenditure, \$250,000 to \$750,000. F. Nicholls, general manager; N. McLeod, chief engineer of structural department.

Saskatoon, Sask.

Thos. Ryan, a well-known boot and shoe man, is here looking into the feasibility of erecting a branch warehouse.

St. John, N.B.

The tenants of the Wright Building have been asked to vacate on the 1st of May, when the building will be thoroughly remodelled for Macaulay Bros., of this city.

Stewart, B.C.

It is possible that McKenzie & Mann may erect a sawmill here in order to secure railway ties for their railway project.

St. Thomas, Ont.

The butter dish factory at Rodney was destroyed by fire on the 11th inst. Estimated loss, \$9,000.

Toronto, Ont.

The Nasmith Company will erect a large bakery on the north side of Duchess street between George and Sherbourne.

Victoria, B.C.

Of the permits issued, that for the McCallum block on Douglas street adjoining the Merchants Bank of Canada, calls for the largest outlay, \$30,000.

Plans have been prepared and tenders are invited for the erection of a warehouse to cost \$10,000 for the B. C. Hardware Company.

Brown & Cooper, the Government street fish dealers, have decided to make an extensive addition to their present quarters.

Vancouver, B.C.

Parr & Fee, architects, have completed all the details for the immediate construction

of two large warehouses. A six-storey building of reinforced concrete, covering 80 by 114 feet on Gore avenue, is to be constructed for the Vancouver Ice & Cold Storage Company.

Whitney, Ont.

It is reported that the St. Anthony Lumber Company will erect a large furniture factory here.

Waterdown, Ont.

The large flour mills owned by Alex. Robertson were destroyed by fire on the 8th inst. Loss not stated.

Welland, Ont.

The plans for the erection of the two-storey planing mill, 60 by 250 feet, on the Harper site are ready. Estimated cost, \$50,000. R. D. Stewart, of Guelph, is interested.

It is stated that a new company to be known as the General Air Product will be incorporated to utilize the by-product from the Electro Steel Company of Canada, Limited, for the manufacture of oxygen. Their plant, when erected, will be of no small extent.

Winnipeg, Man.

The Vulcan Iron Works have purchased twenty acres of land on Notre Dame avenue, close to the Dominion Bridge Company's plant. It is not their intention to build at present. This summer they will erect a new blacksmith shop on the old site, to cost \$30,000.

Gowans, Kent & Company, have secured an option of the fifty feet owned by the John Marrin Company on Market street, where it is stated they will erect a large four-storey warehouse.

The tenants of the property on the northwest corner of Portage avenue and Smith street, have been asked to vacate. This is taken to indicate that the erection of the office building will begin at once. The Sterling Bank is interested.

It is reported that Winnipeg will have in the near future an extensive wire works. Capitalists interested in the project are the leading shareholders in the Imperial Steel & Wire Company, Limited, of Collingwood, Ont., one of them being J. A. Currie, M.P. for North Simcoe. The capacity of the plant will approximate 100 tons of wire daily.

The A. Macdonald Company, it is stated, will build a large brick and stone cold storage warehouse on Market street east. Estimated cost, \$40,000.

A building permit was granted to Messrs. Brown & Cooper on Gordon street, for their new brick store and office, \$6,000. Contractors, Luny Bros.

Another warehouse covering 100 by 120 feet facing the sugar refinery, is to be constructed by H. B. Cottrell.

It is stated that the southwest corner of Flora avenue and Main street has been purchased by an eastern firm as a site for a factory. J. C. Miller is interested.

J. McDiarmid & Company, contractors, have on hand the construction of a large five-storey building on Princess street, frontage of 110 feet and 120 feet depth to be occupied as western headquarters by the Canada Cycle & Motor Company, Toronto. Local managers, F. H. Luke and B. B. Halliday. Work will commence next month.

AWARDED.

Hamilton, Ont.

The contract for the brickwork for the \$1,000,000 extension to the plant of the Hamilton Steel & Iron Company has been awarded to Geo. F. Wobb, Hamilton.

Montreal, Que.

J. Rosson Gardner, architect, New York Life Building, has awarded the contract for alterations to the premises of Downing Brothers, at the corner of Queen and Ottawa streets, to E. B. M. Cape.

Winnipeg, Man.

Architect Frank Evans, this city, has awarded the following contracts for a five-storey warehouse to be erected in Winnipeg for the Paulin Chambers Company, Winnipeg, viz.: General contract, Phil. Burnett, Winnipeg; iron work, Manitoba Iron Company, Winnipeg. The building will be 50 by 125 feet, of mill construction and will cost \$30,000.

Power Plants, Electricity and Telephones

Bracebridge, Ont.

Tenders are being called by A. C. Salmon, town clerk, for the erection of Wilson's Falls power house until February 21st. Plans, etc., at office of town clerk.

Fredericton, N.B.

A company to be known as the Fredericton Street Railway Company will make application to the Legislature for a charter. Solicitor, R. B. Hanson.

Hope, B.C.

The Fraser River Lumber Company will apply on the 23rd inst. for sanction to divert water for generating electricity and other power for light, heat, power, operation of motors, engines and all machinery. A. D. McRae, president. Noted in last issue as relating to Fraser River Land Company.

Hull, Que.

Tenders addressed to J. F. Boulton will be received until February 21st for the construction of an addition to the Corporation Power House, Brewery street. Plans, etc., at office of R. W. Farley, city engineer.

Niagara Falls, Ont.

It is likely that the electric railway line from Queenstown to Niagara-on-the-Lake will be extended. Superintendent Martin Sheehan of the Intercolonial Railway and Mayor James Aikens are interested.

Ottawa, Ont.

A bill to incorporate the Ottawa and Montreal Power Transmission Company will be presented to the House of Commons. Authority will be sought to transmit power in the counties of Wright and Pontiac, etc., and to Montreal. Capitalization, \$500,000. Incorporators, Cameron Edwards, J. B. Fraser, R. G. Edwards and R. Blackburn, all of Ottawa.

Renfrew, Ont.

A bylaw to raise \$77,000 for the erection and development of a municipal power plant will be submitted to the ratepayers in the near future.

Shelburne, N.S.

M. S. Robertson, town clerk, has invited tenders for \$20,000 electric light debentures.

Sherbrooke, Que.

We have been informed that the St. George Electric Company, of this city, will build a new concrete dam and electric plant on the Chaudiere river. Probable expenditure, \$75,000. J. W. Gregoire, secretary-treasurer.

Toronto, Ont.

Two tenders for construction work in connection with the electrical conduit system were received. Prices were as follows: \$1,740, \$2,200. On the recommenda-

tion of the City Engineer, the work will be carried out under his supervision by day labor. Estimated cost, \$1,500.

Victoria, B.C.

The Pacific Radio Company have purchased a site on Smith's Hill for the tower which they will erect.

Miscellaneous

Calgary, Alta.

The ratepayers will vote on a \$242,000 bylaw for waterworks extensions and a \$20,000 subway bylaw.

Exeter, Ont.

The town has sold \$8,365 local improvement debentures.

Montreal, Que.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, will be received until February 22nd for improving approach to St. Gabriel locks. Plans, etc., at office of Chief Engineer of Department of Railways and Canals, Ottawa, and at office of Superintending Engineer of the Quebec canals, No. 2 Place d'Armes, Montreal.

Recent building permits include: Hall Bros., 67 Bleury street, warehouse, \$6,000; A. Lacroix, 479 Mount Royal avenue, house containing store and dwelling, \$3,500; V. Lamoureux, 1273 St. Catherine street east, one house containing two dwellings, \$2,000; J. T. Davis, 212 Drummond street, one dwelling, \$6,000; Mrs. A. Paquette, 1239 St. Hubert street, one house containing two dwellings, \$2,500; St. Aloysius Parish, 2017 St. Catherine street east, one house, \$10,000; Thos. Girard, 360 St. Catherine street east, one house containing three dwellings, \$3,000; Jos. Jacob, 115 Convent street, one dwelling, \$7,000; Chas. Cushing, alterations to dwelling, \$3,000; L. Labonte, 16 Robillard street, house containing three dwellings on Nicolet street, \$3,000; Jos. Girard, 566 St. Germain street, house containing three dwellings on St. Germain street, \$3,000; Theo. Menard, 342 Laurier avenue, two houses containing four dwellings on St. Andre street, \$5,000; Z. Cote, 39a Garnier street, one-storey house on St. Dominique street, \$2,000; Alf. Lacomb, 640 Albani street, alterations to property on Albani street, \$1,000.

Peterboro, Ont.

The Board of Works recently discussed the question of purchasing the years' supply of cement, but took no action. Offers should be addressed to Ald. Hicks.

Revelstoke, B.C.

F. C. Gamble, provincial engineer, has given instructions for the laying of a mat-trass along the east bank of the Columbia river, from the C. P. R. bridge to Big Eddy, to protect the bank from further erosion. Cost, \$50,000.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until February 21st for oil switches. Specifications at the Electrical Department, City Hall.

Victoria, B.C.

The McLaughlin-Buick Company will probably receive the contract for a 40 h.p. automobile and chemical, with 200 feet of hose for the fire department.

Vancouver, B.C.

The following tenders were received by the Park Commissioners for the new steam roller for Stanley Park: Macfarland & Company, \$2,600; Waterous Engine Company, \$3,362; Canada Foundry Company,

\$3,450; Harris & Company, \$3,360; and Nussen & Company, \$3,790. A committee was appointed to consider the lowest tender, and accept it if satisfactory all through.

A building permit was recently issued for a warehouse, corner of Homer and Drake streets, with trackage, to Messrs. Macpherson & Teetzel, wholesale building material merchants, and is estimated to cost \$25,000. Other permits were granted as follows: A. A. Heitz, 2194 Venables street, \$2,500; W. H. Critz, Grant street, \$2,250; Geo. Russell, dwelling, Richardson street, \$3,000; S. McLellan, 2237 Victoria drive, \$2,700; C. J. Church, 2990 York street, two houses, \$6,000.

Winnipeg, Man.

The Board of Control at Winnipeg are calling for tenders for the supply of railway asphalt plant. For further particulars, see advertisement in this issue.

Tenders addressed to the chairman of the Board of Control, will be received until February 23rd for the supply of three "Squee-Gee" street washing machines, with one spare roller. Specifications, etc., at office of the street commissioners, City Hall. M. Peterson, secretary.

AWARDED.

Hamilton, Ont.

The Canadian Cement Company has been awarded a contract by the city for all the cement required during the year.

The following contract for annual supplies have been awarded:—Cement, Canadian Portland Cement Company, \$1.50 a barrel, 36 cents more than last year; lumber, M. Brennan & Sons Company, \$27.75 per 1,000 feet; sewer brick, Ollman Bros., on an average of \$8.25 per thousand; lime, E. J. Guest, 16 cents per bushel; sewer pipe, Toronto and Hamilton Sewer Pipe Company; hydrants, Canada Foundry Company, 150 hydrants at \$43.12 each; castings, Gartschore Thomson Company, \$2.05 per hundred; iron pipe, Gartschore Thomson Company, \$34 per ton; gate valves, Kerr Engine Company, of Walkerville, \$9 each for 6-inch valves and \$36 each for 12-inch valves; pig lead, Adam Hope & Company, \$3.53 per hundred pounds; lead pipe, Canada Metal Company, \$4.35 per hundred pounds.

Montreal, Que.

It is stated that the Canada Cement Company has been awarded the contract for the supply of cement required for the construction of the Quebec bridge.

It is stated that the Dominion Bridge Company has been awarded the contract for the steel work on a million and a quarter dollar building to be erected in Winnipeg this year; also for the Calgary power plant at Eashaw and the Carnegie Library at Calgary.

Ottawa, Ont.

The Department of Public Works at Ottawa has awarded the contract for a twin screw composite tug for Lake Deschambault to the Polson Iron Works, of Toronto, at \$3,475. The amount of contract awarded to W. H. Kelly for one light draught tug was \$7,500. Noted in Issue of January 26.

Shelburne, N.S.

J. McGill has the contract for a steamer involving \$25,000.

Toronto, Ont.

Tenders have been received and opened for an automobile for the Chief of the Fire Department, as follows: 30 to 40 h.p., \$2,450; 30 to 35 h.p., \$2,750; 40 h.p., \$3,470; (Informal), 30 to 40 h.p., \$2,500; 30

(Continued on page 28)

Tenders and For Sale Department

Extension of Time

Tenders for Gaul Heating

Tenders will be received by the undersigned up to noon on WEDNESDAY, the 23rd DAY OF FEBRUARY, 1910, for the heating of the County Jail at the Town of Barrie, according to plans and specifications which may be seen on application to A. W. Beardsley, County Clerk's Office, Court House, Barrie. All tenders to be sealed and marked "Tenders for Gaul Heating" and addressed to

C. J. PICOTTE,
Chairman County Property Committee
Box 128, Pentanguishene, Ont.

City of Moose Jaw Notice

Tenders will be received for two (a), two-horse street sprinklers, steel tanks.

Tenders stating capacity and weight, giving prices f.o.b. Moose Jaw, to be laid on the council table not later than 8.30 p.m., on MONDAY, FEBRUARY 21ST., 1910.

THE CITY OF MOOSE JAW
W. F. Heal, City Clerk.

TOWN OF ORILLIA

Province of Ontario

Sealed tenders will be received by the Town Clerk until 8 p.m. on MONDAY, MARCH 7TH, 1910, for

Sewage Pumping Machinery

comprising Gasoline Engine, Electric Motors and Centrifugal Pumps.

Plans and specifications may be seen at the office of the Chief Engineer, Mail & Empire Building, Toronto, or Resident Engineer's Office, Orillia.

No offer necessarily accepted.

W. C. GOFFAT, Esq., Mayor
Orillia, Ont.

C. E. GRANT, Esq., Town Clerk
Orillia, Ont.

WILLIS CHIPMAN, C. E.,
Chief Engineer,
Toronto, Ont.

Tenders

The University of Saskatchewan will shortly call for tenders for the

**College Building, Students' Residence
Power House, Live Stock Pavilion,
Agricultural Engineering
Building, Horse Barn
and Cattle Barn**

Those interested should communicate with the architects, BROWN & VALLANCE, Canada Life building, St. James St., Montreal, or PRESIDENT MURRAY, University of Saskatchewan, Saskatoon, Sask.

Debentures For Sale

Sealed tenders will be received up to noon WEDNESDAY FEBRUARY 23RD, 1910, for the purchase of \$7,500.00 Local Improvement Debentures of the Town of Oshawa, dated December 20th, 1909, bearing interest at 4½ per annum and payable at the Office of the Treasurer, Oshawa, in 30 equal annual payments of \$579.57 of principal and interest.

Also, for the purchase of \$2,500.00 Local Improvement Debentures of the Town of Oshawa, dated December 7th, 1909, bearing interest at 4½ per annum and payable at the Office of the Treasurer, Oshawa, in 30 equal annual payments of \$153.50 of principal and interest, accrued interest to be paid by the purchaser.

The highest or any tender not necessarily accepted

THOS. MORRIS,
Town Clerk.

City of North Vancouver Debentures for Sale

Sealed tenders addressed to the undersigned and marked "Tender for Debentures," will be received up to 5 o'clock p.m. on MONDAY, THE 28TH DAY OF FEBRUARY, 1910, for the purchase of the following general debentures of the Corporation of the City of North Vancouver:

WATERWORKS	\$ 65,000
SEWER	40,000
SCHOOL	16,000
ROAD MACHINERY	10,000
PARKS	5,000
FIRE EQUIPMENT	3,000
	\$139,000

Repayable 17th January, 1950. Interest 5 per cent., payable half-yearly on 17th January and 17th July in each year.

Tenders will be received for the above debentures en bloc.

The highest or any tender not necessarily accepted. Copies of the by-laws and other information may be obtained on application being made to the City Clerk, North Vancouver, B. C.

THOMAS SHEPHERD,
City Clerk.

City Hall, North Vancouver, B. C.
January 19th, 1910.

County of Perth

Competitive Designs for New Registry Office.

Competitive Designs for a new Registry Office in the City of Stratford, will be received by Wm. Davidson, County Clerk, on behalf of the County Property Committee, up to one o'clock p.m., MARCH 1ST, 1910.

The building to be 34 x 50 feet, one story with basement. Outside walls to be of white stock brick basement of best St. Marys stone. Cost not to exceed \$10,000.00, including steam heating.

The plans showing the greatest efficiency in fire-proof construction and general design will be accepted when approved by Government Inspector. Plans not accepted will be returned. The architect whose plans are accepted will be required to prepare specifications, detail drawings, etc. A short description of general construction of the building to accompany plan.

Any further information can be obtained by communicating with the County Clerk.

WM. DAVIDSON,
County Clerk,
Stratford P.O.

ROBERT ARMSTRONG,
Chairman of Committee.

Stratford, February 1st, 1910.

To Contractors

The Amalgamated Asbestos Corporation, Limited, is prepared to receive tenders for the removal of about 60,000 cubic yards of gravel and clay from the surface of one of their properties at Black Lake. Full specifications can be had at the Company's office, Room 602, Eastern Townships Bank Building, No 263 St. James St., Montreal.

The company reserve the right to reject any or all tenders and does not bind itself to accept the lowest.

R. P. DOUCET,
Secretary-Treasurer

Tenders for Supply of Asphalt

Sealed tenders, addressed to the Chairman, Board of Control, for the supply of from 2,500 to 3,500 tons of Asphalt for street paving for the City of Winnipeg, will be received at the office of the undersigned up to 11 a.m. on FRIDAY, FEBRUARY 25TH, 1910.

Specifications and forms of tender, together with conditions governing tenders as prescribed by By-law may be obtained at the office of the City Engineer, James Street Winnipeg. The Board reserves the right to reject any or all tenders or to accept any bid which appears advantageous to the City.

M. PETERSON,
Secretary.

Board of Control Office, Winnipeg, Jan. 31st, 1910.



To Contractors

Sealed bulk or separate tenders endorsed "Tender for addition to Ontario Parliament Buildings" addressed to the undersigned, will be received at this department until noon on

Tuesday, the first day of March, 1910

for the following works, viz: Masonry, bricklayer, cut stone, carving, fireproofing, etc.; structural steel; steam heating; plumbing and gasfitting; iron armored conduit and electric wiring; vault doors; roofing; copper and sheet metal; carpenter work; ornamental iron and grille work; elevators; lathing and plastering; painting and glazing; marble and tile; metallic fire-proof doors, base and trim; hardware; iron-founders work; required in connection with the extension to the Ontario Government Buildings, Queen's Park. Plans and specifications may be seen at the office of Geo. W. Gouinlock, Architect, 1108 Temple Building, Toronto.

An accepted bank cheque payable to the order of the Honorable, the Minister of Public Works for five per cent of the amount of the tender and the bona-fide signatures and addresses of two sureties or the bond of a Guarantee Company approved by this Department prepared to give a bond for the due fulfillment of the contract must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance. The Department will not be bound to accept the lowest or any tender.

J. O. REAUME,
Minister of Public Works, Ontario

Department of Public Works, Ontario.
Toronto, February 4th, 1910.

(Newspapers publishing this advertisement without authority will not be paid for it.)

Factory For Sale, Rent or Exchange

1 storey, light, three-sides, 3,500 square feet floor space. Prominent corner on Queen Street, five minutes from Yonge Street, Toronto. Address Box 920, CONTRACT RECORD, Toronto.

Tenders for Supply of Railway Asphalt Plant

Sealed tenders addressed to Chairman of the Board of Control, Winnipeg, for supply of Railway Asphalt Plant, complete and tested for operation, will be received at the office of the undersigned up to 11 A. M., on TUESDAY MARCH 1ST 1910. Specifications and forms of tenders, together with conditions governing tenders as prescribed by By-Law, may be obtained at the office of the City Engineer, Winnipeg.

The lowest or any tender not necessarily accepted.

M. PETERSON
Secretary

Board of Control Office, Winnipeg, Feb. 9th, 1910.

For Sale

A 60,000 gallon Water Tank on Steel Trestle, 90 ft. high.

Sealed tenders addressed to the Chairman of the Water Works Committee, endorsed "Tender for Water Tank", will be received by registered post only up to 5 p.m. TUESDAY, MARCH 1ST, 1910, for the purchase removal of a 60,000 Imperial Gallon Wooden Tank and mounted on a steel trestle, 90 ft. high, at the Ottawa East Pumping Station.

Particulars may be obtained on application to the City Engineer's Office, City Hall, Ottawa.

The Corporation does not bind itself to accept the highest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, January 25th, 1910.



Temiskaming and Northern Ontario Railway Commission

Tenders for Grading

Sealed tenders, addressed to the undersigned, and marked "Tenders for Grading" will be received up till 12 o'clock noon, on MONDAY, FEBRUARY 28th, for all and every kind of labor, tools, machinery, and other plant, services and material whatsoever necessary for the due execution and completion of, in a thorough and workmanlike manner, all the grubbing, grading, embankment protection, clearing and culverts necessary for the construction of a cut-off on the Main Line of the Temiskaming and Northern Ontario Railway, between M.P. 60 and M.P. 61.

Plans and specifications may be seen at the office of the Commission, 25 Toronto Street, Toronto, and the office of the Chief Engineer, North Bay.

Certified cheque on a chartered bank, payable to the order of the Secretary-Treasurer of the Commission for \$500.00 must accompany each tender.

Tender must be made out on form supplied by the Commission.

Deposit cheque of unsuccessful tenderers will be returned.

Successful tenderer's deposit cheque to stand as security for immediate execution of construction contract, and then to be held, together with further security by bond satisfactory to the Commission, for the due performance of the contract.

Commission will not be bound to accept the lowest or any tender.

A. J. McGEE, Secretary-Treasurer,
25 Toronto Street, Toronto, Ont.

Toronto, February 8th, 1910.

Papers inserting this advertisement without authority will not be paid for same.

Tenders Wanted

Tenders will be received by the undersigned, until FRIDAY, MARCH 4th, at 12 o'clock noon, for the erection and completion of a Sabbath School building in connection with the Welland Presbyterian Church, and also for certain modifications in the present church as per plans and specifications, which may be seen at W. H. Crowther's store, North Main street, Welland, on and after Thursday, February 10th, 1910. Tenders to be as follows: (1) Bulk tender for whole work as described in plans and specifications; (2) Separate tender for Sabbath School building alone.

No tender necessarily accepted.
ALEX. ASHER,
Secretary, Bd. of Managers.



Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon, on TUESDAY, FEBRUARY 22, 1910, for a 42-inch hydraulically operated Stop Valve.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman Board of Control.

City Hall, Toronto, February 8, 1910.

Miscellaneous

Fine Factory Site—New Westminster, B. C., the coming factory city. Lot 7, Block 36; corner 108 x 132 three frontages; close to tracks and waterfront. Right in city, and already surrounded by industries. \$15,000. Snap. Will bring double this inside two years. Investigate. Address P. O. Box 516, Vancouver—owner.

Miscellaneous

(Continued from page 27)

to 40 h.p., \$2,452. The contract was awarded to the McLaughlin Carriage Company, Limited, at \$2,470.

Victoria, B.C.

The contract for castings for 1910 has been awarded to the Victoria Machinery Depot Company.

Vancouver, B.C.

The secretary-treasurer, North Vancouver City Ferries, sends us the list of the following tenders for construction of ferry steamer: Wallace Shipyards, Limited, North Vancouver, B.C., for 6 months' construction, one set engines, \$114,927; two sets engines, \$117,927; for 7 months' construction, \$13,427, \$116,427; for 8 months' construction, \$111,907, \$111,927. Colin F. Jackson & Company, Vancouver, B.C., for delivery, February, 1911, one set engines, \$133,632; two sets engines, \$132,217. British Columbia Marine Railway Company, Victoria, B.C., for 44 weeks' construction, \$124,400. The tender was awarded to Messrs. Wallace Shipyards, for delivery August 1st, 1910, double engines for \$117,927.

Winnipeg, Man.

The Board of Control have accepted the tender of Max Baranisky of this city for the supply of 250 dust cans for the street commissioner's department at a contract price of \$3.60 each or a total of \$900. The tender of the Taggart Iron Company for

50 carts for dust cans at \$8.95 each was also accepted. The combined tenders are only about half what was asked by other tenderers for similar equipment.

New Companies

The Canadian Dart Company, Montreal, Que., capital \$50,000, incorporated to carry on the business of a general construction and contracting company in all its branches. Incorporators: W. Dart, C.E., F. H. Jefferson, engineer, A. E. Cambridge, engineer, and W. H. Brunning, architect, all of Montreal.

Riordon Paper Company, Limited, Montreal, Que., incorporated, capital \$6,000,000. Incorporators: Gordon Walters MacDougall, K.C., L. Macfarlane and C. A. Pope, advocates, all of Montreal.

The Canada Slate Company, Limited, Toronto, incorporated, capital \$500,000. Incorporators: F. L. Hutchinson, accountant, A. N. Morgan and M. F. Pumaville, barristers, and others, all of New Liskeard, Ont.

Instantan Company, Limited, Toronto, capital \$50,000, incorporated to carry on the business of plumbers and gas fitters. Incorporators: J. H. Spence and M. Brooks Cameron, barristers, both of Toronto.

The Central Canada Power Company, Montreal, Que., incorporated, capital \$5,000,000. Incorporators: J. C. Hickson, K.C., S. B. Hammond and V. M. Drury, accountants, G. Casimir Papineau-Couture, advocates, all of Montreal, Que.

The Holland Varnish Company, Limited, Montreal, Que., incorporated, capital \$100,000. Incorporators: G. C. Greenshields, E. B. Parkins, advocates, both of Montreal, Que.

L. E. Labrecque, Limited, Quebec, Que., capital \$49,000, incorporated to carry on business in construction materials, etc. Incorporators: Messrs. Leonidas E. Lebreque, merchant, Quebec, and R. Giguere, plumber, Levis, Que.

Telectron Company, Limited, Ottawa, Ont., capital \$40,000, incorporated to manufacture electrical instruments, etc. W. Metcalfe, merchant, Ottawa, is interested.

Kingston Shipbuilding Company, Limited, Kingston, Ont., incorporated, capital \$500,000. Incorporators: W. J. Fair, H. A. Calvin and J. McKelvey, all of Kingston; J. M. Smith, Collingwood; Simon Dymont, Barrie, and A. McDougall, Duluth, Minn., U. S. A. (president of the Collingwood Shipbuilding Company).

Munn Lumber Company, Limited, Orillia, Ont., incorporated, capital \$100,000. Incorporators: J. B. Tudhope, W. H. Tudhope, carriage makers; A. E. Munn and H. J. Bartlett, lumbermen, all of Orillia.

Renfrew Machinery Company, Limited, Renfrew, Ont., incorporated, capital \$250,000. Incorporators: B. Handley, accountant, W. T. Guest, T. Logan, managers, and E. J. Stewart, barrister-at-law, all of Renfrew.

Fletcher Pulp & Lumber Company, Limited, Sherbrooke, Que., incorporated, capital \$300,000. Incorporators: C. H. Fletcher, gentleman, R. A. Ewing, R. H. Fletcher and Harold Bruce Fletcher, all of Sherbrooke, Que., and J. W. Parker, lumberman, Portland, Maine, U. S.

Fred Holmes & Sons, Limited, Toronto, Ont., capital \$40,000, incorporated to acquire the building and contracting business, etc., of the partnership known as "Fred Holmes & Sons." Incorporators: F. Holmes, contractor; O. R. Holmes and T. P. Holmes, builders, all of Toronto.

Making "Y" and "T" Joints for Straight Concrete Sewer Pipe

The making of T's, Y's and connections and other special pipe is, like all other parts of the cement pipe business, a very simple matter when you understand how to go about it. We give herewith the different steps to be taken in making special pipe, and if you follow these simple instructions, you cannot go wrong.

These special shapes always sell at a very handsome profit, and require no extra investment on your part to make them. They are made from regular stock pipe constructed on your regular sewer pipe moulds. In the sewer pipe market a T or Y joint usually sells at from two to four times the price of a regular length of the main pipe. You have no extra investment in equipment and the only extra cost to you is the labor of making, which is a small matter.

Extreme care should be used in these operations. While a concrete pipe is not as easily broken as a vitrified clay pipe, at the same time, if you go at it with a sledge hammer and strike heavy blows, you will break it to pieces; but, if you will be careful, you will experience no breakage in making this special pipe.

By way of an illustration: Suppose you wish to make a T joint for joining a 10-inch sewer pipe to a 24-inch main sewer. For this purpose you should have some pieces of 10-inch pipe, made not over 12 inches in length—that is, 12 inches above the bell. Select a good, sound, well tamped 24-inch pipe from your stock that is two or three weeks old. It will cut best at this time, but can be cut at any time and at any age. Bed the large pipe in sand, so as to keep it from rolling, and give it a soft bed to lie in. Take the small section of pipe to be joined to it, cut it so that the end of it will fit the outer shell of the large pipe at right angles. Set the small pipe on the large pipe and with a pencil or sharp instrument, describe the circular line on the outside of the large pipe around the end of the small pipe, where you wish to cut the hole. Wet the large pipe thoroughly, then, with hammer and chisel, cut a line around the hole you wish to make about half an inch inside of the line that you have drawn. Keep on cutting carefully until you get about half way through the pipe all the way around, then cut the balance of the way through in three or four places about half way around the hole, and tap the piece gently from the inside, and the piece will come out easily, just where it has been cut.

Now trim or rim out this hole with a chisel until it fits the pipe that you wish to insert. After this hole has been trimmed so the small section will slide in easily, wet the end of the small pipe to be joined and the large pipe where it has been cut thoroughly, and go over it with a solution of neat cement of about the consistency of thick cream, a small brush being used. Then insert the small section of pipe in the opening where it is to be joined to the large pipe and brace from the inside so as to hold it in position, being careful that the end of the small section does not project beyond the inside of the shell of the larger pipe. After this has been firmly braced in position, mix up a cement mortar so it will handle easily with a trowel, about one part of cement and one part of fine sand, and fill around the junction. This junction at the angle where the two outside surfaces meet can be built up and strengthened in this manner with cement mortar to give any required strength, and it really becomes the strongest part of the pipe.

This joint is then wiped with a solution of neat cement, the same as was used at the start, the same as a plumber wipes a lead joint. In this manner a very

strong and durable, as well as neat-looking, pipe is produced.

The next day the braces from the inside can be removed and the inside plastered, the same as the outside has been, with a rich cement mortar, and the inside made perfectly smooth by the use of the solution of neat cement and water applied with a small brush. Ordinary care will result in smooth, clean, strong joints, and the margin of profit in these special forms makes the extra labor worth while. The same method is used for making a Y joint as for making a T joint.—Concrete.

Cement and Concrete Association Convention

It has been decided to hold the annual convention of the Canadian Cement and Concrete Association at London, Ont., March 29-April 1. Special committees have been appointed and there is every indication that the convention will be a great success. A delegate is being sent to the convention of the American Concrete Association, held in Chicago this month, in the interests of the Canadian association.

The Princess rink at London has been secured and applications for space have already been sent in. The president of the Canadian Cement Association is Professor Gillespie, of Toronto University. The vice-president is Mr. Gustav Kahn, of the Trussed Concrete Steel Company, Toronto. The chairman of the Finance Committee is Mr. C. T. Pulfer, manager of the Ideal Concrete Machinery Company, London. Mr. R. E. G. Haggerty, of Toronto University, is the acting secretary.

After interviewing Mr. Pulfer in London last week, the "Contract Record" representative went away with big ideas in regard to the coming convention. Mr. Pulfer expects a representative gathering from the States and expects the convention to be away ahead of the one in Toronto last year. Complete details will be published in a later issue.

A. W. Campbell Suggests "Skilled Inspectors"

At a dinner of the University of Toronto Engineering Alumni Association, on Thursday, Feb. 11th, Mr. A. W. Campbell emphasized the fact that there is great need in Canada to-day for skilled inspectors who will act as the connecting link between the designing engineer and the contractor in the construction of public works. Deplorable waste and extravagance was the result of municipalities engaging laymen. To the layman, the architect or engineer was apt to be a man of fanciful ideas, who could write long specifications and draw more or less intricate pictures. Towns and cities were frequent offenders in the matter of inspection, and the inferior results and failures in some municipal improvement works throughout the province were due to the employment of untrained inspectors. The public were slow to grasp the value of expert services, and it was only through the blunders of unskilled men and costly experience that these matters would adjust themselves.

Mr. Campbell said he was not speaking in the interests of technically trained men. As a public official, charged with the handling of public funds, he had reached those conclusions from years of experience, and deemed it but right that he should give the public the benefit of his experience, and warn them in the interest of good workmanship and economy. Contractors, however honest, were chiefly concerned in the profits accruing, not in the perfection and durability of the work, and it might be accepted as an axiom that the quality of the work could not be left wholly to the contractor.

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Vol. 24 Toronto February 16, 1910 No. 7

Of Vital Interest to Contractors

In this issue is published a complete report of the builders' convention at London, Ont., last week. The matters discussed were of vital interest to the contracting fraternity and we would suggest that those of our readers who were not present at the meeting study the proceedings carefully and communicate to us for publication their views upon any subject with which they may happen to be particularly concerned.

Apropos of improvement in the present conditions of contracting, the suggestion is made that in every instance where time is the essence of the contract and a penalty is imposed, it shall be incumbent to stipulate a bonus equal to the amount of the penalty, so that contractors may have an equitable inducement to put forth their best efforts. An argument in favor of this system is that in every case where it has been employed it has worked out satisfactorily. It is reasonable to suppose that if such a provision were more general in penalty contracts, there would be better results and probably less litigation.

Subscribing by Wire

It is a source of much gratification to us to be able to state that never before in our experience as publishers have we been rewarded with such practical encouragement as during the past few months. Never before in a similar period have we had the pleasure of entering so many new subscribers to the "Contract Record," and certainly in no other period of like duration have we had so many satisfactory reports from our advertisers as to enquiries—an indication that the "C. R." is

performing a well defined function quite apart from its advance information and editorial matter. It is a somewhat uncommon experience to have subscriptions wired in, but this is what happened the other day. A telegram received at this office was as follows:

Saskatoon, Sask., Feb. 8.

"Contract Record,"

Toronto.

Enter our subscription and forward latest copies.

In nearly every sphere of human endeavor the measure of success is gauged by the practical evidence of appreciation forthcoming. And the publishing field is no exception. It could not be hoped—indeed it would be useless to try—to fulfil the letter of every individual requirement, but by the close association of ideas, by studying carefully the developments of the field, and with a certain amount of foresight it is possible to maintain the interest of the minority and to render a service that is practically indispensable to the majority. Results are what count—and these we are accomplishing.

To the many friends of this journal, who, in the past, have manifested such a gratifying interest in the work, we offer our best thanks, with confidence in their continued good will. To our new subscribers we extend a warm welcome, with a request for that personal co-operation which shapes the destiny and ensures the success of that for which it is put forth.

Another Echo of the Quebec Bridge Affair

to the Quebec bridge. In brief, it is that the Government was outwitted in its dealings with the Phoenix Bridge Company, the corporation which was engaged on that ill-fated structure. The Government thought the contract was with the famous Phoenix Iron Company, of Philadelphia, but found, when it came to investigate the question of responsibility, that the contract was with a subsidiary company with a capitalization of only \$50,000. To this company some \$3,000,000 was paid. The bridge fell down, and there is little hope of anything being realized. About the bond of \$100,000, which the company deposited as security, technical difficulties have arisen, and no payment has been made as yet. It seems almost incredible that on work of such a magnitude as this the Government should be in such an obscure position. Under such administration, can it be wondered at that tendering on public works is so unsatisfactory, that graft is rife—and that bridges collapse? It is to be hoped that those in charge will profit by past experience and take a timely hint from the unsavory publicity that has developed in the connection stated.

Typographical errors have come to be regarded with a certain amount of leniency. Occasionally, nevertheless, the limit of passive endurance is almost exceeded. Last week the Toronto "Globe" published an advertisement inviting applications for the position of city engineer of Victoria, B.C., stating that the job was worth \$3,500,000 a year!—With apologies to "The Globe."

Fourth Annual Convention of the C.N.A.B.

Enthusiastic Gathering of Master Builders at London, Ont.—Complete Account of Important Deliberations—Next Convention to be Held at Winnipeg

In point of enthusiasm, attendance, good practical discussions and important resolutions, the fourth annual convention of the Canadian National Association of Builders, which was held at London, Ont., on Feb. 8th and 9th, was one upon which the executive and members of the Association may well be satisfied. Our assertion in regard to the attendance will be supported by the following list, which is an abbreviated schedule of those who signed the register.

A. Dinnis, Toronto.	Samuel Willis, London.
Fred Armstrong, Toronto.	H. W. Magee, London.
Geo. Oakley, Jr., Toronto.	F. J. Rumble, London.
J. W. Aldridge, Toronto.	Wm. Geary & Sons, London.
Edward Gearing, Toronto.	Geo. A. Kernohan, London.
A. P. Steward, Toronto.	I. Sargent, London.
Wm. Pears, Toronto.	Thos. Copp, London.
John Wickett, Toronto.	L. A. Boss, London.
P. L. Fraser, Toronto.	L. R. Folley, London.
T. E. Cannon, Jr., Toronto.	Thos. Redge, London.
Chas. Bulley, Toronto.	W. T. Pace & Son, London.
Harry Jennings, Toronto.	H. Stratfold, London.
Geo. Gander, Toronto.	W. C. Mortimer, London.
J. H. Lauer, Montreal.	I. Quick & Son, London.
Thos. Gilday, Montreal.	Thos. Beer, London.
W. E. Ramsay, Montreal.	John Maker, London.
D. J. MacKenzie, Ottawa.	Wm. Chamberlain & Sons, London.
W. J. Adamson, Ottawa.	J. Evans & Son, London.
Aug. Boehmer, Ottawa.	J. A. Matthews, London.
James Ritchie, Ottawa.	Wm. Warner, London.
G. A. Crain, Ottawa.	W. T. Brown, London.
W. A. Rankin, Ottawa.	L. H. Martyn, London.
E. T. Nesbitt, Quebec.	Wm. C. Northey, London.
Chas. S. Shipman, Winnipeg.	Walter Dann, London.
James A. Payne, Winnipeg.	R. H. Smith, London.
J. W. Morley, Winnipeg.	Chas. Dyson, London.
John Jones, London.	

W. J. Nutkins, London.	Geo. H. Belton, London.
John Nutkins, Sr., London.	Scott Murray, London.
C. H. Gould, London.	John Putherbough, London.
Geo. S. Gould, London.	C. Colerick, London.
T. R. Wright, London.	L. J. Odell, London.
Geo. C. Young, London.	F. McWaine, London.
John Whittaker, London.	Thos. Jones, London.
W. Tytler, London, Ont.	Wm. Gray, London.
Ex-Mayor S. Stevely, London.	M. J. Irwin, London.
Ex-Ald. D. Ferguson, London.	A. J. Cromer, Brantford.
Thos. Wilkey, London.	G. W. N. Day, (Contract Record).
E. R. Dennis, London.	F. W. Scherbarth, (Contract Record).
A. E. Nobbs, London.	
John Moran, London.	
Wm. Jeffery, London.	

The business sessions of the convention were held in the commodious quarters of the London Builders' Exchange, in the Bank of Nova Scotia Building. The local secretary, Mr. Geo. S. Gould, in his own unostentatious fashion, worked hard from start to finish to make the delegates feel at home in the Forest City and to ensure the success of the convention.

Tuesday, February 8th

After the delegates had registered they were called to order by Mr. Geo. A. Crain, of Ottawa, president of the Association. In the absence of the Mayor, Aldermen Eckert and Stevenson extended the freedom of the city to the visitors. In reply to these speeches ex-Ald. Donald Ferguson, who was in a particularly happy vein, thanked the aldermen on behalf of the Association. Mr. Wm. Tytler, of the London Builders' Exchange, also welcomed the visiting delegates, saying in part:

I am sure we are all particularly pleased to see represented here for the first time the building contractors of the city of Toronto, and I trust that the time is not far distant when the



Mr. E. T. Nesbitt, of Quebec,
the New President.



Mr. J. W. Morley, of Winnipeg,
Vice-President C.N.A.B.



Mr. Geo. A. Crain, of Ottawa,
the Retiring President.



Mr. Arthur Dinnis,
President Toronto Exchange.



Mr. Chas. Bulley,
Vice-President Toronto Exchange.



Mr. W. J. Nutkins,
Vice-President London Exchange.

trades in every city of importance in the Dominion will feel it in their interest to send delegates to our conventions.

There can be no doubt that our organization and annual gatherings can be made to serve a good purpose and have considerable influence in the forming of legislation bearing on our trade interests. Every session of parliament sees legislation, or attempts at it, in what is called "the interests of labor," but it is rare indeed that a member of parliament considers it worth his while to speak out in behalf of those but for whom "labor" would fare badly indeed. This should not be so, and I believe that if we were to assert ourselves, our legislators would listen to us more attentively.

At the present session of parliament, as at every session for years past, the question of fixing eight hours as a standard work-day has been brought up, and the matter is now before a select committee, upon the presentation of whose report the whole question will be finally disposed. In my opinion, this is a subject well worthy the serious attention of our organization, and we should see to it that our views are clearly placed before the committee in question. Such a law as is contemplated would bear most harshly on the building contractors, whose operations at best are confined to a few months of the year, many days of which are broken up by unfavorable weather. If, gentlemen, we can devise some means whereby we may be heard before the committee in question—and I understand it is the committee's desire to hear all sides—our meeting this year will not be barren of results.

Canada has undoubtedly recovered from the temporary check to industrial activity, and I believe that the coming season will see in this city, as well as in others, a distinct revival in every line. For years the building trades of London have been in the enjoyment of industrial peace, and I sincerely hope that it will be many years before that peace is broken.

Let me express my personal gratification at seeing here so many delegates whom I have met at previous conventions, and again extend to you all a hearty welcome, coupled with the hope that your visit to London will be one long to be remembered as pleasurable and profitable.

A suitable response was made to this address by Mr. Arthur Dinnis, president of the Toronto Exchange, following which Mr. J. H. Lauer, the indefatigable secretary of the C.N.A.B., delivered an address dealing with the development and the work of the Association. He referred to the first meeting at Toronto, when only three

visiting Exchanges were represented, namely, London, Hamilton and Montreal. Mr. Lauer paid a tribute to the excellent work of Mr. E. T. Nesbitt, who, in 1907, founded the Quebec Exchange, which now has a membership of over sixty. The speaker pointed out that the Association was composed of the six largest Exchanges in Canada: Quebec, Montreal, Ottawa, Toronto, London and Winnipeg. Mr. Lauer dealt with the responsible nature of the builders' calling and referred to the important industries which are allied with building. "Eighteen million dollars expended in one year on bricks and mortar," said Mr. Lauer, "is a weighty tribute to the importance of the building industry in Canada." Following this address the minutes of the last annual convention at Ottawa were read by Mr. Lauer, and duly confirmed.

President Geo. A. Crain's address, which followed, was of considerable interest. The speaker dealt with the growing popularity and usefulness of the C.N.A.B. and to the continually expanding sphere of the Association. "If builders are to make any real progress in their various aims," said Mr. Crain, "they must make the architects respect them more." Mr. Crain held that the National Association would help considerably in this work. The speaker dealt briefly with the efforts of the Ottawa Exchange to obtain a uniform form of contract. He also referred to the undesirable practice of withholding percentages, quoting several examples from his own experience.

Vice-president E. T. Nesbitt, of Quebec, was of the opinion that the C.N.A.B. should be made quite as important an organization as the Manufacturers' Association, and that it should derive equally substantial benefits. Touching upon the eight-hour question, Mr. Nesbitt expressed the opinion that if the measure were adopted, the cost of manufacturing would increase and higher prices generally would result. No good purpose would be served. The speaker deplored the unreasonable attitude of the workmen who were continually seeking higher wages and less hours. Coming down to the troubles of the individual builder, Mr. Nesbitt touched upon the manner in which the average architect omitted to provide the contractors with proper details. It was most unreasonable to expect contractors to spend

an unlimited amount of time in this work. Mr. Nesbitt concluded by expressing the opinion that a special effort should be made to induce outside contractors' associations to join and co-operate with the federal body.

The next speaker was ex-Mayor Sam. Stevely, of London, Ont., who extended a hearty welcome to the convention. Mr. Stevely also referred to the insufficient co-operation of the architects.

In the annual report of the secretary, Mr. J. H. Lauer, interesting and extended reference was made to the various aims and purposes of the Association. Mr. Lauer referred to what had been accomplished by united effort in New Zealand, and how the builders in that dominion had obtained a uniform form of contract by persistent joint action. Mr. Lauer contended that the Government is afraid of the labor unions, and that it is only encouraging the immigration of unskilled labor. Nothing is being done to induce skilled mechanics to come here. Mr. Lauer recently wrote to the High Commissioner in London, England, requesting that official to bring to the notice of skilled mechanics the opportunities afforded them in this country. In reply thereto he received a communication stating that it is the "avowed policy of the Canadian Government to encourage the immigration of farm laborers and domestic servants only." Speaking on the subject of technical education, Mr. Lauer stated that the Montreal Exchange had recently memorialized the Premier of Quebec asking for the incorporation of a trade school in the new technical school at Montreal, and had received a favorable reply. The financial report submitted by Mr. Lauer showed a balance of over \$200 to the credit of the Association.

Before adjournment, the convention adopted a resolution expressing its appreciation of the courtesies extended by Mr. Weston Wrigley, secretary of the Retail Hardware Dealers' Association of Ontario. Towards the close of this session, Mr. J. A. Payne and Mr. J. W. Morley, two of the Winnipeg delegates, arrived and were accorded an enthusiastic reception. The afternoon session closed with the appointment of a committee on resolutions, this comprising Messrs. Dinnis (Toronto), Nesbitt (Quebec), Ferguson (London), Morley, (Quebec), and Ritchie (Ottawa).

Tuesday Evening, February 8th

The session opened with a few words of welcome from Mr. McMahon, secretary of the London Board of Trade. Response was made by Messrs. John Aldridge, of Toronto, and J. A. MacKenzie, secretary of the Ottawa Exchange.

The subject of technical education was the first matter discussed. Mr. W. E. Ramsay, of Montreal, representative of the Pedlar People, gave an interesting account of what had been done in recent years in the eastern metropolis. "The kind of education we want," said Mr. Ramsay, "is something similar to that given in the New England States, where, by a course of practical training, they fit men to become skilled mechanics." The various exchanges should urge the question of providing more practical work in the technical schools. The speaker was in favor of reviving the apprenticeship system—on a revised basis. He referred to the system in vogue thirty years ago, under which the master taught the boy and was responsible to his parents. The period of apprenticeship in the old days was seven years, but now the time could be shortened to two, three, or at the most, four years.

Speaking on the same subject, Mr. Nesbitt (Quebec), stated that the Quebec Exchange had petitioned the Quebec Government to establish trade schools in con-

nection with the technical institute and had been promised consideration. Mr. Nesbitt gave a rather amusing instance of what the technical schools are doing. "Some time ago," said Mr. Nesbitt, "I employed a boy at pulling boards out of a planer at 80 cents a day. He left me and I forgot all about him for the time. Seventeen months later he applied to me for a position. He had all the style of the young gentleman then. He had a chest of tools, called himself a full fledged joiner and demanded \$2.25 a day." What the Quebec Exchange had done the speaker thought the other exchanges should do. Mr. Nesbitt was of the opinion that a boy would learn as much in a good trade school in three months as he did in the old apprenticeship system in as many years.

Mr. T. Cannon, Jr., complained that the work done in the technical school at Toronto was purely theoretical. There was no practical training. The speaker stated that his firm had found the apprenticeship system a failure. Apprentices are apt to get ideas above their job. He, Mr. Cannon, had to learn his trade from



**Mr. George S. Gould,
Secretary of the London Builders' Exchange.**

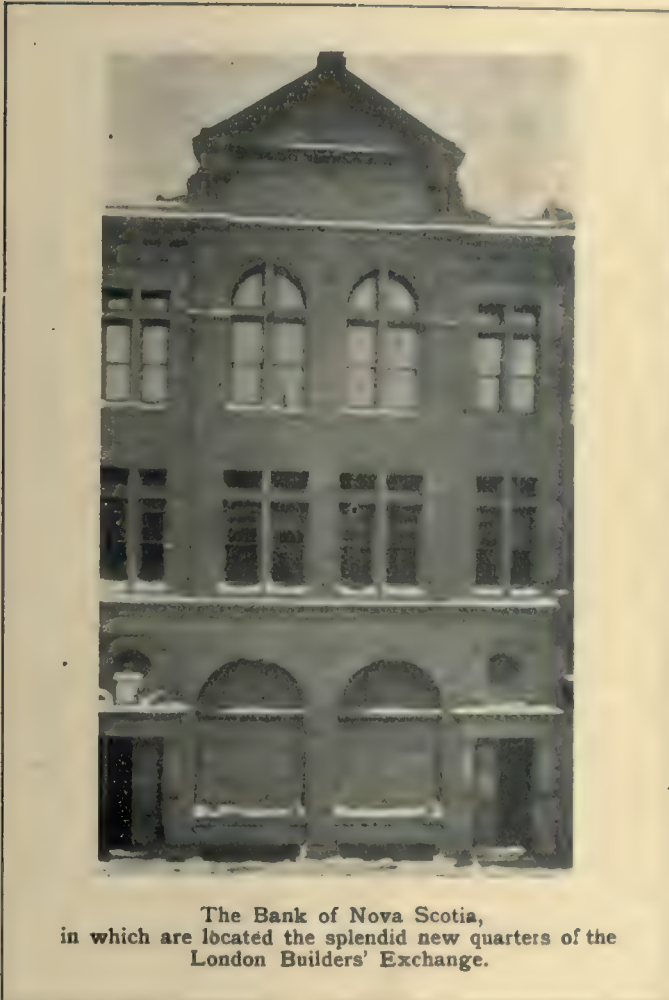
the ground up. He had both mixed mortar and carried the hod. The speaker was strongly in favor of the trade school as established at Chicago, where facilities are provided for doing the actual practical work.

Mr. Geo. A. Crain (Ottawa), regarded a possible solution in the raising of the wages of the apprentice and in giving him proper encouragement.

Mr. Wm. Jeffery (London), contended that the apprentice should be advanced on merit. His own practice was to start a boy at three dollars a week the first year, and the second year to raise him to five and a half, and so on.

Mr. W. J. Morley (Quebec), maintained that both the apprenticeship system and trade schools were necessary. He thought that contractors should do their part and not leave it all to the trade school. He advocated a plan of placing a weekly sum to the credit of the boy for him to draw on the completion of his time. It furnished a good incentive and invariably worked out satisfactorily.

Mr. Gilday (Montreal), would educate the rising generation to a higher enthusiasm for mechanical training. The young man of to-day should appreciate the inde-



The Bank of Nova Scotia,
in which are located the splendid new quarters of the
London Builders' Exchange.

pendent position enjoyed by those who had mastered a trade.

This brought the discussion to a close.

An account of the work of the Exchange at Winnipeg was given by Mr. W. J. Morley, of that city. Ninety per cent. of the contractors and 95 per cent. of the supply men at Winnipeg are members of the Exchange. Mr. Morley looks for labor troubles in Winnipeg during the coming season owing to the unreasonable demand for closed shop made by the unions. Mr. Morley considered that these bodies were getting beyond their legitimate sphere. They wished to place good and bad mechanics on the same level, fix wages and limit the number of hours a man should work. The builders should support the C.N.A.B. and have a regularly appointed organizer. This would fortify the employers. The speaker deplored the fact that the influence of the labor people affected the ruling of the Legislature on very important points. At the conclusion of his address, Mr. Morley extended to the Association a cordial invitation to hold its next annual meeting in Winnipeg.

Mr. E. R. Dennis, of the Dennis Wire & Iron Company, London, then read the following paper, entitled

Reform in the Present Method of Awarding Contracts

Ralph Waldo Emerson, in his Essay on Compensation, says: "Every act rewards itself," also that "human labor, through all its forms, from the sharpening of a stake to the construction of a city, or an epic, is one immense illustration of the perfect compensation of the universe." I would not presume to argue with the reasonings of the rare and gentle New England philosopher, but I would suggest that, in his musings on universal compensation, he missed the great exception because he was

never a contractor and never had to do with the estimating department of a contracting concern.

We all realize that under the present system of competitive contracts, contractors expend a very serious amount of time, energy and means on the preparation of estimates on proposed contracts, for which expenditure they receive no just compensation or reward. Let us endeavor to discover, with as much accuracy as the nature of the situation admits, the extent of this futile expenditure.

Proportionate Cost of Estimating

Some time ago, the Illinois Chapter of the American Institute of Architects appointed a committee to investigate and prepare a report on the present method of securing competitive bids. One of the results of this inquiry was to establish approximately the proportion, the percentage, which the cost of estimating bears to the value of the contracts. Five representative general contractors furnished statements, showing the time and money spent by them in one year in making competitive bids for buildings which would cost as a rule from \$100,000 to \$150,000. The average number of jobs figured upon by each contractor was 72. The average number which he obtained was 10. On each estimate, the average value of time spent by the office force of each firm was \$125.00, I submit. But further, the average expense incurred on each estimate, in addition, by the numerous sub-contractors and supply men amounted to \$378. Now, \$125 plus \$378 makes a total of \$503 spent by each general contractor, his sub-contractors and material men on each



Mr. P. L. Fraser,
Secretary of the Toronto Builders' Exchange—one of the Delegates.

bid. In addition to this, the head of each contracting firm spent 21 per cent. of the total time devoted to this business, in estimating, and overseeing the work of estimating.

There are usually six or more tenders taken for each building. The committee took six, the minimum number, as a basis for their calculations. \$503 multiplied by six, gives \$3,018 (or from two to three per cent. of the value of the work), expended by these six firms bidding in preparing estimates. Each builder, on the average, tendered on 72 structures, so that the expense of estimating for the five contractors for these 72 buildings was \$180,583. But one-third of this amount is deducted for the sub-contractors bids in common, by the general contractors, leaving approximately \$120,000.

Only ten contracts were secured by each builder.—50 in all.

Therefore the expense of the bids from which work was actually secured was \$25,150, and the expense incurred for estimating other contracts, which they did not get, was \$95,000. This \$95,000 was a dead loss to the five contractors, sub-contractors and material men in one year. This sum is charged on the books as estimating and office expenses. Someone has to make up the loss and if the contractors are to run their business profitably, the owners from whom buildings are obtained, must pay for it. The figures quoted as having been ascertained by this committee appear reasonable, and at all events they illustrate, graphically, the serious waste where a number of contractors perform the same work of taking off quantities.

Official returns from thirty cities in Canada record a grand total of building permits issued during the year 1909 of \$68,606, 821. According to the figures submitted, the expense for estimating on the work amounted to about \$1,360,000. Of this amount about \$1,080,000 was spent fruitlessly. Another serious loss, from the standpoint of good construction, has been pointed out, and that is the time given by the heads of contracting firms in making and overseeing estimates.

Consideration of Suggested Remedies

Can a generally acceptable method be devised for compensating tenderers for their time, expense and trouble—a method that will be mutually satisfactory to the contractor, architect and owner alike? "There's the rub." Our present system of competitive contracts does not seem to foster real co-operation and sympathetic service. It appears rather to have been devised upon the theory that a contractor should obtain his profit by skinning the cost of the work down to the minimum possible without violating the terms of his contract. Rather should the builder be assured of a just remuneration for the skill, care and energy he devotes to the direction of the execution of the work. The principles of equity and justice are frequently absent from many present day contracts.

Let us turn to a brief consideration of prospective remedies. An English contractor has suggested that when a building is to be erected, the owner will select his contractor, a man of repute in his business, just as he selects his architect, and that they together bargain for the work to be done. Where the work is of an exceptional character they invite a limited number to submit estimates—each competitor to receive a premium for the trouble and work imposed on him. This, perhaps, is an ideal condition which would without doubt further the real interest of the owner as well as the contractor, and the substitution of such a method for the present one would certainly mean a great benefit and gain to the character of every building constructed. But as my paper does not embrace the subject of "The Dawn of the Millennium" we will not spend any more of our limited time on our English confrere's proposal.

Frankly, I confess that I can neither see nor suggest any practical method whereby tenderers may be directly compensated for their expense and trouble, or whereby the demerits of our system of competitive bidding may be wholly eliminated, so long as human nature is at present constituted. We will always have with us the owner who wants to go shopping around everywhere he can, for fear he will perchance miss a bargain to be obtained, perhaps, at the expense of an inexperienced or incompetent tenderer. On the other hand we have the contractor who bases his prospect for profit on a chance of varying the specification, the meaning of which may be none too clear or definite. From inquiries I have made, I can find no instances, in the regular course of business, where contracting concerns are reimbursed for bids submitted where the contract is not awarded to them. Measures, however, may be taken to reduce to a minimum the cost of figuring.

The practice of competitive bidding is a very old one, and time was when the nature of the work was such that an experienced builder could estimate the cost with fair accuracy. The modern structure, however, has become so complicated that in some instances it is no easy matter to prepare safe estimates for the work. For these exceptional and complicated works it

seems that a cost-plus-a-fixed-sum contract, is the fairest basis for carrying on the construction. For the general run of work, however, the lump sum contract seems to be the most satisfactory. In connection with this class of contract, the committee of the Illinois Chapter, to which I have already referred, submits an interesting proposal, the adoption of which would do away with nearly all the expense of preparing tenders.

The Professional Estimator and Quantity Surveyor

The plan in brief is to engage a professional estimator—paid by the owner. He would be absolutely independent in his position, like an auditor in financial matters. His success in business would depend on the reliability and accuracy of his estimates. Mr. Estimator would, I presume, have free access to the architect and would be able to secure a thorough understanding of all the details of the work to be done. He would submit his estimate or report on the cost of construction to the architect and owner. If the cost were satisfactory to the latter he could decide to proceed. The papers are turned over to a contractor in whom the architect and owner repose confidence. If he is satisfied with the estimate he would be awarded the contract for the estimated amount, plus a fee, depending on the character and magnitude of the structure. If, at the completion of the work, the building cost less than the estimate, it is suggested that the amount saved be divided equally between the contractor and the owner, and if the cost exceeded the estimate, then the loss would be divided equally. This arrangement, it is declared, would make the interests of the owner and the contractor harmonious, whereas now they are the opposite. While these suggestions are admitted to contain elements of merit, the plan does not receive general support.

Then there is the English practice of furnishing the bidder with quantities prepared by the "Quantity Surveyor." From an economic standpoint I have already directed your attention to the palpable waste of a dozen contractors, more or less, performing the same identical work of taking off quantities. When the quantity surveyor is employed, the contractor's estimating is reduced to a matter of placing prices on the various items. The architect is responsible for the assumed quantities and dimensions and the cost to the contractor of figuring is reduced to a minimum. It is the subsequent duty of the surveyor to check over quantities, and it is ascertained to what amount the builder is entitled for extras.

One objection is suggested to the introduction of the quantity surveyor into Canada. Lump sum contracts are in vogue in this country, and our present method of awarding contracts provides for placing upon the builder the entire responsibility for the cost of the building. When assumed quantities are furnished by the surveyor, to be subsequently checked, the gross cost is finally determined after the completion of the work. This, as has been pointed out, would be objectionable here to many owners, who would insist on knowing at the outset, just what the building was going to cost.

But why should all the responsibility, risk and loss from miscalculation, for which he is not responsible, always be borne by the contractor? The architect is assured of definite remuneration for services rendered by his office—and he is certainly entitled to all he receives in Canada. Why should the owner object to paying the builder for just what he gets and no more?

I submit that the employing of a quantity surveyor would

(1) Reduce to a minimum the cost of estimating to the contractor;

(2) Ensure (prima facie) that the contractor receive fair remuneration for all material furnished by him;

(3) Secure a square deal to the owner (as well as to the builder) in that the former would get all he paid for and pay for just what he got.

Of course, there may be a fly in the ointment in connection with this system—but we are not yet living in Utopia, and it seems evident that the practice of having quantity surveyors furnish quantities to contractors would be, for the reason given, an improvement on our present system here. I am getting on

in years and personally do not expect to see the day when contractors are directly compensated for tendering.

When an owner decides to pull down his barns and build greater, he is sure to become a staunch believer in the proverb, "Competition is the life of trade." But it behooves contractors to secure conditions of competition that are fair and just. Whether material compensation for figuring contracts is possible of attainment or not, it is not easy to say, but many of us, I feel sure, are convinced that there is an ethical compensation, in the way of which there are no reasonable barriers.

Insufficient Information to Bidders

We would often consider it welcome compensation for the care and time we spend in figuring contracts, if the plans and specifications submitted to us for tender, gave us reasonably full and adequate information as to work required to be done.

Many of the plans and specifications from our architects convey a clear conception of just what is to be performed, but in too many instances such is not the case. In some work that comes out for tender, the bidders, in effect, simply and consecutively, make a series of bets as to what in their respective judgments will be required to be done. A contractor will often figure certain work from $\frac{1}{8}$ -inch or $\frac{1}{4}$ -inch scale drawings and a weak specification. In the second act of the drama he is made happy by being awarded the contract, but in the third act, possibly a month or two afterwards, occurs the tragedy when he is generously presented with full-size details and dimensions of members, the like of which he had never dreamed and which produce the contractor's heart ache, that most of us, no doubt, have some time experienced.

You will agree that there are conditions prevailing in our present system of competitive contracting, which obtain in no other sphere of business activity. I have heard discussions and read articles wherein architects are unjustly blamed. We, ourselves, and not the architects, are the blameworthy ones, when we give definite and fast figures on work described on indefinite drawings and variable specifications. Safety in tendering lies either in the provision of proper details, or in the contracting concern submitting details showing definitely what they are figuring on.

What is often the cause of the wide difference in the bids of responsible and competent builders? And, why are contracts rendered unprofitable? Very often because of indefinite and weak specifications. When tendering, the contractor should be furnished adequate and comprehensive details and information. If this is difficult, the contractor should not be made to suffer in consequence.

With a plain, unmistakable specification, rigidly enforced, the business of the contractor will be less the vocation of the gambler. Prices will automatically become more consistent, and competitive tendering will become a more equitable practice.

In the discussion that ensued, Mr. J. H. Lauer expressed himself strongly in favor of having properly qualified quantity surveyors. Mr. Lauer instanced the success that had attended this practice in Great Britain. He thought that concerted action should be taken by the various Exchanges.

Mr. W. E. Ramsay quoted several forcible examples of the successful application of the quantity surveying practice in Montreal. He had always regarded it as an unqualified success.

Mr. Nesbitt was in favor of the system employed at Quebec, where bidders are supplied at a small charge with a bill of quantities. The speaker protested against the process of taking bids and then not awarding contracts. In this case there should certainly be compensation to the bidder. The various architectural bodies should be interested in this question.

Wednesday, February 9th

The morning session was opened with the reading of the following interesting paper by Mr. Chas. H. Gould:

This subject of organization is one which is occupying to a large extent the thoughts of the people to-day, and men are realizing as never before that only by united efforts can any branch of industry be a success. If the members of any such branch act independently of each other, they cannot fail to make life a struggle for the majority. Consequently, looking over the commercial and industrial conditions of to-day, we find that the members of almost every trade, business and profession have their organization.

I believe that the success or failure of any organization of men depends on two things, first, a true recognition of their position and the conditions by which they are surrounded, and second, their willingness to give the other fellow a square deal.

When the subject of this paper was named to me I noticed at once that it was divided into two clauses: (A) Employers helpless as individuals against the great labor combine, and (B) Shall the employer boss the job, or shall he be the mere tool of the labor "bosses?" I notice that it has been worded somewhat differently on the program, where it reads, "Shall the dog wag the tail or the tail wag the dog?"

I believe, gentlemen, that this is a wrong view to take of the conditions surrounding us. I fail utterly to find any fight to-day between labor and capital. There is, I know, a struggle on the part of labor for an existence which sometimes has the appearance of being against the interests of capital, but the real fight of to-day and that which is making life such a struggle for all men, is between capital and capital — contractor against contractor, supply dealer against supply dealer, manufacturer against manufacturer. Because of that struggle, labor suffers, and not recognizing the true condition of affairs, thinks Capital opposed to it, and sometimes tries to hit back.

I do not think there is a man present—and indeed but few in this country—who do not prefer to pay their workmen a good wage if possible, and I feel sure that if we can overcome the unjust conditions existing among ourselves, the solution of the labor problem will be an easy proposition. I believe that it is just as easy for the tail to wag the dog as it is for united labor standing alone to affect our interests.

For any industry to be successful, all the branch organizations of that industry must work together. What was it gave the people of Montreal that for which many of them had been wishing and fighting for a long time? The early closing law. Was it because the employees formed a society of their own, and ignoring everyone else, fought for and obtained it? Or did the merchants gain the point in that way? No, they tried that for a long time and failed, and at last, banding together, they demanded and got what they wanted.

Did the retail grocers reach the position they occupy to-day by fighting their employees and the wholesaler and manufacturer? They could never have gained their present position in that way, no matter how strong they became as an organization. They realized that theirs was but part of a still greater organization, and, recognizing the rights of others, agreed to respect those rights. In return they received the help they needed themselves, and to-day the whole grocery industry is firmly banded together and is a success.

What we who are engaged in the building business need, is to have every branch of our industry strongly organized—the workmen's organization to be composed of separate sections such as the bricklayers, carpenters, painters, etc., and the contractors, supply dealers, manufacturers, etc., to be fully organized along similar lines. An arbitration board composed of all the organizations should be established, this body having the power to decide all questions affecting two or more of the separate organizations.

But after we have accomplished all this there will still remain the two most important points to be gained, namely, (1) placing ourselves on a foundation which cannot be undermined, and (2) gaining the good will of the public; for no matter what agreements we may make among ourselves, if that is all we have to depend on we will be in a position where unscrupulous men can successfully work against us. A weak organization, if

approved of by the public, will be more successful than one of which the people are suspicious, no matter how strongly it may be formed. How can we gain these points? I do not think we can find a better answer to this question than by studying the methods by which the people of Montreal accomplished that which they desired.

Instead of agreeing among themselves to close their places of business at an early hour, (an agreement which some of them would have broken the next day), and then telling the people that they would have to put up with it whether they liked it or not, they made a public claim that they were working under unnecessary and unjust conditions, and asked that laws be made which would correct those evils. And having the support of almost all those who were affected by those conditions and having demonstrated to the public that they were demanding only that which was just, they obtained the laws they desired.

What then is the practical need of organization as regards ourselves? It seems to me to be that we gather together, if not all, at least a strong majority of those engaged in the several branches of the building business, and with all the influence we can obtain, demand from our governing bodies such laws as will remove from us those conditions, which are unjust and unfair, and then if the representatives of the people sanction those demands the public will not be afraid they are being treated unfairly, and it will be possible for us to absolutely stop all recurrence of those methods and customs against which we find it so hard to contend to-day.

This may seem to some the vision of a dreamer, but our friends of the hardware organization are meeting here this week, several hundred strong. If they can do that, why cannot we do even greater things? We certainly do not know what we can do until we try, and I have a strong hope that it will not be long before we are as far in advance of them as they are at present ahead of us.

But we must not expect our governments to spend their time thinking about laws to amend the things which are injurious to us, while we are too selfish—or too indifferent—to give of our time and energy to do something for ourselves. In union is strength, always. We can, if we will, place our industry in a strong and satisfactory position; but to accomplish that, we must work together.

Mr. J. W. Morley (Winnipeg, Man.) took exception to the statement that there is no antagonism between labor and capital. He quoted several instances of arbitrary conduct on the part of the unions. These bodies were all right so long as they confined themselves to their legitimate sphere. At present they were trying to curtail the number of hours worked and the amount of work done. In addition to this, they, of course, wanted to regulate the wages paid. The speaker thought that it was quite time for employers to get busy in their own interests. The remedy was for the employers to build up a stronger organization than the unions possessed.

Ex-Ald. Ferguson (London, Ont.) asked: "Have we, in our organization, sufficient power to counteract the work of the unions?" After all, the strength of the workmen lay entirely in their organization. The workmen themselves were ignorant. They had good advocates for their cause, and they followed them blindly. Were there not some suggestions in this for the C.N.A.B.?

Mr. Arthur Dinnis (Toronto) did not see why contractors should bother themselves about high wages. If wages were lower, they would have to make their tenders lower accordingly. He thought that contractors should devote their energy to securing better profit on the work, without troubling themselves as to the relatively high cost of labor, compared with former times.

President Crain expressed himself as being entirely in accord with Mr. Gould: "We should strive to make the interests of labor and capital identical," said Mr.

Crain, "and to secure the good will of the men. The only way to build up a business is to plan your organization and devise schemes for holding your staff together." The speaker was in favor of bonuses. It was a great incentive to a man to have an inducement of this kind before him and to be working for an employer who would keep faith with him. He, Mr. Crain, had taken work with practically no profit in it, solely with a view to keep his organization together. The whole solution of the problem was in treating the men properly and securing their co-operation.

Ex-Ald. Ferguson thought that this principle might work out satisfactorily in regard to small organizations, but such a scheme could not work out in the case of larger concerns who were obliged to frequently employ and discharge large numbers of workmen.

Mr. Crain said that this was a question of management. In the case of larger concerns the skeleton of their organization could be retained in the same way as was that of the militia in time of peace. It could be built up when required.

The main difficulty of the employer, from the point



Mr. J. H. Lauer,
Secretary-Treasurer C.N.A.B., to whose zealous work the
expansion of the Association is mainly due.

taken by Mr. William Pears (Toronto), was to be found in the fundamental principle of unionism—equalization of labor. Unionism had succeeded in establishing first, second and third rate workmen on one footing. The preponderance was with the third class workmen.

Mr. W. E. Ramsay quoted the success of his firm in granting presents to employees upon the completion of a particularly satisfactory, remunerative job.

Early in the afternoon, the delegates, responding to invitations from the Dennis Wire & Iron Company, Limited, the McClary Manufacturing Company, the Ideal Concrete Machinery Company, and Labatt's and Carling's breweries, paid a visit to these various industries where they were hospitably received and given an explanation of the various processes of manufacture.

The delegates found much interest in the Dennis Wire and Iron Works. A feature here was the construction of ornamental iron stair work, of which class of work the firm have a very considerable quantity in hand at the present time. Those who visited the pattern shop were interested in some rather unusual and difficult stair work patterns that were going through the hands of the wood workers. In the plating department were seen copper tanks with a capacity for handling the largest kind of architectural work. In the blacksmith department were be-

ing turned out, ornamental grills and railings. Upstairs were found wire working, light grill and locker departments. The construction and finish of the lockers seen in the various stages of construction were very favorably commented upon. The grill work, being manufactured for elevator fronts and other purposes, was also an interesting feature. In the round wire working department, wire window screens, the D. L. flexible door mat and other specialties in wire, were being turned out. The visiting delegates voted the Dennis works one of the most complete and up-to-date manufacturing establishments of its kind they had seen.

Some of the members visited the convention of the Retail Hardware Association and were much interested in the various exhibits made at that meeting.

Upon reassembly at headquarters, Mr. T. R. Wright (London) gave an address upon the "Rights of the Lowest Bidder." Mr. Wright said in part.

"Our trade has been honored, as has no other line of business, by the carpenter of Galilee, who taught us to do unto others, etc. I regret that this precept is often forgotten. We ought to be able to impress on the prospective builder that in placing his contract in the hands of a member of the Builders' Exchange, he can rest assured of having his building completed according to plans and specifications, without being subjected to trouble and litigation. As to the rights of the lowest bidder, I am of the opinion that if the man who puts in the lowest bid is a responsible contractor and has a reputation for supplying good materials and doing first-class work, he should be awarded the job. There are cases, however, when the contract should not be awarded to the lowest bidder. The reputation of the contractor should decide the point. For instance, suppose two contractors are figuring on the same job. The specifications call for the work to be completed in a certain length of time. One contractor always attends to business and rushes the work through so as to complete it in the time specified. The other has an unsatisfactory reputation for delaying work and causing annoyance to other trades. If two such men figured on the same job and the latter were the lowest bidder, I do not think that he should be awarded the contract. In conclusion, I would suggest that we impress upon the Government the need of a law compelling contractors to furnish bonds."

Mr. Arthur Dinnis and John Aldridge were opposed to throwing a man out after he had obtained the job. If he were incapable, he should not be allowed to tender in the first place. The rights of the lowest bidder were held by these gentlemen to be generally unassailable. Mr. Aldridge contended that it would be most injurious to trade if this were otherwise. An instance of close figuring was provided by Mr. Dinnis. He stated that he recently obtained a contract at \$1,986. The next tender was \$1,987.

Mr. W. E. Ramsay cited the practice of the Montreal architects. They have a preferred list of contractors engaged in the various trades, and never invite more than four tenders in any one department.

Mr. T. Cannon said that contracts should not necessarily be let to the lowest bidder. Inferior contractors should no more be allowed to set the price than inferior workmen should be permitted to establish a standard. The time would never come when the Association would have the power to settle the question. As to bonds for contractors, Mr. Cannon said that it was just as necessary to have proof that the client could pay for the building when completed as it was to have evidence to show that the contractor was able, financially and otherwise, to carry out the terms of his contract.

Following this discussion a number of resolutions were submitted to the convention by the committee

which had been specially appointed for the purpose. These were read and adopted. The more important resolutions are the following:

To provide working expenses during the current year, 1910, including ways and means to extend the organization of the C. N. A. B., by providing transportation expenses of the secretary or other properly-constituted delegate to visit such centres as have not yet affiliated with the National Association. The assessment for the current year, 1910, per capita on all constituent exchanges be and is hereby fixed at 50 cents per member of each local exchange. Said assessment shall be due immediately upon adjournment of present annual convention, as per constitution, Article VII.

That in cases of strikes, or labor troubles, additional help to replace strikers shall be sought by the builders' exchange affected, through the co-operation of the other affiliated exchanges of the C. N. A. B., who shall pledge themselves to render all assistance possible without disorganizing their own local trade requirements.

That the Departments of Public Works in Ottawa, Toronto, Quebec, St. John, Halifax, Winnipeg, Regina, Edmonton and Victoria be respectfully requested to furnish plans and specifications of all projected public works to the respective builders' exchanges existing in the vicinity of the work contemplated, in order to facilitate convenient access to such plans by intending bidders, and to ensure wider and healthier competition in the public interest, such local builders' exchanges to guarantee safe keeping and return of plans to the Department at expiration of date named for tenders.

That each affiliated exchange shall request its respective provincial association of architects, that, when calling for tenders, every local architect shall supply full details with plans and specifications when the nature of the work demands it, so as to secure intelligent estimating on the part of the bidder.

That in view of the Workmen's Compensation Bills, now before the legislature of Ontario and Manitoba, an urgent request be made to the local exchanges of Toronto and Winnipeg to obtain copies of such proposed legislation, and to carefully watch and oppose any clauses detrimental to the interests of employees, by memorializing their local legislative members and also demanding permission to present their side of the case before the respective parliamentary committees in charge of such bills. Furthermore, that the executive of the C. N. A. B. pledges any assistance in its power to the local exchanges in question by sending representatives to strengthen their efforts if requested.

(Copy of resolution adopted unanimously at a meeting of the Builders' Exchange, London, Canada, January 25th, 1910. Re bill to limit work on government contracts to 8 hours per day.)

(1) Whereas the adoption by the Federal Government of an 8-hour day on all public works would promptly result in a similar demand to be extended to all private building contracts; and

(2) Whereas such a law would undoubtedly lead to increased cost of building operations and consequent increase of rentals, constituting an added burden to the vast body of tenants (including artisans and mechanics) residing in our larger cities, to whom present high rents are already a serious item in the cost of living; and

(3) Whereas any such arbitrary limitation of the working day is opposed to the climatic conditions of Canada, inasmuch as exterior building is already confined by nature to about seven months, into which limited period it is essential to get all outside work completed; and

(4) Whereas such a measure would constitute a "privileged class" opposed to the democratic principle of "equal rights for all," and would unjustly discriminate both against mechanics and contractors on non-public works.

(5) Be it resolved, that while this association is ready at

all times to co-operate with the government in supporting legislation for the protection of life and limb in hazardous occupations, whether by shortening the hours of work or by other protective measures, such protection is uncalled for in the building trades; and the proposed legislation would be against public policy and constitute an unwarrantable interference with the personal liberty of the individual, unjust alike to the worker, who would thereby be prevented from turning his spare capital (i. e., his labor) to account by utilizing it to make prudent provision for the winter months; and to the contractor who on most contracts is bound to complete by a certain time-limit, and who would thus be discouraged from competing on government works, owing to the great risk involved.

Resolved further, that a copy of this resolution be sent to the chairman of the select parliamentary committee, and that a delegation follow later, at the convenience of said committee.

That the builders' exchange of each province be requested to petition their respective provincial governments when establishing provincial technical schools, to incorporate a system of practical trade schools for the training and development of mechanical skill.

(Mr. John Aldridge took objection to the manner in which this resolution is framed. The government should be induced to establish a system of schools on the lines laid down in Detroit. When a boy left school he should have the opportunity of taking a four-months' course in order to discover his natural bent. The government must be shown the need of practical work in the trade school.

There was some division as to where the next annual convention should be held. Winnipeg and Toronto being the cities under consideration. Mr. Arthur Dinnis, Toronto, finally withdrew his invitation in favor of Mr. J. R. Morley, and the next convention will be held in Winnipeg.

The election of officers resulted as follows:

President, Mr. E. T. Nesbitt (president Quebec Exchange).

Vice-President, Mr. J. W. Morley (ex-president Winnipeg Exchange).

Provincial Vice-Presidents.

Ontario, A. Dinnis (president Toronto Exchange).

Manitoba, W. H. Carter (president Winnipeg Exchange).

Quebec, J. N. Arcand (president Montreal Exchange).

Executive Council (one representative from each corporate exchange): John Aldridge (Toronto), Geo. A. Crain (Ottawa), Thos. Gilday (Montreal), Wm. Tytler (London), Emil Cote (Quebec), and Chas. S. Shipman (Winnipeg).

Secretary-Treasurer, J. H. Lauer (secretary Montreal Builders' Exchange).

Mr. Nesbitt expressed his appreciation of the honor conferred upon him and stated that he would work for the extension of the Association into western Canada. "Don't divide the east from the west," said Mr. Nesbitt. "what we should have is a national organization with a permanent staff and a permanent secretary, like the Canadian Manufacturers' Association." A hearty vote of thanks was passed in favor of the retiring president, Mr. Geo. A. Crain, of Ottawa, who made a suitable reply.

At the conclusion of the business proceedings, the London Builders' Exchange was presented by the C.N.A.B. with a handsome arm chair, with an engraved plate attached thereto, as a souvenir of the convention. A resolution to grant \$150 to the secretary-treasurer was carried with much enthusiasm. Mr. Lauer thanked the members and traced the line of the future work of the Association.

An Enjoyable Banquet

On Wednesday evening, February 9th, an enjoyable banquet was tendered to the delegates at the City Hotel by the London Builders' Exchange. About 150 were present. The toast list included the names of a number of excellent orators, and a good musical programme had been provided. The toast list was as follows: "Legislature of Ontario," Capt. T. E. Robson, ex-M.P.P.; "Municipality of the City of London," Aldermen J. H. Saunders and Stevenson; "Manufacturers' Interests," Messrs E. R. Dennis and Wm. Gerry; "Mercantile Interests," Messrs. S. Stevely and Donald Ferguson; "The C.N.A.B.," Messrs. Geo. A. Crain and J. H. Lauer; "The Sister Exchanges," Messrs. E. T. Nesbitt, A. S. Dinnis, W. E. Ramsay, Thos. Gilday and F. Armstrong; "Retail Hardware Association," Mr. Brocklebank; "The Architects," Messrs. H. C. McBride, W. G. Murray and A. E. Nutter.

Mr. E. R. Dennis, who replied to the toast of "Manufacturers' Interests," spoke of the importance of promoting and developing manufacturing interests. The speaker considered that technical education had an important bearing upon this. He referred to the excellent system of technical and trade schools now in vogue in Germany.

Mr. Geo. A. Crain, who replied for the C.N.A.B., spoke enthusiastically upon the business of a contractor. "If I had to start life over again," said Mr. Crain, "there is no calling I would chose other than the one in which I am now engaged." The speaker urged those present to strive to establish a higher standard of ethics in the business. Membership in the C.N.A.B. should stand for honest work—fulfilment of the contract to the letter. Mr. Crain concluded by thanking the various city bodies and the London Builders' Exchange for the hospitality shown the visitors.

Replying to the toast of "The Sister Exchanges," the new president, Mr. E. T. Nesbitt, gave an interesting account of what was being done at Quebec, where there were 71 Frenchmen and only three English-speaking members in the field. Mr. Nesbitt said that he attached special significance to his election as president. To him it was an indication that the C.N.A.B. was anxious to extend its good work into every section of the country.

Annual Banquet Quebec Builders' Exchange

The Quebec Builders' Exchange held its first annual banquet on February 5th. As a live and enterprising organization the Exchange ranks second to no other body in existence in Quebec. The members are enthusiastic in the work of the Exchange, taking the spirit from Mr. E. T. Nesbitt, their president, who organized the society in 1907. About 70 members and guests sat down to dinner, which was presided over by President Nesbitt. Others present included Messrs. D. Ouellet; Ald. Lemay, Emile Cote, vice-president of the Exchange; G. A. Vandry, president of the Quebec Board of Trade; Jos. Picard, president of the Quebec branch of the Canadian Manufacturers' Association, and P. A. Lamonde, first president of the Exchange.

President Nesbitt dwelt at some length upon the work and aims of the Exchange and referred to the need felt by the city for a system of building inspection. The speaker quoted from the "Contract Record" of Jan. 12. In this issue, building statistics were furnished by the principal cities and towns throughout the Dominion, but Quebec was notable only by its absence. Mr. Nesbitt appealed to candidates for civic honors in the municipal elections to pledge themselves to work for the organization of an inspection department.

Estimating by a Reliable Uniform System

The Fifth and Concluding Number of a Series of Practical Articles
Designed to Illustrate the Advantages of Up-to-date Figuring

Specially Contributed by W. M. BROWN, Collingwood, Ont.

Glazier Work—Frequently the glazier work is executed by the painter, and is, therefore, included in this item. Glazier work is usually considered of minor importance in building operations, but for the comfort and attractiveness of the home much depends upon its proper execution.

There are different kinds, qualities and shapes of glass adopted for the respective requirements. In the measurement of all glass, the extreme size to be taken and calculated into superficial feet. All fractions of inches to be charged as full inches. The kind and quality of glass to be minutely described. In measuring windows that have astragals, the panes of glass are measured to centre of astragals, and allowance made for insertion in side, top and bottom frames or rails. Sometimes the window sash includes glass, glazing and priming one coat oil paint. In large rooflights, the panes are measured separately and classed as to kind, and calculated into superficial feet and priced. Lattice work and glass to be measured together, not by the pane, but in compartments or lights, each compartment or light being measured at its extreme size. Glass in tracery heads or the like, to be classed separately, and the price to include for all moulds required. The prices for all lead lattice work to include iron stiffening rods and copper wire fixing, also pointing and painting. The diameter of rods and their distance from each other to be specially described.

The glass in windows having small panes, each containing under two superficial feet of sheet or crown glass, and separated only by astragals, to be measured within the frames, and over the astragals; any fractional parts at astragals not to be allowed, but the fractions at frames to be dealt with as previously described.

The cost of cutting glass to angle or circle to be included in the price per foot, but such glass to be classed separately, and the price to include for any moulds required. The price of glass in all cases to include for priming, puttying with pins, catches, and work glazing. Where painting is included with glazing the measurement shall be same as the glazing.

Painter Work—There are two departments of painter work, viz., outside and interior work. There are several features in connection with outside painter work that have to be considered in forming a correct estimate. There is the facility in which the work may be executed. Where much ladder work is required there is often the time lost in shifting and removing ladders to convenient positions. Again, there is usually a greater degree of caution exercised in this class of work, as the situations are more hazardous. This waste of time must be taken into account in framing and calculating the estimate. Again, the intricacy of the work should also be considered, such as painting ornamental crests and finials, or ornamental railings and gates. This depends, of course, upon the design; and careful attention should be given to this feature of the work. Wood linings, doors, etc., to be measured and calculated per superficial yard. Ornamental railings, gates and crests to be minutely described and classed separately, measured and calculated per superficial yard.

In measuring the painter work of conservatories, it

is preferable to see the work to be executed, as in many cases the expenditure of time on the astragals cannot be correctly calculated or measured by superficial measurement, and priced at a common rate. Frequently the cost of painter work of conservatories is ascertained by a note of the materials employed and time taken to execute the work. This method is generally the most satisfactory. Wherever mouldings or beads are painted a different color or shade they should be measured by lineal foot and charged for extra value. In measuring the interior painters' work of house, take each apartment separately. Note down what has to be done to ceiling. Measure same, the length by breadth, and calculate same into superficial yards, pricing at current



West Elevation (House at Collingwood, Ont. See Articles 1-4 of this series)

rate. Walls to be measured next in a similar manner, calculated into superficial yards and priced. Cornices to be measured and priced per lineal foot, the number of shades and girth to be stated. Centrepieces to be enumerated and priced, stating number of shades and diameter. Windows, doors and other woodwork to be measured and calculated into superficial yards and priced. When painting is done in shades, to be charged extra over common paint. Skirtings, bases and surbases to be measured per lineal foot, stating girth. Mantelpieces to be described and priced according to class. In estimating painter work the time of men travelling to and from the job to be considered and allowed for. Scaffolding also is an important item to be allowed for, especially for roofs of churches and public buildings. The architectural design will regulate the amount of scaffolding required, and the time employed in erecting the same.

At the close of the C.N.A.B. convention at London last week, two of the Winnipeg delegates, Messrs. J. R. Morley and J. W. Payne, left for Detroit, Mich., to attend the annual convention of the International Master Painters' Association.

Improving a Small Municipal Lighting Plant

**Economy of Skilled Engineering Service for Such Work
—Costs and Methods on an Interesting Case in Point**

Recent observation of the operating conditions in a number of small power plants suggests that the practice of such stations must be brought into harmony with methods found successful in large installations, if present sources of waste and inefficiency are to be removed. While it may be necessary to avoid the refinements which frequently produce record figures in large stations, enough of their methods remains to enable substantial savings to be gained under skilled engineering treatment. A recent investigation of the municipal lighting plant of Marblehead, Mass., by Mr. C. W. Whiting, of Boston, indicates certain lines of attack which not a few stations of small capacity might follow advantageously to secure greater service reliability and lower generating and distributing expenses. It is well to bear in mind that however satisfactory a plant may be as a mere source of current, close attention must be paid to the technical features of its administration and development if anything like acceptable service is to be expected.

The Marblehead station was found to have boilers of excellent type for the service required, the installation being a horizontal return tubular one with enough capacity to permit the retention of one boiler as a spare unit. Sources of inefficiency in the operation of the boiler plant were the presence of scale in considerable quantities; failure to check the weight of coal purchased or burned; absence of analyses of the feed water, and lack of means of measuring the quantity of water used by the boilers. With one boiler lying idle, the normal capacity available was equivalent to 444 k.w. at the switchboard with the present arrangement of the station. The maximum load on the station last year was 340 k.w. It was shown that an open feed-water heater would assist in the removal of scale-forming material, and that the use of a separate meter for boiler feeding would enable the performance of the boilers to be scrutinized effectively. In place of a fireman's estimate of the coal consumption during 24 hours, in 8 of which he is on duty, regular weighing was shown to be imperatively necessary for definitely successful operation.

The engines in the station were found to be well designed, well constructed and in good condition, with a combined normal capacity of 363 h.p. Both were connected to a line shaft by belting, and one was operated non-condensing, developing 138 h.p. at the fly-wheel. The second unit was a cross-compound condensing outfit rated at 225 h.p. at the fly-wheel. The belts and shafting absorbed about 30 h.p., and at the peak of the yearly load the engines were run at 51.5 per cent. overload. There was no reserve, and if either unit had been shut down during the peak, the town would have been in comparative darkness. The generators consisted of eight dynamos of assorted types and sizes, only one machine being of the standard 2,300-volt, three-phase, 60-cycle design now common in central station work. The direct current arc machines used in the plant were found to be worth little more than their scrap value, being obsolete in type, inefficient and badly depreciated, with hand regulation. Such equipment jeopardized the service by its retention. Although there was sufficient dynamo capacity in the plant to handle the peak load, the different machines could not be handled with any degree of flex-

bility on account of their character and the shaft drive. The switchboard was also found to be in need of re-modelling, there being seven panels of five different types in its composition. To secure better results it was pointed out that the three watt-hour meters installed should be placed where easier reading could be effected; that a watt-hour meter on the street lighting circuit would be useful, and improved wiring on the rear of the board advantageous.

The street lighting was found to be very unsatisfactory, with unsteady and poorly distributed units. It was found that by the use of so-called direct current metallic arcs, with mercury arc rectifiers, a total saving of \$1,649 per year could be made in the operation of the street illumination system, giving much better lighting than at present. Tungsten incandescent lamps were advised for supplementary service on the streets. Improvement in the methods of keeping the station records and in the complete tabulation of data called for on the blanks was also emphasized as necessary to the best service. The plant kept no record of the amount of cylinder and lubricating oil used, or the temperature of its feed water. The total estimated cost of current at the switchboard, including interest and depreciation on the cost of the equipment, but not on the cost of the land and building, was 3.67 cents per k.w. hour for last year. By making changes in the equipment and adding two small steam turbines, at a total cost of about \$28,000, it is estimated that the current can be furnished at 3.10 cents, a saving of $15\frac{1}{2}$ per cent.—"Engineering Record."

High Carbon Steel for Concrete Reinforcement

This was the subject of discussion at the Engineers' Club of Toronto on Thursday evening, Feb. 3rd. The topic was opened by Mr. Peter Gillespie, who referred at the outset to the experiments of Considere and others, showing that the extensibility of concrete in the immediate vicinity of steel reinforcement is very much greater than is that of concrete not reinforced.

The published results of experiments by several investigators were cited to prove that there is little evidence that visible cracks occur in concrete reinforced by steel the stress in which is not greater than 15,000 pounds per square inch. On the contrary, the elongation of plain concrete under stress is probably not greater than one-hundredth of one per cent. before rupture, a deformation which, having regard to the relative rigidities of the two materials, would accompany a steel stress not exceeding 300 pounds per square inch.

There is in concrete of the better grade a so-called "elastic limit" more or less clearly marked. This will occur at approximately 60 per cent. of the ultimate crushing strength. A working stress of half this, or 30 per cent. of the ultimate, would be permissible. For all intents and purposes, the elastic limit of the steel controls the ultimate strength of a steel-concrete structure, at all events for structures adequately or insufficiently reinforced.

In order to utilize, in case of necessity, a portion of the strength of concrete in excess of its "elastic limit,"

the elastic limit of the steel, should be developed after the elastic limit of the concrete has been passed. To have the ultimate strength of the latter coincide with the elastic limit of the steel would necessitate a factor of safety for steel much larger than is really necessary.

It was then shown that a working stress in steel of one-third its elastic limit to accompany a working stress of 30 per cent. of the ultimate strength of the concrete, will secure this desideratum. If this, again, be limited to 15,000 pounds per square inch, as above, it will call for an elastic limit for steel of 45,000 pounds per square in., a value, while higher than that of medium steel, is not likely to be accompanied by the treacherous qualities likely to display themselves in steel whose elastic limit and ultimate strength are excessively high.

Mr. C. R. Young, in discussing Mr. Gillespie's address, was of the opinion that the advantage of using high-carbon steel was practically limited to the increased factor of safety thereby introduced into the design. It was quite true, as Mr. Gillespie had pointed out, that a considerable widening of the range of loading upon the structure was made possible by employing for reinforcement a steel with an elastic limit of from 40,000 to 50,000 pounds per square inch, but the utilization of this reserve strength at all frequently, would be highly undesirable. Experiment had shown that cracks in the concrete adjacent to steel in tension could be detected by careful observation when the stress in the steel was only 5,000 pounds per square inch. An increase in the stress was accompanied by an enlargement and an increase in the number of the cracks, so that the best authorities were inclined to limit the working stress in steel reinforcement to 15,000 pounds per square inch and under. In Europe, working stresses still lower than this were commonly adopted, 12,500 pounds per square inch being specified in a number of building codes for continental cities. Since the moduli of elasticity of high-carbon steel and medium steel were practically the same, no greater stress could be used for the former than for the latter, and where overloading was highly improbable there was no advantage in employing a material of high-carbon content, by reason of its cost being greater than for medium steel and its properties subject to greater irregularity. The latter material being easily obtained and readily bent to the desired shape in the work, was in most cases more satisfactory than any other yet proposed.

Mr. L. J. Street suggested that the irregularity and brittleness of high-carbon steel might arise from the cooling of the bars by water before the last pass through the rolls.

Messrs. R. A. Baldwin, J. A. Culverwell and T. T. Black were of the opinion that serious effects might arise in reinforced concrete work if water were permitted to come in contact with the reinforcement.

Mr. T. R. Loudon pointed out the necessity for careful inspection for both high-carbon and medium steel reinforcement material.

Mr. C. M. Canniff, the president of the club, was in the chair.

At the regular meeting of the Engineers' Club of Toronto, held in the new Mechanical Laboratory Building of the University of Toronto last week, a lecture on "Turbine Pumps" was given by Prof. Robert W. Angus, who explained by the use of lantern slides the construction and operation of this type of pump and gave many details of the construction of the latest designs.

Good Roads Convention for Ontario

Nineteen counties in the Province of Ontario have adopted the Good Roads system and planned the improvement of 3,000 miles of their leading highways. The Good Roads Association of Ontario consider the time favorable for a general advance in the construction of good roads throughout the whole province. With this in view, they are arranging for a widely representative convention to be held in Toronto on March 2nd, 3rd and 4th. The programme will provide for a valuable series of addresses from superintendents of country road systems already in operation, explaining the method of construction, machinery and material used, cost, and other details. Experts, in addition, are being secured from New York, Pennsylvania, Massachusetts and other States where the finest roads in America have been built up. After a thorough discussion, it is proposed to decide upon some policy that will include the most valuable points of all these systems. During the convention a deputation will wait upon the Provincial Government to consult with it as to future assistance. As over 500 delegates are expected to attend, single fare rates will probably be secured. Communications should be sent to the Secretary of the Ontario Good Roads Association at Whithy.

It is rumored that Mr. G. H. Bryson will be appointed city engineer of Victoria, B.C., to fill the vacancy caused by the resignation of Mr. C. H. Topp. The latter will continue for a time in a consulting capacity, afterwards joining the civil engineering firm of Gore & McGregor.

During the recent convention of the Canadian Society of Civil Engineers at Ottawa a rumor was heard that the American Society might hold their annual meeting in the Federal capital.

City Engineer Bell has been invited to address the Good Roads convention in Toronto upon the subject of "Concrete Bridges."

Cost of Bricklaying by a Municipality

As a result of the very careful investigation of the Sewer Department of the City of Boston, Metcalf & Eddy, consulting civil engineers to the Boston Finance Commission, present in a recent report some very interesting facts regarding the cost of brick laying by municipal employees. Comparing the smaller sewers built by the Massachusetts Metropolitan Commission with those built by the day labor force of the City of Boston, the engineers find the prices ranging from \$9.04 to \$18.34 per thousand on the day labor work, whereas on the Metropolitan work done by contract the highest price was \$4.23 and the lowest \$2.77.

Based on the number of brick laid, the difference between the day labor work of the city and the contract work of the Metropolitan Board is as noticeable as is the difference in cost. These items are particularly interesting when it is noted that upon the city work, taking the average for a whole week, the number of brick per mason per hour was as low as 13, and the largest number was 242, as against 94 and 570 respectively upon the Metropolitan work. The highest number per hour for the average of an entire job done by the Sewer Division was 73, whereas the lowest average upon Metropolitan work was 165 and the highest 384.

The engineers show that to a considerable extent the excessive cost under city administration was due to the fact that sufficient work was not always presented to keep the masons busy, but taking material and labor costs into consideration it appears that the total cost for brick masonry in the sewers was \$30.75 per thousand brick and \$18.45 per cubic yard of brick work on the basis of 600 brick to the yard. It is shown that a fair price to pay for Portland cement concrete of this class would not be in excess of \$8.00 per cubic yard. The engineers therefore recommend the substitution of concrete for brick work in sewer construction wherever possible.



The New Toronto Plant (now in course of erection) of the Standard Sanitary Mfg. Company.

Important Branch Factory at Toronto

One of the most enterprising supply firms in the Canadian field to-day, and a concern which claims to be the largest manufacturer of plumbing fixtures in the world, is the Standard Sanitary Manufacturing Company of Pittsburg, Pa. The accompanying illustration is a view of the new Toronto factory of this concern as it will appear upon completion. The building will be constructed of reinforced concrete and will embody the latest features of design and construction in accordance with the progressive policy of the firm. Three or four hundred men will ultimately be engaged in this plant in the manufacture of "Standard" sanitary ware. The company is to be congratulated upon the establishment of this plant, which will facilitate matters greatly in distributing the products of the firm throughout the country. Moreover, it will increase the service rendered through the job houses which have already been established in Toronto. The Canadian office of the company is at 39 St. Sacramento street, Montreal. The Toronto show rooms are at 55-61 Richmond street east.

Discussion on the Quebec Bridge Disaster

The discussion of the Quebec bridge disaster is one that loses no interest, and there is practically no limit to the information that can be gleaned from its mass of wreckage.

Mr. Henry Holgate, C.E., who gained an intimate knowledge of details of the failure, from his work on the investigation commission, made the Quebec bridge the subject of a satisfactory lecture in Montreal on the 10th inst. Mr. Holgate had a number of excellent slides, showing chiefly the south anchor arm and the cantilever arm. In the course of his discussion, he laid stress upon the fact that the raw material used in the construction of the bridge had been without a flaw. In spite of the great contortion and twisting that the steel had undergone, the closest inspection had failed to reveal a single crack. The friction, due to the falling, had been terrific, and as a result the metal in places had melted and fused.

The collapse had been due to the failure of one rivet, but even if this had held, it is questionable whether the

bridge would not have failed at another point. The designers had estimated the dead load upon the members at 55,000,000 pounds, whereas in reality the actual dead load upon the bridge was 75,000,000 pounds. Older bridges, Mr. Holgate pointed out, were able to carry larger loads than designed for, because, through gradual usage, the different members were working in unison to best advantage. This, of course, could not be possible in the new bridge.

An interesting fact pointed out by Mr. Holgate was the design of the different members. Tension chords were made smaller than they were when actually in place, while compression chords were made larger. The setting of the members were consequently loose jointed, the compression members being oftentimes fifteen degrees out of plumb. Mr. Holgate also drew attention to the fact that in planning the Quebec bridge, the designers had used a higher unit stress than had previously been customary for this class of construction.

Montreal Branch Can. Soc. C. E.

A meeting of the general section of the Montreal branch of the Canadian Society of Civil Engineers was held on Thursday, the 10th inst., in the Dorchester street rooms. The paper dealing with "The Avonmouth New Harbor, Wet Dock and Graving Dock," read a short time ago by Mr. A. D. Swan, was discussed. The question of the relative cost of construction work in Canada and Great Britain was brought up, and at a later date Mr. Swan will give some interesting figures covering this subject. A short paper on reinforced concrete pile work, by Mr. E. Mohun, M.C.S.C.E., was also read. The meeting of the electrical section, called for the 24th inst., will not take place until a later date, when a paper will be read by Mr. J. E. Dalemont, on "Resistance in Transmission and Distributing Circuits."

Permits issued at Cornwall, Ont., during 1909 represented a value of \$30,000, compared with \$15,000 for 1908. Mr. McTavish, town clerk, informs us that the prospects for 1910 depend largely upon what takes place at Ottawa in connection with the proposed dam at the Longue Sault Rapids.

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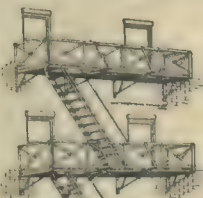
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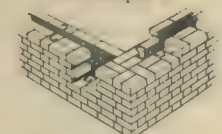
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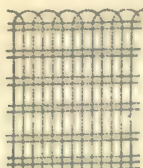
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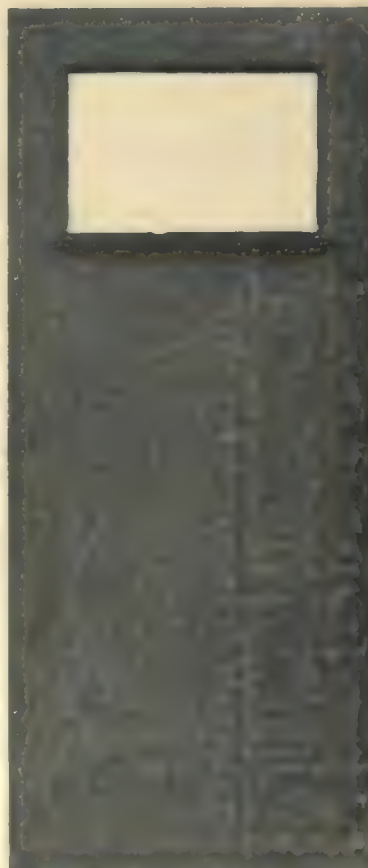


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Personal News and Notes

The Winnipeg Builders' Exchange will hold its annual banquet on Feb. 21st, in the Manitoba Hall.

Mr. T. Harry Mace has opened an office as consulting engineer at 630 Confederation Life Building, Toronto.

At London, Ont., last month, building permits were issued to the value of \$61,810. The total for January, 1909, was \$24,385.

At the annual dinner of the Plumbers' Company held in London, England, recently, the Lord Mayor of York, as a practical plumber, urged the advisability of retaining the old apprenticeship system.

Mr. A. R. Macdonell, the contractor who built the Temiskaming & Northern Ontario Railway, will ask the Government for a fiat in order to enable him to sell for the payment of extras in connection with the construction of the road.

Mr. Stephen Newton, formerly erecting engineer for the Dominion Bridge Company, of Lachine, has accepted the position of general superintendent of construction for the Structural Steel Company, Limited, of Longue Point, Quebec.

A dispatch from Windsor, Ont., states that Mr. Basil D. D. Rorison, aged 26 years, a civil engineer employed by the Detroit River Tunnel Company, was instantly killed by falling 60 feet down shaft No. 1 at the Canadian approach to the M.C.R. tunnel.

The International Waterways Commission has finished the report of the proposed million dollar dam to be built between Lake Erie and Niagara river to raise the level of Lake Erie. It will be submitted to the Governments at Washington and Ottawa. The report has taken six years to prepare.

At the fortnightly luncheon of the Manitoba Association of Architects held recently, the advisability of an amalgamation of the provincial architects' associations throughout the Dominion with the Royal Architectural Institute of Canada was discussed at some length. The holding of educational classes was also brought up for consideration and arrangements were made for a regular series.

Samuel Cabot (Inc.), Boston, Mass., are publishing a concise and interesting little booklet dealing with their waterproof brick stain and preservative for coloring and waterproofing brickwork. From the number of testimonials sent in to the firm by satisfied users, it would

appear that the company's products are going ahead on their merit. Other lines manufactured by the firm are creosote shingle stains, sheathing and deafening "quilt," waterproof cement stains and "Conserve" wood preservative.

It was rumored recently that Mr. J. S. Irvin would retire from the board of the Canada Cement Company on account of his interest in a new cement plant at Spokane, Wash. The construction of the Spokane plant will begin early in the spring and Mr. Irvin will be president of the company. Mr. Irvin emphatically denies the report of his retirement and expresses his confidence in the future of the Canadian concern. It is announced that the Canada Cement Company has received the contract for supplying all the cement required in the construction of the Quebec bridge. It is possible that the contract will call for 150,000 barrels or more.

The first meeting of the Engineers' Society of the University of Manitoba, held at Winnipeg last week, was addressed by Mr. T. Aird Murray, C.E., on the subject of sewerage disposal. H. N. Ruttan, city engineer, presided. Mr. Murray took up the history of the sewerage disposal and spoke of the results obtained in England, Germany, Austria and France and the recent installations in America, deducing from these what is to-day considered the most efficient method of disposal. Mr. Murray presented lantern slides illustrating these principles. The student attendance, as well as that of the outside members of the profession, evidenced the popularity of the course. The society will be addressed later by City Engineer Ruttan and J. E. Schwitzer, chief engineer of the C.P.R. western lines.

The fifth annual convention of the Ontario Retail Hardware and Stove Dealers' Association was held at London, Ont., on February 8-11. It was attended by representatives from every corner of the province and distant parts of Canada. In all, about 250 attended the convention. Hardwaremen were present from New Brunswick, Manitoba, Saskatchewan and Alberta. An interesting feature of the meeting was the exhibition. Prominent among the exhibitors were the following firms: Ideal Concrete Machinery Company; Scott Machine Company; Dennis Wire & Iron Company, Limited; Hobbs Manufacturing Company; Goldie & McCullough; International Varnish Company; Lufkin Rule Company; F. W. Bird & Son; Brantford Roofing Company, and Gurney-Tilden Company. The front of the City Hall was converted into a modern store front. At night, the building was illuminated by an electric "Welcome to London." The officers of the association are to be congratulated upon the successful manner in which the various arrangements were carried out.



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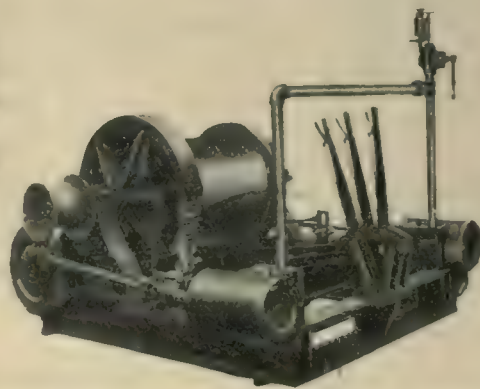
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Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Halifax, N.S.

Tenders for \$20,000 30-year 4 per cent. debentures are being received until March 9th for the purpose of building sewers.

Medicine Hat, Alta.

The council has decided to spend over \$60,000 this season in extending the sewerage system and cement walks.

Orillia, Ont.

Tenders are being called by the town clerk until March 7th for sewage pumping machinery. For further particulars see advertisement in this issue.

Ottawa, Ont.

Among the estimates prepared by City Engineer Ker are the following: Repairing pavements, \$10,000; road maintenance and repairs, \$30,000; new macadam roads, \$20,000; bridge repairs, \$3,600; concrete walks, \$3,000; plank walks, \$2,000; sewer main, \$5,000. Waterworks—Old aqueduct, (renewing piers), \$4,000; renewing old services, leaks, thawing, etc., \$10,000; laying new services, \$15,000; renewing and repairs to hydrants, \$3,500.

Port Arthur, Ont.

The council plans an extensive paving programme with the opening of the construction season. All streets in the business section of the city are to be renewed.

Saskatoon, Sask.

The city will spend \$90,000 in waterworks and \$110,000 on sewer extensions.

Thorold, Ont.

Tenders will be received until February 26th for the purchase of \$3,573 20-year 5 per cent. sewer debentures, issued under Local Improvement Act. D. J. C. Munro, town clerk.

AWARDED.

Ottawa, Ont.

Newton J. Ker, City Engineer, writes that the contract for the supply and delivery of 3,000 lineal feet of 42 inch intake pipe has been awarded by the Waterworks Committee to the International Marine Signal Company of this city for \$17,290.

Toronto, Ont.

The Board of Control awarded the contract for the construction of the outfall sewer, in connection with the sewage disposal works to Mr. F. H. Dickenson, of Hamilton, for \$125,504. The Constructing & Paving Company, of Toronto, also tendered, but withdrew before the tenders were opened. Their price was \$104,900, or \$20,604 less than Mr. Dickenson's. The Canada Foundry Company was awarded the contract for special castings needed in connection with the plant, but the pipes, valves, cranes, etc., will be supplied by English firms.

Vancouver, B.C.

George Ledingham was awarded the contract for laying ten miles of cement side-

walks at 12 1-2 cents a square foot. This is half a cent higher than last year's rate. Other tenders were: McEachern & Richardson, 13 1-2 cents; D. G. McKenzie, 13 1-2 cents, and 14 cents for walks over 6 feet wide; Palmer & Henning, 13 1-3 cents. Tenders for three years' supply of crushed rock ranged from \$1.95 to \$3.05 a cubic yard, according to length of haul. The city's present contract with the Coast Quarries Company expires about July 1st, and is at \$1.75 a cubic yard. The tenders for block paving covered the following sections:—Georgian street, from Burrard to Cardero; Georgia street, Cardero to Chilco; Burrard street, Hastings to Robson; Howe street, Robson to Nelson; Beatty street, Pender to Georgia. The prices were as follows: M. P. Cotton, wood blocks, Georgia street, first section, \$59,392; second section, \$39,400; Burrard street, \$55,950; Howe street, \$8,232; Beatty street, \$22,427. Palmer Bros. & Henning, wood blocks, Georgia street, first section, \$55,791; second section, \$37,729; Burrard street, \$53,917; Howe street, \$7,685; Beatty street, \$20,620. T. R. Wickson & Company, wood blocks, Georgia street, first section, \$57,484; second section, \$36,443; Burrard street, \$55,108; Howe street, \$7,893; Beatty street, \$21,625. Hassam Paving Company, Hassam concrete pavement, Georgia street, first section, \$52,413; second section, \$36,913; Burrard street, \$48,494; Howe street, \$7,153; Beatty street, \$19,326. M. P. Cotton, concrete pavement, Georgia street, first section, \$64,189; second section, \$42,083; Burrard street, \$60,773; Howe street, \$8,954; Beatty street, \$23,547. Palmer Bros. & Henning, granolithic pavement, Georgia street, first section, \$68,663; second section, \$47,433; Burrard street, \$66,470; Howe street, \$9,638; Beatty street, \$24,849. R. S. Blowe Company, granitoid pavement, Georgia street, first section, \$59,076; second section, \$41,588; Burrard street, \$56,655; Howe street, \$8,308; Beatty street, \$21,748. Palmer Bros. & Henning, bitulithic on concrete base, Georgia street, first section, \$71,310; second section, \$52,733; Burrard street, \$69,450; Howe street, \$10,108; Beatty street, \$25,662. Warren Construction Company, Georgia street, first section, \$59,793; second section, \$46,345; Burrard street, \$57,424; Howe street, \$8,357; Beatty street, \$21,212. Warren Construction Company, bitulithic on bituminous base, Georgia street, first section, \$53,258; second section, \$44,025; Burrard street, \$52,949; Howe street, \$7,704; Beatty street, \$19,577. The pavement tenders were referred to City Engineer Clement to be considered at next meeting.

Railroads, Bridges and Wharves

Erockville, Ont.

The ratepayers will be asked to vote on a \$16,000 by-law for bridges.

Chapleau, Que.

It is reported that bids will be received until February 28 by the Department of Public Works, Ottawa, Ont., for construct-

ing piers, abutments and approaches for a highway across the Culbut Channel of Ottawa River.

New Westminster, B.C.

The residents of Annacis Island are anxious to secure a \$40,000 bridge to connect their island with Lulu Island.

Ottawa, Ont.

It is understood that the Government has decided to grant a subsidy toward the construction of a dry-dock at Sault Ste. Marie. Cost, \$600,000.

St. John, N.B.

The Board of Trade have passed a resolution urging the building of the Valley railway from Grand Falls to St. John along the western side of the river.

St. Thomas, Ont.

County Engineer Bell is preparing plans for the construction of a steel and concrete bridge 16 feet wide, with sidewalk, at Port Burwell, and for a concrete bridge in Southwold to replace Dodd's bridge on the L. & P. S. gravel road, north of the city.

St. Johns, Nfld.

At a recent meeting of the Board of Trade of Montreal, Que., a letter was read from the Trade Commissioner for Newfoundland, stating that the Reid Newfoundland Company was building 250 miles of railway, and it was understood that the rails would be laid in the spring. It was also understood that the locomotives and the necessary rolling stock would be built by the Reid Company. The letter went on to state that the commissioner would like to see Canada secure some of these orders.

Toronto, Ont.

Surveyors have been put at work by the G. T. R. west of Strachan avenue in preparation for the depression of the tracks to Sunnyside and the elevation of them from there to the Humber, as recently ordered by the Railway Commission.

AWARDED.

Fredericton, N.B.

Hon. John Morrissey, Chief Commissioner of Public Works, has awarded a contract for the substructure of the new Shediac bridge to Julien S. Fournier, of Shediac. The contract price is between \$6,000 and \$7,000.

Hon. John Morrissey, Chief Commissioner of Public Works, has awarded the contract for the Starkey bridge, Parish of Johnston, Queen's County, to Kenneth McLaggan, of St. Mary's. The contract price is in the vicinity of \$8,000.

Toronto, Ont.

The contract for the construction of a steel viaduct over the North Wabie river has been awarded to the Hamilton Bridge Company by the Commission of the T. & N. O. Railway.

Winnipeg, Man.

The J. D. McArthur Company has secured the contract from the Grand Trunk Pacific for the sixty miles of the Regina

Melville branch, from Balcarres to Regina. The same firm has secured the balance of the Tofield-Calgary line, a distance of 135 miles. Both contracts are to be finished by the end of October 31, and the company will have the tracks ready for operation by the end of this year.

Tenders were received by the Board of control yesterday for the steel superstructure of the Louise bridge. The following firms bid for the contract:—Canadian Bridge Company, \$123,500; Algoma Steel Bridge Company, \$126,216; Dominion Bridge Company, \$147,400; Wm. Jacks & Company, \$164,415; Cleveland Bridge & Engineering Company, \$193,898. The Canadian Bridge Company make a note that they require piers to be lengthened and widened, at an additional cost, which brings their tender up to \$431,165. The Dominion Bridge Company make the same requirement, bringing their tender up to \$153,274. The location of machinery by the Algoma Steel Bridge Company would require to be altered and moved from the top of the pier where they designed it, to a cabin over the roadway. The extra cost of this would add \$250, bringing their tender up to \$126,466. The requirement of larger piers asked for the Canadian Bridge Company might be overcome, but there is another objection to their design, in that the strain sheets of the trusses show that there is not quite sufficient material to comply with the city's specifications. The amount of steel provided for in the tender of the Canadian Bridge Company is 900 tons; that of the Algoma Steel Bridge Company, 938 tons, exclusive of tracks and floor reinforcements. If it is not required to keep traffic going during the erection of the bridge, a deduction of \$3,000 to \$4,000 should be made from the cost. The board recommended the award to Algoma Steel Bridge Company.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

The plans prepared by Thos. Sinclair, architect, for the new church to be erected by the congregation of St. Mary's have been accepted. They call for a building 104 feet long by 50 feet wide.

A committee composed of Messrs. J. Hanbury, R. Darrach and others was appointed to look into the matter of a new wing to the hospital or that of alterations, which would cost about \$17,000.

Cobourg, Ont.

The offer of Mr. Harry Black, of New York, to give \$10,000 towards the new hospital has been accepted by the joint boards of the town council and board of trade.

Chilliwack, B.C.

Tenders addressed to J. N. Ashwell, city clerk, will be received until February 28th for the purchase of 10-year \$4,500 school debentures, 5 1-2 per cent.

Eganville, Ont.

J. R. Campbell, secretary, will receive competitive plans and specifications for an eight-room school house with basement, plans to provide for heating and ventilating. Price of plans, \$75. Proposed cost of building from \$10,000 to \$12,000.

Fergus, Ont.

Tenders have been called for the removal of the building occupying the site for the proposed new library on St. Andrew street. P. Perry, secretary-treasurer, Library Board.

Fraserville, Que.

The Town Hall was destroyed by fire on the 16th inst. Total estimated loss, \$25,000.

Fernie, B.C.

Ald. Cree, of the city council, has given notice of a by-law to amend the fire limit by-law so that the Dominion Government may erect a frame drill hall.

Fonthill, Ont.

Arrangements are being made for the construction of a four-room school house at a cost of \$8,500.

Flesherton, Ont.

W. J. Bellamy, secretary, will receive competitive plans and specifications for an eight-roomed school house, with basement, and also plans and specifications for a four-roomed school house, with basement, plans to provide for leveling and ventilation, for "Artemesia Rural High School." For the eight-room building the board will pay \$60, and for the four-room building \$35. Competitors to give approximate cost, exclusive of furnishing. Proposed cost of eight-room building from \$10,000 to \$14,000, and four-room building from \$8,000 to \$10,000.

Halifax, N.S.

The new naval college which is to be built in connection with the Government's naval scheme at a cost of \$150,000 will, it is understood, be located at Halifax, as will also be a barracks for staff, etc., at a cost of \$200,000 and possibly an admiralty dockyard at an estimated cost of \$100,000.

Hamilton, Ont.

It is stated that the new east end police station will be situated at the corner of Barton street and Kinrade avenue.

The Board of Hospital Governors is said to be planning the erection of a 3 storey addition to the Nurses' Home, the cost to be \$23,000.

Architects are invited to submit plans, etc., for a new public library here. Plans to be delivered not later than April 16th. For further information apply to Adam Hunter, secretary, Public Library Board.

London, Ont.

The financial committee have decided to obtain plans for a new registry office and also estimates of the probable cost of improvements. Noted in issue of January 19.

It is stated that Hamilton Road Presbyterian Church will build a new church at a cost of about \$10,000. Mr. E. Bourne, 423 Hamilton road, chairman of Board of Managers.

It is understood that the erection of King Street Presbyterian Church will be commenced within a year or so, and that a new site, on either Dundas street or Queen's avenue, in the east end, will be secured. Pastor, Rev. Mr. Rollins.

Lakeview, Ont.

Tenders addressed to John A. Saxton, chairman, building committee, will be received until February 23rd for the erection of Baptist church. Plans, etc., at office of Thomas Wooster, architect, Aylmer, Ont.

Minnedosa, Man.

Tenders will be received by the trustee board of the Methodist church until February 26th for the erection of a two storey brick ginner parsonage. Specifications at post office. Harvey Armitage, secretary-treasurer.

Montreal, Que.

The Royal Arthur School, Canning street, sixteen class rooms is under the supervi-

sion of A. F. Dunlop, Lindsay Building, and is to be completed by August next.

The Art Gallery on Phillips Square, it is stated, has been sold to Mr. James Maher, contractor, 57 Guardian Building.

The Board of Commission of the Montreal Technical School have deferred action in the matter of awarding the contract for the heating and ventilating and power equipment for the Technical School.

Mr. Theo. Daoust, architect, 103 St. Francois Xavier, is receiving tenders this week for the construction of buildings for the amusement enterprise at Isle Grosse Bois.

MacDuff & Lemieux, architects, 212 Merchants Bank Building, have been appointed to draw plans for a new church building and Presbytery for the Parish of St. Zotique, St. Henri.

It is stated that a Normal School for training of Roman Catholic teachers will be erected on the southeast corner of Atwater avenue.

New Westminster, B.C.

The Provincial Government has given one and a half acres of land on Lulu Island to the school board for use as a site for the proposed new school in that district. Chairman, T. J. Trapp.

Owen Sound, Ont.

The scheme to sell town hall and build a new one on west side is said to be favorably considered by the citizens.

Ottawa, Ont.

The Salvation Army has decided, if practicable, to build a rescue home.

W. N. Noffke, architect, is receiving tenders for extensive alterations to the basement of the Central Chambers.

Port Arthur, Ont.

Tenders are being called until February 28th for the erection of a Masonic temple, exclusive of heating, plumbing and wiring; the building to be completed by 1st of September. Plans, etc., at office of M. B. Aylesworth, architect, 27 Cumberland street.

Phoenix, B.C.

The board of trustees have petitioned the Provincial Government for a grant of \$10,000 towards a new school. Ernest Miller, M.L.A. for Grand Forks, is interested.

Princeton, B.C.

The committee appointed by the Board of Trade to take initial steps toward the erection of a general hospital, report that a site of six lots has been donated by the Vermillion Forks Company. Secretary-treasurer, Board of Trade, H. H. Avery.

Penetanguishene, Ont.

C. J. Vicotte, Chairman County Property Committee, writes that the tenders for heating jail in Barrie will not be called for a while, alterations in plans being necessitated.

Regina, Sask.

It is stated that the Methodists will establish a college here to cost \$250,000.

Riviere du Loup, Que.

The City Hall was completely destroyed by fire on the 16th inst. Loss, \$30,000.

St. Thomas, Ont.

The citizens have contributed \$5,000 towards the erection of a new Y. M. C. A. building on condition that the committee raise \$40,000. A canvas will be made. The present site will be used.

St. John, N.B.

The survey for the new exhibition building was made recently. Extent, 60 x 100 feet. Mr. Good, manager.

Smith's Falls, Ont.

G. T. Martin, architect, has prepared plans for the new general hospital, which will call for an expenditure of about \$18,000, including heating.

Toronto, Ont.

The Board of Education are calling for tenders until the 25th inst. for masonry and plastering in the erection of Logan Avenue School. For further particulars see advertisement in this issue.

The trustees of Bathurst Street Methodist Church have approved of plans for a modern Sunday School structure to be built on the site of the present school, on which work will begin next spring. Cost, about \$25,000.

Plans and specifications for the police station and fire hall at the corner of Main street and Swanwick avenue, and for the fire hall at the corner of Howland avenue and Dupont street, are to be prepared as soon as possible by the City Architect. The cost of the former building is to be \$28,000 and the latter \$27,000.

Wm. Morris, manager of the Majestic Theatre and head of the Morris vaudeville circuit, has leased a property on Yonge street, just north of Queen. A modern theatre building will be erected.

It is rumored that a new company has been formed and that options have been secured on houses on Wood street, on which an arena will be built.

Victoria, B.C.

A club house is being erected for the members of the Empress Athletic Club.

A modern athletic club house is being constructed on the foreshore of Shawinigan Lake in the vicinity of Koenig's Hotel. Estimated expenditure, \$10,000. S. Heald is interested, also the James Bay Athletic Association.

Vancouver, B.C.

The Board of Works have decided to erect an incinerator to cost \$70,000. Tenders are to be called at once.

W. A. Leech, schools architect, will be asked to prepare plans for two new buildings on the Mount Pleasant school grounds. The by-law is being prepared.

An automobile club is being organized, and a club house proposed to be built near the international boundary line on the sea coast. Several plans have been submitted by city architects.

Whitby, Ont.

Mr. Robert Findlay, architect, 10 Phillips place, Montreal, Que., has completed plans and specifications for a Nurses's Home to be erected in Whitby, Ont. Tenders are being received by Mr. J. D. Flavell, Lindsay, Ont.

Walkerton, Ont.

The members of the English Church have decided to erect a new church on Colborne street. Work will be started in the spring. Estimated expenditure, \$8,000.

Woodville, Ont.

The Methodist church here was almost completely wrecked by an explosion on the 16th inst.

Winnipeg, Man.

Among the recommendations made by the University Commission is one for the establishment of an engineering college and a college of domestic science.

A large colored drawing of the proposed provincial university buildings has been placed in the window of Hart's book store, by Mr. Heubach, of F. W. Heubach, Limited, showing how the 160 acres he is will-

ing to deed to the government for this purpose can be laid out.

AWARDED.**Guelph, Ont.**

The tender for the electric wiring of the new Forsyth-Hepburn Nurses' Home has been awarded to Mr. Clarence Noice, of this city.

Moncton, N.B.

The contract for overhauling the Davidson theatre has been given to Arthur LeBlanc. Summer Company have charge of the installation of the boilers, radiators, etc.

Ottawa, Ont.

J. Herbert George, architect, has awarded to Alex. Christie, contractor, the bulk contract for the new theatre to be erected on Queen street. Estimated cost, \$30,000.

Messrs. Horwood & Taylor, architects, have awarded the bulk contract for the erection of the new golf club to H. C. Hitch, 98 Commercial Union Building, Montreal. Estimated cost, \$45,000.

Sarnia, Ont.

W. D. Giffin has been awarded the contract for the new club house for the Sarnia Golf Club.

Stratford, Ont.

T. J. Hepburn, architect, writes that the following tenders have been awarded for the addition to the General Hospital:—Foster Clase, mason work; Wm. Daly, carpenter work; L. Hassell, plastering; A. O. Neff, painting and glazing; McDonald & Henry, plumbing, steam heating, gas fitting, metallic lathing and ventilation; Parkin Elevator Company, for hydraulic elevator and dumb waiter; F. Entrican, contractor for supply of bricks. The combined tenders amount to \$20,786.

Residences**Montreal, Que.**

Tenders were received up to the 23rd inst. for the erection of a residence on Roslyn avenue, Westmount, for Mr. G. H. Bishop. Mr. Robert Findlay, architect, 10 Phillips place.

Toronto, Ont.

Tenders will be received until March 7th for the various trades required in the erection of a residence on Oriole road. Plans, etc., at office of the architects, Darling & Pearson, 2 Leader Lane.

Victoria, B.C.

Judge Galliher will erect a residence on the southwest corner of Rockland avenue and St. Charles street. Estimated expenditure, \$12,000.

Vancouver, B.C.

A. Campbell Hope, architect, has prepared plans for R. M. Edgar for a new six storey apartment house on Beach avenue between Jarvis and Bute street, extending back to Pacific. Dimensions, 130 feet on Beach and 127 on Pacific. Materials, brick and stone. Estimated cost, \$175,000.

AWARDED.**Montreal, Que.**

Sub-contracts for the plumbing and heating of a residence on Cedar avenue, for Mr. J. Earl Birks, has been awarded to John A. Gordon, 301 St. Antoine street. Geo. T. Hyde, architect, 157 St. James street.

Chas. W. Steele, lumber merchant, Bethune, Sask., has sold to Beaver Lumber Company, Limited.

Business Buildings and Industrial Plants**Brandon, Man.**

The ratepayers will vote on the 28th inst. on the agreement between the city and the C. N. R. re the new hotel.

Calgary, Alta.

The C. T. Reineck Company, Portland, Ore., according to reports, has decided to build a plant at East Calgary for manufacture of stoves and kitchen ranges. Estimated cost, \$100,000.

Digby, N.S.

It is stated that the executors of the Nichols estate intend erecting a business block on Water street, opposite the D. A. R. station.

Dunnville, Ont.

The by-law to authorize a loan of \$30,000 to the Canadian-American Gas & Gasoline Company was carried. By the agreement the company will erect a foundry and machine shop to cost \$45,000.

Durham, Ont.

It is stated that the Furniture Company will erect a chair factory here in the near future.

Galt, Ont.

It is reported that a new shoe factory will be established here in the near future. Dr. J. H. Radford and Mr. Stewart are interested.

Humberstone, Ont.

A new bank building is to be erected on the site purchased some time ago by the Imperial Bank.

Hamilton, Ont.

W. H. Cooper has taken out a permit for the erection of an addition to the wood room of the International Harvester Company, to cost \$7,500.

Kingston, Ont.

The City Council and Board of Trade are considering an offer of D. Roy Smith, of Boston, regarding the erection of an hotel on the Carruthers site on King street, to cost not less than \$250,000.

Kincardine, Ont.

The Bank of Hamilton will erect new premises here.

London, Ont.

The London Rag & Metal Company's premises were damaged by fire to the extent of about \$6,000.

Lethbridge, Alta.

Superintendent Taylor, of Medicine Hat has announced that the C. P. R. will double the station here at a cost of about \$35,000.

Montreal, Que.

Tenders are being received by Mr. Alphonse Piche, architect, 52 Victoria square, for the fittings required for the new cafe in the Banque Nationale, corner St. James and Place D'Armes square.

Plans are being prepared by Messrs. Finley & Spence, architects, 74 Guardian Building, for an extensive addition to the factory of the Crescent Manufacturing Company, corner Inspector and William streets. The new building is to be completed by the fall.

It is stated the H. Kellert & Sons, 351 St. James street, have bought the corner of St. Catherine and St. Urbain streets for a factory site.

It is stated that the Rea store will be enlarged to eventually take in the entire

block bounded by St. Catherine, University, Burnside and Union avenue. Plans are well under way. A. F. Dunlop, Lindsay Building, architect. Estimated expenditure, \$2,000,000. Noted in issue of January 26.

New Westminster, B.C.

Kelly, Douglass & Company, of Vancouver, are reported to be negotiating for a business site here for their lower Fraser valley wholesale grocery trade.

Orillia, Ont.

It is stated that the Tudhope Carriage Company purpose manufacturing automobiles, and that they will erect an addition to their present factory for that purpose.

Ottawa, Ont.

S. M. Rogers & Son have purchased property on the north side of Rideau street near the corner of Cumberland, on which they will make improvements.

Hugh Carson Company, Limited, whose store on Rideau street was destroyed by fire, have secured premises on the corner of Elgin and Queen streets, which they will remodel for their business.

Prince Rupert, B.C.

It is reported that a smelter with a 250 ton capacity will be started shortly.

Prince Albert, Alta.

Sturgeon Lake Lumber Company will move their mill to a point two miles up from the mouth of the Red river. A. J. Bell is in charge of arrangements.

St. John, N.B.

The A. E. Hamilton woodworking factory, recently destroyed by fire, is being erected on a larger scale. Dimensions, 80 x 100, and two storeys in height.

The shipchandlery establishment owned by Mrs. Wilson was damaged to the extent of about \$2,000.

Strathcona, Alta.

A company is negotiating with the municipality as to a site for a plant to manufacture sewer pipe. J. A. McDougall, M.P.P., and S. H. Smith, Edmonton, are interested.

Toronto, Ont.

The construction of the 59-ton ice manufacturing plant under contemplation may not be erected this season, owing to the large supply of natural ice. H. J. Fairchild, secretary, Lake Simcoe Ice Supply & Cold Storage Company, 43 Esplanade east.

The Gurney Foundry Company has purchased property at 740 and 742 Yonge street, Toronto, for \$30,000, on which they will erect a retail branch store and warehouse.

Mr. Joseph E. Thompson, Commissioner of Industries, is negotiating with a French firm of steel manufacturers, who desire to establish a plant in Canada. They require a site of about 300 acres.

Vancouver, B.C.

W. Marbury Somervell, whose head office is in Seattle, has prepared plans for Mr. W. A. Bauer, provincial land surveyor, for a large eight storey building on the corner of Howe street and Hastings. Materials, reinforced concrete, with creamy white terra cotta and light sienna colored brick. The interior decorations will be of the best. Mr. F. F. Adams is in charge of the cement work, being the local representative of the Ferro Construction Company, of Cincinnati.

Separate or bulk tenders are wanted for the erection of a brick block on Harris street for Mr. Geo. Kine. E. E. Blackmore, Architect, Leo Building.

Victoria, B.C.

It is reported that A. E. Todd is planning to erect an office building on the corner of Cook and Fort streets, opposite the building now being erected by him. Estimated expenditure, \$10,000. Work will not likely commence for a couple of months.

Walkerville, Ont.

It is stated that the Dominion Motor Company, recently organized, will locate here. Work will be started on the new plant in a short time. The company plans to open a branch in Edmonton to handle the cars manufactured here.

Winnipeg, Man.

J. N. Semmens, Union Bank Building, is the representative of McKim, Mead & White, of New York city, the architects in charge of the new Bank of Montreal branch. Work will be commenced and the building housed in by next winter, when interior work will be started.

AWARDED.

Kenora, Ont.

The contract for the erection of a branch building of the Imperial Bank has been let to William Garson, contractor, of Winnipeg. The building will be constructed of white stone and will cost about \$35,000. Work will be started as early as possible. Architects, Darling & Pearson, 2 Leader Lane, Toronto.

St. Boniface, Man.

The Western Canada Flour Mills Company have let the contract for their plant here to George H. Archibald & Company, engineers and contractors, at an approximate cost of \$250,000. Work will commence in two weeks, and it is expected that the plant will be completed by September.

Winnipeg, Man.

The Bank of Montreal have awarded to the Dominion Bridge Company, of Montreal and Winnipeg, the contract for steel and iron work on their new building. Price, over \$50,000. Between 600 and 700 tons will be used.

Victoria, B.C.

The contract for the reinforced concrete building on the corner of View and Douglas streets has been awarded to G. Masher by J. A. Sayward. Estimated cost, \$65,000 to \$75,000.

Power Plants, Electricity and Telephones

Edmonton, Alta.

Tenders are being called by the Department of Public Works for the supply of whole or any part of the required estimate or material for telephone construction. List of material, etc., on application to the Superintendent of Telephone office, Department of Public Works, Edmonton. John Stocks, Deputy Minister.

London, Ont.

Now that the charter to the London & Lake Erie Railway & Transportation Company (the old South Western Traction) has been granted, construction work on the line from Brantford to London will be commenced this spring. It is the intention that the company shall complete the section from Paris to Woodstock and also from Paris to St. George in the near future.

Ottawa, Ont.

The municipal electric department is calling for tenders until March 1st for supply of meters, transformers, etc. Specifications at office of the electric department. J. E. Brown, superintendent.

ifications at office of the electric department. J. E. Brown, superintendent.

Wetaskiwin, Alta.

A by-law to raise the sum of \$5,000 for the purpose of improving, extending, etc., the existing municipal electric light and power plant will be submitted to the rate-payers on the 8th of March. E. Roberts, secretary-treasurer.

Winnipeg, Man.

Incorporation is being sought by the Rural Railway Company of Manitoba. The object of the company is to construct, etc., an electric or steam railway and telegraph and telephone line in the city of St. Boniface to connect with a point on the American frontier at or near Emerson, etc. Provisional directors, Dr. Albert Galliot, of Notre Dame des Lourdes; Francois Deniset, Prosper Gevaert, both of Winnipeg. Capitalization, \$200,000.

AWARDED.

Fort William, Ont.

The Hinners-Jones Electrical Company of this city has secured the contract to build the four miles of transmission line from the line of the Kaministiquia Power Company to the sub-station in Port Arthur for the Hydro-Electric Commission. It means the building of eight miles of line, for it is to be a duplicate one the entire distance.

Guelph, Ont.

The contract for the equipment for the power station has been awarded to the Canadian General Electric Company.

Nelson, B.C.

Tenders for the supplying of rails, switches and spikes were received by the Nelson Street Railway Company from the following companies: Wood-Vallance Hardware Company, Croasdale & Company, Dominion Steel Company, and Evans, Coleman & Evans. The tender from the last, being the lowest, was accepted, delivery of rails to be made in three weeks. The contract for poles has been let to Messrs. Knauf & Ogilvie, of Harrop, and the Robson Lumber Company, of Robson, have the contract for supplying ties.

Vancouver, B.C.

Mr. Herbert W. Kent, the British Columbia representative of the Jens Ortenboving Company, hydraulic engineers, London, Eng., has been awarded the contracts to supply and erect the 9,000 feet of pipe lines and specials for the water from the dam to the powerhouse, required by the Vancouver Island Power Company for its Jordan River plant, at an estimated expenditure of more than \$80,000.

Miscellaneous

Cobalt, Ont.

The Peterson Lake Silver Cobalt Mining Company, Limited, call for tenders until February 25th for the enlarging of the present shaft on the island in Peterson Lake, midway between the shaft of the Union Pacific and that of the Susquehanna Mining Company. R. F. Segsworth, secretary-treasurer, 103 Bay street, Toronto.

Hamilton, Ont.

The following list of tenders for the annual supplies was adopted by the City Council:—Portland Cement: Canadian Cement Co., Star Brand at \$1.50 per barrel of 350 lbs. at Hamilton, all charges paid, bags to be charged at 10c extra and credited at same figure when returned, freight prepaid. Lime: Oneida Lime Co., 16c per bushel of 70 lbs; E. J. Guest, 16c per

bushel of 70 lbs.; supply to be equally divided. Gravel: Edward New, loaded on wagons at pit, 75c per load of 2 cubic yards. Lumber: M. Brennen & Sons Co., Limited, white pine, \$27.75 per M., board measure. Sewer Brick: Ollman Bros., as follows—west of Bay street, \$7.75 per 1,000; east of Bay street, \$8.00 per 1,000; east of Wentworth street, \$8.25 per 1,000; east of Sherman avenue, \$8.50 per 1,000. Paving Brick: Massillon Stone & Fire Brick Co., \$26.50 per M., f.o.b., Hamilton, duty paid. Iron—Castings (ordinary): Gartshore, Thomson Pipe & Foundry Co., \$2.05 per 100 lbs. Iron Pipe and Special Castings: (iron pipe) Gartshore, Thomson Pipe & Foundry Co., \$34 per ton; (special castings) Gartshore, Thomson Pipe & Foundry Co., \$2.75 per 100 lbs. Asphalt: California Asphaltum Sales Agency, \$27.25 per ton, f.o.b., Hamilton. Hydrants: Canadian Foundry Co., 150 hydrants at \$43.12 each. Sewer Pipe: Hamilton & Toronto Sewer Pipe Company, whatever quantity may be required of the following—size 4, straight pipe, per foot, 5 cents; junctions, each 2 feet, 45 cents; elbows and bends, each, 26 cents; traps, each, 75 cents; stoppers, each, 7 cents; size 6, straight pipe, per foot, 6 cents; junctions, each 2 feet, 54 cents; elbows and bends, each, 33 cents; traps, each \$1; stoppers, each 10 cents; size 8, straight pipe, per foot, 12 1-2 cents; junctions, each 2 feet, 78 3-4 cents; elbows and bends, each, 40 cents; traps, each, \$2.50; stoppers, each, 17 cents; size 9, straight pipe, per foot, 14 2-5 cents; junctions, each 2 feet, 94 1-2 cents; elbows and bends, each, \$2.50; size 12, straight pipe, per foot, 25 cents; junctions, each 2 feet, \$1.35; elbows and bends, each, \$2; size 15, straight pipe, per foot, 37 4-5 cents; junctions, each 2 feet, \$2.13 1-2; elbows and bends, each, \$2.70; size 18, straight pipe, per foot, 54 2-5 cents; junctions, each 2 feet, \$3.06; elbows and bends, each, \$2.70; size 20, straight pipe, per foot, 56 1-4 cents; junctions, each 2 feet, \$3.14 3-100; elbows and bends, each, \$2.70; size 24, straight pipe, per foot, 97 1-2 cents; junctions, each 2 feet, \$7.02 6-25; elbows and bends, each, \$2.70. Wood Paving Blocks: United States Wood Preserving Co., \$1.85 per square yard. Stop and Gate Valves: Kerr Engine Co., 75-6" at \$9, each \$675; 5-12" at \$36, each \$180. Lead Pipe: Canada Metal Co., \$4.35 per 100 lbs. Pig Lead: Adam Hope & Co., English lead, \$3.58 per 100 lbs.; Canadian lead, \$3.53 per 100 lbs. Brass Work: The London Brass Manufacturing Co., as follows—50 1 in. couplings, \$34.50; 75 1 in. couplings, \$146.25; 75 1 in. stop cocks, \$99.75; 75 1 in. corp'n cocks, \$89; 50 3-4 in. stop cocks, \$39.50; 50 3-4 in. corp'n cocks, \$39.50; 100 1-2 in. corp'n cocks, \$84; 75 1-2 in. couplings, \$27; 1200 1-2 in. stop cocks, \$1,068; 12 1-2 in. stock waste cocks, \$11.16; 1,200 1-2 in. corp'n cocks, \$564; 50 1-2 in. off 1" branches, \$42; 100 1-2 in. corp'n valves, \$10; 200 1-2 in. corp'n spindles, \$16; 100 1-2 in. back caps, \$7; 25 1-2 in. hydrant sliding valves, \$6.75; total, \$3,000.91.

Montreal, Que.

An order for 140,000 barrels of cement has been received from the Department of Railways and Canals by the Canada Cement Company. This order is the second largest placed this year, the Quebec bridge order only taking precedence.

Recent building permits include:—F. Tremblay, 82 Forsyth, one house containing five dwellings on Cuvillier street, cost \$3,500; J. D. Latour, 1200 Mount Royal avenue, two houses containing two dwellings and two stores, cost \$6,000; A. Messier, 412 Moreau street, five houses containing nineteen dwellings and one store on Cuvillier street, cost \$15,000; Rev.

Chagnon, two houses containing seven dwellings on corner Hogan and Forsyth, cost \$6,800; G. DeSerres, 97 St. James street, alterations to property, cost \$5,000; I. Denis, 1023 Mount Royal, alterations to property at 659 Mount Royal avenue, cost \$1,100; E. Braid, 709 St. Lawrence Boulevard, alterations to property, cost \$2,500.

Morris, Man.

Tenders will be received until February 25 by the rural municipality of Morris for the expenditure of about \$8,000 on grading roads during the year 1910. All tenders to include levelling of grades fit for traffic. D. M. Ure, secretary-treasurer.

Neepawa, Man.

Tenders will be received until March 11th for \$4,148, 5 per cent. 20 years local improvement debentures. J. W. Bradley, secretary-treasurer.

Ottawa, Ont.

Recent building permits include:—L. Lavigne, brick veneer tenement, Armstrong street, \$4,000; James Davidson, fourteen brick veneer dwellings, \$25,000; Ottawa Car Company, erecting car shop, iron clad, \$3,000; L. F. Fradburks, brick veneer dwelling, Cobourg street, \$4,500; W. Shenkman, double brick veneer, iron clad dwelling, Murray street, \$2,200; W. Shenkman, three brick veneer dwellings, Rideau street, \$3,500; S. Miller and D. Epstein, solid brick addition to shop, Elgin street, \$5,000; Geo. Tomlinson, brick veneer dwelling, Thornton street, \$2,200; David Biggs, brick veneer dwelling, Florence street, \$2,500.

Tenders are being called until February 25th by the Department of Public Works for the supply of oil and grease for the dredging plant.

Tenders addressed to G. J. Desbarats, Department of Marine and Fisheries, will be received until March 7th for the construction of a cribwork pier for a pole light at Grand Entry Harbor, Magdalen Islands. Plans, etc., at Department of Marine and Fisheries, and at the post office, Gaspe.

Tenders addressed to L. K. Jones, Secretary, Department of Railways and Canals, will be received until March 16th for the supply and delivery of B. C. or "Douglas Fir" dimension required for the Rideau Canal. Delivery, 13th of August next. Specifications at office of the Chief Engineer of the Department of Railways and Canals.

Taber, Alta.

Voting on a by-law to raise \$15,000 for the purpose of testing for gas and water resulted in the by-law being carried.

Toronto, Ont.

Recent building permits include: S. G. Smith, pair brick dwellings, Gladstone avenue, \$4,400; H. Wright, two and a half storey brick dwelling, Roncesvalles and Constance, \$3,500; E. G. Switzer, three pair brick dwellings, corner Lynd and Neepawa, \$11,500; G. B. Cooney, five detached brick dwellings, near St. Clarens, on Wallace, \$10,000; Government of Canada, two storey brick addition to Post Office, Adelaide street east, \$43,000; R. C. Bustard, two storey and attic brick dwelling, De Lisle, near Yonge, \$3,500; Gurney Oxford Stove Company, alterations and additions to stores, Yonge, near Charles, \$4,500; A. A. Hobson, brick dwelling, near Barton, on Clinton, \$6,000; E. Wickham, two storey and attic brick dwelling, Beech avenue, near Queen, \$4,000; Burton & Tucker, one pair semi-detached two storey brick dwellings, near Wallace, on Symington, \$4,000; Jas. Gibson, one pair semi-detached brick dwellings, near Bloor, on Symington, \$4,

000; W. J. Pickard, three storey brick addition to warehouse, near McGill, Church street, \$3,6000; S. H. Hurst, brick dwelling, Geoffrey, \$3,500; Stothers & Kandle, three brick dwellings, Ossington avenue, \$6,000; G. H. Anthony, one pair two storey brick dwellings, Yarmouth road, \$4,000; L. N. Yolles, alterations to store, 343 365 Queen street west, \$3,500; Mrs. John Wheeler, one pair brick dwellings, Howard Park avenue, \$5,000; W. F. & H. G. King, one pair brick dwellings, corner of Rusholme and College, \$4,000; G. Bray & Son, two storey brick store and dwelling, corner Galley & Sorauren, \$3,000; A. Mackey, three attached two storey brick dwellings, Lappin avenue, \$6,000; Jos. Pinder, two storey brick store and dwelling, on Queen street east, \$3,500; L. M. Schwartz, three storey brick warehouse, on Edward, \$11,000; Dale Furniture Company, four storey brick store building, Yonge street, \$20,000; Standard Sanitary Manufacturing Company, and one two storey addition to foundry, corner Royce and Lansdowne avenue, \$20,000; Worthy Pinkerton, one pair brick dwellings, Garnet, \$4,000; H. Goldman, altering dwelling into apartment, 71 Gloucester, \$10,000; Wm. Graham, three storey brick warehouse, near King, on George, \$12,000; Weismiller & MacKenzie Bros., fourteen pair semi-detached two storey brick dwellings, near Roncesvalles, on Fermanagh, \$50,000; Reid Bros., one pair brick dwellings, Burnfield, \$4,000; W. Barber, brick dwelling, near Galley, on Roncesvalles, \$3,500; F. Martin, one pair brick dwellings, Leslie, \$4,000; J. Cole, two pair brick dwellings, Margueretta, \$8,000; Thos. Grinnell, two detached brick dwellings, Logan, \$6,000; Alfred Knibbs, four detached brick dwellings, Galley, \$3,000; T. T. Fleming & Company, one pair brick dwellings, Evelyn avenue, \$4,000; F. Jackson, one pair brick dwellings, corner Carden and Sorauren, \$4,600; Wm. Priest, four pair brick dwellings, Symington avenue, \$16,000; C. C. Kurtz, one pair brick dwellings, Hogarth, \$4,000; Gray & Gray, two and a half storey brick dwelling, near Roncesvalles, 71 Fermanagh avenue, \$2,460; Tony Bartello, two storey brick dwelling, Strachan avenue, \$2,500.

Vancouver, B.C.

Recent building permits include: Prudential Investment Company, \$9,000 factory on Dufferin street; Mrs. A. Holtz, 1026 Thirteenth avenue, \$3,000; Bentley & Wear, Eighth avenue, two houses, \$4,600; C. Reid, Napier street, \$3,000; D. Fraser, 1804 Second avenue, \$2,500; Vernon Brothers, 1923 Fifth avenue, \$3,000; A. L. Ramage, Clark drive, \$2,500; J. Thomson, 722 Tenth avenue, \$2,700; Mr. Williams, 186 Seventh avenue, \$6,500; Max Krusknoft, Harris street, \$2,400; W. J. Weismoth, Eighth avenue, two houses, \$4,000; H. M. Arnaud, 2566 York street, \$5,800; J. McMillan, 343 Thirteenth avenue, \$2,200.

Victoria, B.C.

Recent building permits include: James Richards, house on Gladstone avenue, \$2,500; J. Redmond, house on Mass street, \$2,600. For both of these buildings R. Hetherington is the architect. Other permits include Mrs. S. Baxter, dwelling on Superior street, \$3,600; Dr. W. Russell, Superior street, \$3,600; R. Borthwick, for a dwelling on Johnson street, \$2,500; C. H. Rivercomb, for a dwelling on Denman street, \$2,500; Alexis Martin, for a garage, corner of Cook and Fort streets, \$6,000; J. O. Dunsford, for a dwelling on Dunedin street, \$2,000.

Tenders addressed to Wm. M. Northcott, purchasing agent, City Hall, will be received until March 7th for supply of 150,000 imperial gallons of creosote.

Tenders and For Sale Department

To Civil Engineers

Applications (addressed to W. J. DOUGLAS, Town Clerk, Eglington P. O.) will be received up to and including FRIDAY FEBRUARY 25 next, at 8 o'clock p. m. for the position of Civil Engineer for the Town of North Toronto. Applicants must produce testimonials as to qualification and general fitness for the position and also state salary expected.

Duties are prescribed in a draft By-law which can be seen at any time during office hours at the office of the Clerk, Town Hall, Eglington.

Board of Education

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the board will be received until

Friday Noon, February 25th, 1910

for masons and plasterers work required in the new eleven room

School Building, Logan Avenue

Plans and specifications may be seen and all information obtained at the offices of the board, City Hall. Each tender must be accompanied by the deposit mentioned in the said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH,
Chairman of Committee

W. C. Wilkinson
Secy.-Treas.



**Temiskaming and Northern Ontario
Railway Commission**

Tenders for Grading

Sealed tenders, addressed to the undersigned, and marked "Tenders for Grading" will be received up till 12 o'clock noon, on MONDAY, FEBRUARY 28TH for all and every kind of labor, tools, machinery, and other plant, services and material whatsoever necessary for the due execution and completion of, in a thorough and workmanlike manner, all the grubbing, grading, embankment protection, clearing and culverts necessary for the construction of a cut-off on the Main Line of the Temiskaming and Northern Ontario Railway, between M. P. 60 and M. P. 61.

Plans and specifications may be seen at the office of the Commission, 25 Toronto Street, Toronto, and the office of the Chief Engineer, North Bay.

Certified cheque on a chartered bank, payable to the order of the Secretary-Treasurer of the Commission for \$500.00 must accompany each tender.

Tender must be made out on form supplied by the Commission. Deposit cheque of unsuccessful tenderers will be returned.

Successful tenderer's deposit cheque to stand as security for immediate execution of construction contract, and then to be held, together with further security by bond satisfactory to the Commission, for the due performance of the contract.

Commission will not be bound to accept the lowest or any tender.

A. J. McGEE, Secretary-Treasurer,
25 Toronto Street, Toronto, Ont.

Toronto, February 8th, 1910.

Papers inserting this advertisement without authority will not be paid for same.

County of Elgin

Tenders For Bridges

Sealed tenders addressed to the undersigned will be received until noon SATURDAY MARCH 5TH, 1910 for the construction of Reinforced Concrete Abutments for a 133 foot span of a Roadway Bridge with Sidewalk, to be built over the Otter Creek in Pt. Burwell.

Also for a 60 foot Arch Bridge to be built over Kettle Creek in Lynhurst, adjoining St. Thomas. Plans and specifications may be seen at this office and forms of tender obtained.

The committee reserve the right to reject any or all tenders.

JAS. A. BELL
County Engineer

St. Thomas, February 21, 1910.

Tenders Wanted

Tenders will be received by the undersigned, until FRIDAY, MARCH 4TH, at 12 o'clock noon, for the erection and completion of a Sabbath School building in connection with the Welland Presbyterian Church, and also for certain modifications in the present church as per plans and specifications, which may be seen at W. H. Crowther's store, North Main street, Welland, on and after Thursday, February 10th, 1910. Tenders to be as follows: (1) Bulk tender for whole work as described in plans and specifications; (2) Separate tender for Sabbath School building alone.

No tender necessarily accepted.

ALEX. ASHER,
Secretary, Bd. of Managers.

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To Contractors

Sealed bulk or separate tenders endorsed "Tender for addition to Ontario Parliament Buildings" addressed to the undersigned, will be received at this department until noon on

Tuesday, the first day of March, 1910

for the following works, viz: Masonry, bricklayer, cut stone, carving, fireproofing, etc.; structural steel; steam heating; plumbing and gasfitting; iron armored conduit and electric wiring; vault doors; roofing, copper and sheet metal; carpenter work; ornamental iron and grille work; elevators; lathing and plastering; painting and glazing; marble and tile; metallic fire-proof doors, base and trim; hardware; iron-founders work; required in connection with the extension to the Ontario Government Buildings, Queen's Park. Plans and specifications may be seen at the office of Geo. W. Gouinlock, Architect, 1108 Temple Building, Toronto.

An accepted bank cheque payable to the order of the Honorable, the Minister of Public Works for five per cent of the amount of the tender and the bona-fide signatures and addresses of two sureties or the bond of a Guarantee Company approved by this Department prepared to give a bond for the due fulfillment of the contract must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance. The Department will not be bound to accept the lowest or any tender.

J. O. REAUME,
Minister of Public Works, Ontario

Department of Public Works, Ontario,
Toronto, February 4th, 1910.

(Newspapers publishing this advertisement without authority will not be paid for it.)

Factory For Sale, Rent or Exchange

1 storey, light, three-sides, 3,500 square feet floor space. Prominent corner on Queen Street, five minutes from Yonge Street, Toronto. Address Box 980, CONTRACT RECORD, Toronto.



Tenders For

New Isolation Hospital Toronto

Bulk tenders, or separate tenders for the several trades mentioned below in connection with the above building, will be received by registered post only, addressed to the undersigned, up to noon on

Tuesday 8th March, 1910

1. MASON WORK, Etc.
2. CARPENTER WORK.
3. GALVANIZED IRON AND ROOFING.
4. PLUMBING, Etc.
5. HEATING.
6. ELECTRIC WIRING.
7. PLASTERING.
8. PAINTING AND GLAZING.
9. TILING.
10. COMPOSITION FLOORS, Etc.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering, as prescribed by City By-law, must be strictly complied with, or tender may not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman Board of Control.

City Hall, Toronto, February 4th, 1910.

8

Notes

Brodeur & Company, lumber, St. Hughes, Que., Mrs. Adeland Brodeur, registered.

A. S. Murray & Company, contractors, Niagara Falls, Ont., are stated to have assigned.

Monette, Cardinal & Company, builders' materials, Montreal, Que., it is stated, have dissolved.

E. B. Tedford & Company, lumber merchant, has sold out to Beaver Lumber Company, Limited.

Jutras & Freres, saw mill proprietors, St. Albert, Que. W. Jutras, A. Jutras and D. Jutras registered.

Peart Bros., hardware Company, Limited, Regina, Sask., have increased capital stock from \$100,000 to \$300,000.

The Expanded Metal & Fireproofing Company, Limited, of Toronto, have decided to open a Montreal office. Mr. J. E. McDougal will represent the firm in that city and has taken offices in the Builders' Exchange. It is understood that the company will make an extensive exhibit in the permanent exposition of the Exchange.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

PUBLISHED EACH WEDNESDAY BY

HUGH C. MACLEAN, LIMITED

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Vol. 24 Toronto February 23, 1910 No. 8

Need of Trade Schools

At the recent convention of the Canadian National Association of Builders, possibly none of the many important subjects discussed were of more vital interest to the building industry than that of technical education. The need of trade schools which shall be really and truly schools for turning out competent mechanics, and not producers of foremen and supervisors, is again being experienced. With the approaching revival of building activities, contractors and builders apprehend the usual scarcity of sufficient workmen to carry on the work as rapidly as desired. They realize that competent workmen are becoming scarcer and scarcer in many of the trades, due to the decline of the apprentice system, and the lack of younger men learning the trades. Young artisans should be trained to do as acceptable work as was demanded under the old standards, and better. Their training was not the last that could be attained and progress is demanded in everything. The development of newer forms of construction makes it essential that all the merits of the older forms of building shall be utilized as a matter of meeting competition.

The element which is inclined to resent the training of new men to the trades, may not realize it, but the attitude is one which will surely divert construction to the other forms, for building, like everything else, will naturally work along the lines of least resistance. If the scarcity of skilled men in one craft makes it impossible to erect a building as speedily as it might be done, the natural result will be that many buildings will be changed to such forms of construction as can be handled more quickly through having workmen available

to that line. The older element is dying off, and if younger men are not trained to succeed them, there will be the inevitable result of the trade becoming nearly obsolete.

The Cash Deposit Clause

In a recent communication to the city of Winnipeg, a leading supply company of Baltimore, Md., revived an interesting subject in objecting to the payment of a 5 per cent. cash deposit. Seeing that in the case under discussion the amount involved by the condition totals about \$7,000, the company might appear to have some cause for complaint. They state that it is their practice to give a "bid bond" in place of a cash deposit.

It seems to us, however, that although the cash deposit clause condition may at times seem somewhat stringent when its equivalent in dollars is worked out, it is essential to the interests of a municipality and to equitable and reliable tendering. If there were no restrictions of the kind stated there would be all kinds of irresponsible firms getting into the game and spoiling it for those who are perfectly willing to risk a certified cheque of \$7,000 or more on the reliability of their bid, once prepared. The contract with which the Baltimore company was concerned was for the supply of 2,500 to 3,500 tons of asphalt. On such an order as this it would seem particularly desirable to enforce the letter of the by-law.

Unionism Has Food for Reflection

The Plumbers' Union have lost once more in their final effort to set aside the judgments of the Canadian courts in the now famous strike case, in which the master plumbers of Winnipeg attacked the right of the striking employees to "picket" their places of business during the progress of the strike of two years ago. As a last resort, the unions appealed to the Privy Council on certain points. The master plumbers secured the services of a leading firm of London, Eng., barristers to present their arguments. No case in many years has excited so much interest. The damages, about \$4,000 awarded to the master plumbers against the unions, will stand, according to the decision of the Privy Council. The finale is a heavy blow to unions at large, and especially in so far as their rights during a strike are concerned.

At a meeting held recently in the rooms of the Engineers' Club, Toronto, the organization of the new club for technically trained men, was completed. Among the provisional directors who were instructed to obtain a charter may be mentioned: Dean Galbraith and Messrs A. W. Campbell, C. M. Canniff, J. G. Sing, Willis Chapman, Cecil B. Smith, J. G. Kerry, R. G. Black, Chas. W. Dill, W. E. Douglas, T. S. Scott, Geo. W. Gouinlock, John A. Pearson and Acton Bond.

The best a man ever did shouldn't be his standard for the rest of his life.

Extension of "Right House" Hamilton, Ont.

Features of the Work which make it of Unique Interest — Detailed Description of Up-to-date Methods of Construction Employed

Specially Contributed by Edwin H. Beck, Inspecting Engineer, Canadian Inspection Company, Limited

The reinforced concrete addition which is now being erected for the Thomas C. Watkins Company's store on King and Hughson streets, Hamilton, Ont., contains several features of interest. Among other interesting points, it embodies the connecting up of a reinforced concrete structure with an ordinary brick building, the



21st September '09—Concreting in Alley at Rear, Showing Method of Reinforcement: Triangular Wire Mesh with Steel Rods.

floors of which are of wood beams supported by iron columns.

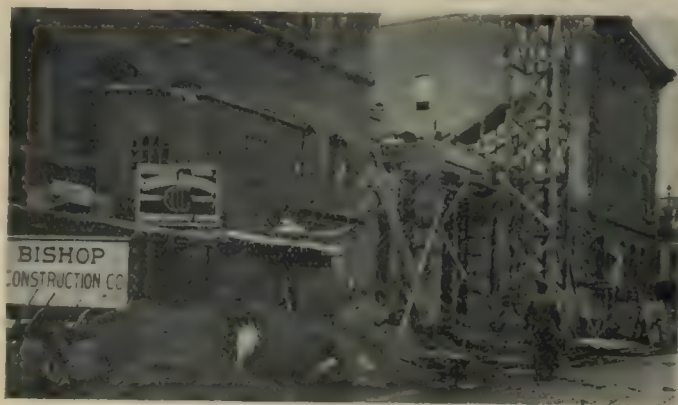
The old building has 61 feet frontage on King street and 136 feet on Hughson street, and is four storeys high. The new addition has a frontage of 81 feet on Hughson street, and runs back 80 feet to an alley in the rear. It will contain six storeys and basement, with a Mezzanine floor between 1st and 2nd floors, running across the north end of building. It is proposed to add another two storeys to the old building in the near future, thus making the whole structure six storeys high.

After a part of the excavation had been removed, the south wall of the "Times" building, which is on the north of the Watkins property, had to be underpinned, to ensure the safety of that building during the excavation for the foundations of the concrete piers. The ground at this point was found to be of the following nature: Hard packed sand and earth down to 14 feet

below Hughson street level; then a 12-inch layer of hardpan; beneath was found a soft fine sand with water standing at a level of about 12 inches under bottom of hardpan. A test made on this sandy bottom gave 3-16-inch penetration with a load of $3\frac{1}{2}$ tons per square foot, the test being made with a 6-inch x 6-inch post, with platform on which was placed the load.

This test being considered satisfactory, the foundations for concrete piers along the "Times" building were proceeded with. In order to take up all possible space, these piers were built close up to the "Times" wall, necessitating a cantilever footing, or, more correctly, an inverted beam, supporting an outside pier at the one end, and an inside column at the other. These five footings were designed as before mentioned, as inverted beams, being from 7 to 9 feet wide, 21 feet long, and 5 feet deep, with reinforcing bars of $1\frac{1}{2}$ -inch square steel embedded near the top, and shear bars attached to every other bar, as shown in fig. 1. The footings for the columns and piers were as shown in fig. 2, with steel bars 5 feet long embedded 2 feet 6 inches in the top cap, forming dowels. The allowable load on the ground was $2\frac{1}{2}$ tons per square foot.

The shipping alley, which previously ran from James street through to Hughson street, along the north wall



15th October, '09—Preparing 2nd Floor Forms for Concreting.

of the old building, had to be deviated, the property being bought and pulled down in order to turn the alley out to King William street. Before the portion of the alley along the north side of the old building could be excavated, the alley opening on King William street had to be completed for traffic, and as the boiler room of the new building is situated in the area beneath the portion of the alley directly in the rear of the new building, this necessitated the erection of first tier of columns, and a 6-inch slab of concrete, supported by reinforced concrete beams, forming floor of alley at this point, which is finished off with Massillon, Ohio, vitrified paving brick, laid in a bed of pitch and grouted in with cement. This portion of the work was completed and traffic turned into King William street on October 5th, 1909. Meanwhile, the rest of footings, except those for columns along line of north wall of old building were put in. The



28th September, '09—Excavation of Old Alley in Progress.

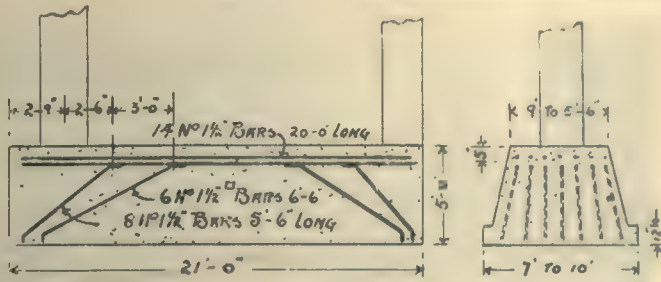


Fig. 1—Shear Rods firmly attached to Horizontals.

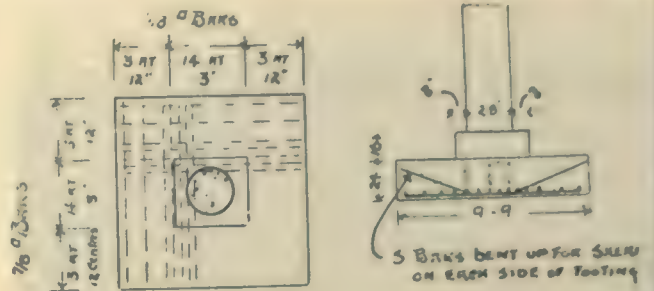


Fig. 2.



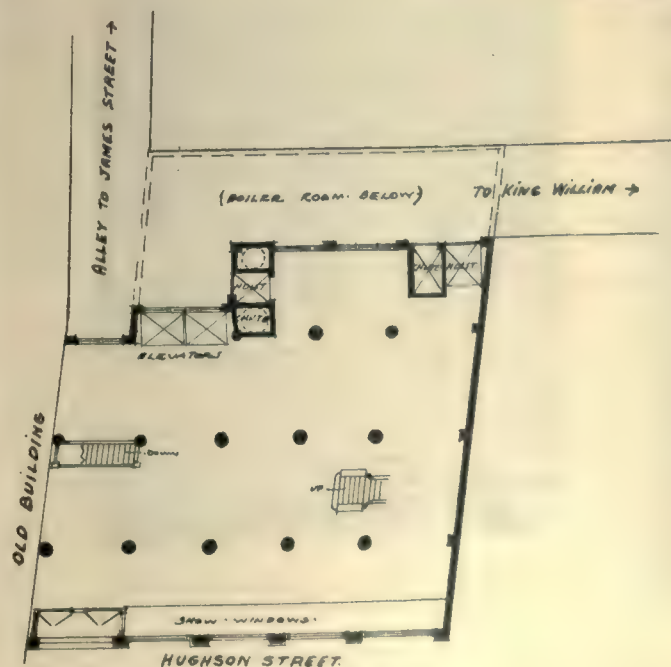
5th Nov., '09—Fourth Floor Completed.



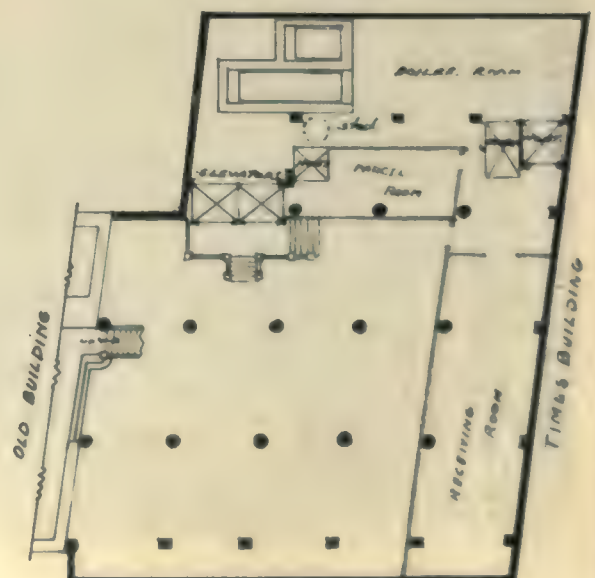
15th Nov., '09—Erecting Forms for Sixth Floor.



Veneering front of Columns on Hughson St. (This was started from the second floor level, the brick being carried in angles bolted into concrete piers at each floor).



Ground Floor Plan.



Basement Plan.



View from Rear, Showing Form Supports in Position.



15th October, '09 — Showing Steel Reinforcement on Mezzanine Floor.

excavation for area beneath sidewalk on Hughson street and the old alley excavation was then removed, and rests of footings put in. Those for columns along old building wall going under the foundation of the wall, necessitated more underpinning. This was done by using two jacks to each column foundation, having a steel plate at top and bottom, and then running in concrete as soon as excavation was removed, the jacks being left embedded in the concrete.

As can be seen by an examination of the accompanying "progress chart," and the photos published herewith, record progress was made after these difficulties had been overcome, the average time taken being six days from start to finish of each floor. For this, due credit must be given to the officials of the Bishop Con-

struction Company, the contractors for the concrete work, and their superintendent, Mr. H. Hovis.

All outside piers are built square, reinforced with square steel bars and veneered on the Hughson street front with brick, which is tied into the piers with iron ties, one end of which are embedded in the concrete during construction. The beams form the window lintels and will be finished off to match the sills, which were made of Roman stone. The curtain walls are of brick, one brick thick. At the rear, the concrete piers are left exposed, as are also the north and south walls, which rise above the other buildings, the brick curtain walls bonding into a 4½-inch groove left in piers for that purpose. All inside walls and partitions are of best American tile. The inside finish to columns and concrete will



The satisfactory stage reached by December 1st, '09.



Setting in Place the Reinforcement for Circular Columns.

be a putty coat and will be painted and decorated to correspond with the old building. The roof is designed as a floor at 100 pounds per square foot, the slopes being formed in wood above so that another storey can be added in the future, if required. The passenger elevators will take up the roof, which will be used as a roof garden. The pent house over passenger elevators will therefore have to be built up 24 feet above the roof. As far as Hamilton is concerned, this will be an unique feature.

Owing to the desire of the owner to keep the diameter of concrete columns as small as possible in order to conform somewhat with those in the old building, a greater amount of reinforcement had to be used. This was obtained by using vertical square bars with $\frac{1}{2}$ -inch diameter bar hooping, as shown in accompanying photo. The columns range from 28 inches diameter in the basement, to 12-inch diameter on the top floor. The floor slab is made $4\frac{1}{2}$ -inch thick, reinforced with triangular wire mesh, and is supported by 8-inch x 18-inch beams reinforced with Kahn cup bars, running into 14-inch x 24-inch girders reinforced with Kahn trussed and square bars. Concrete throughout is 1:2:4 mixture. The floors are finished with hardwood, laid on wood strips filled in with cinder concrete. All conduits for electric wiring were embedded in the concrete during construction, as also were small castings for hanging the sprinkler system. These items do away with a considerable amount of drilling in the floors after erection, which is detrimental to reinforced concrete work. Window frames and sashes in Hughson front are of wood, and those in rear and at sides of metal, with wired glass.

The new concrete columns in the south side are about six inches from the brick wall of the old building, the wall of which has to be removed. The old floor beams are replaced at this point by steel beams, which will be supported in brackets already provided for on concrete columns. In this way the two buildings will be opened

up into one, having a total frontage on Hughson street of 217 feet.

The vacuum system of heating will be employed throughout. A fire protection water tower of 25,000 gallons capacity will be erected on the northwest corner of the new addition.

Single floor area of new addition feet 6,000
Single floor area of old building feet 8,000

Total one floor feet 14,000

Total floor area of building feet 82,000

Kinnear automatic fireproof curtains will be installed between the two buildings, thus ensuring safety to the new building in case of fire in the old, or vice versa.

The following is a list of contractors employed in the construction: Reinforced concrete, brickwork and artificial stone, Bishop Construction Company, 19 Wellington street, Toronto; underpinning and boiler foundations, George E. Mills, Hamilton; wood frames and sashes, Brisset, Hamilton; excavation, C. Kennedy, Hamilton; plumbing, Drake & Avery, John street, Hamilton; heating, Adam Clarke, Hamilton; electrical work, Culley & Breary, Hamilton; painting, Wellington, Hamilton; elevators, Otis-Fensom Elevator Company, Toronto and Hamilton; metal window frames, Metal Shingle & Siding Company, Preston, Ont.; boilers, Polson Iron Works Company, Toronto; water tower, Gould, Shapley & Muir, Brantford, Ont.; slab reinforcement, W. D. Beath & Son, Limited, Toronto; beam and column reinforcement, Trussed Concrete Steel Company, Limited, Toronto; fireproof doors, A. B. Ormsby, Limited, Toronto.

The architects were Messrs. Stewart & Witton, of Hamilton. The Canadian Inspection Company were entrusted with the testing of all materials used, and with inspection throughout. The approximate cost of the new building is \$75,000.

CEMENT TEST RECORD—LEHIGH (BELLEVILLE) BRAND.

Tested by Canadian Inspection Co. to Standard Specification Adopted by Canadian Society of Civil Engineers.
The following is average of 3 briquettes broken for each test.

TEST.	DURATION.	REQUIRED OR ALLOWED.	MINIMUM.	OBTAINED MAXIMUM.	AVERAGE.
Neat Cement	24 hours	150-200	250	358	309
	7 days	450-550	474	632	543
	28 days	550-650	559	656	614
3 Sand 1 Cement	7 days	150-200	156	221	179
	28 days	200-300	250	319	280
Loss on Sieve	50 mesh		0	0.2	0.07
	100 mesh	8%	2.9	4.3	3.73
	200 mesh	25%	19.0	21.2	20.24
Initial Set	Not less than 30 min.		1 hr. 33 min.	3 hr. 47 min.	3 hr. 2 min.
Final Set	1 to 10 hrs.		4 hr. 35 min.	6 hours	5 hr. 16 min.
Boiling Test	O. K. in every case.				

In the 7 day test of 3 sand to 1 cement, 4 briquettes failed under the 150 lbs., but in the 28 day test all briquettes were over requirements.

PROGRESS CHART—1909.

	1st.	Mezzanine.	2nd.	3rd.	4th.	5th.	6th.	Roof.
Wood Forms								
Started	8 Sept.	5 Oct.	7 Oct.	20 Oct.	1 Nov.	8 Nov.	13 Nov.	23 Nov.
Finished	11 Oct.	8 Oct.	19 Oct.	28 Oct.	5 Nov.	11 Nov.	19 Nov.	27 Nov.
Days taken	28	4	11	8	4 $\frac{1}{2}$	3 $\frac{1}{2}$	5	5
No. of Carpenters	7	23	32	34	37	40	36	30
Concrete								
Started	18 Sept.	14 Oct.	16 Oct.	27 Oct.	3 Nov.	11 Nov.	18 Nov.	27 Nov.
Finished	12 Oct.	15 Oct.	21 Oct.	29 Oct.	5 Nov.	12 Nov.	20 Nov.	30 Nov.
Days taken	21	2	4	3	2 1-5	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$
Cubic yards	182	48	185	183	170	160	158	150
Hours concreting		27	26	24	21 $\frac{1}{2}$	20	20	19
Average yards per hour		4 about	6.85	7	7.1	7.4	7.9	8

Average concrete laid from 2nd floor to roof—7.3 yards cubic per hour. Floor area, 6,000 square feet.

1st floor height 12 ft.								
2nd " " 19 ft. 6 in.	Completed in 5 working days.			5th " " 14 ft. 0 in.		6		
3rd " " 17 ft. 6 in.				6th " " 12 ft. 0 in.		7		
4th " " 15 ft. 3 in.				Roof " " 12 ft. 0 in.		8		

Methods in the Demolition of Old Buildings

An Important Factor in Modern Building Construction, Requiring Care and Skill—Outline of Proper Procedure to be followed

Among the many recent innovations which have gradually, by a sort of evolution, crept into, and become an important part in building operations is that of demolishing old or previously erected buildings to make room for and provide sites for more modern and up-to-date structures. In the large cities it has become necessary to tear down the buildings no longer tenatable or adaptable for office or business purposes to make room for those more profitable. Add to this the moving away of homes and residences, to quieter localities far from the hurly burly of business, and there will be found a sufficient reason for active "demolition."

Needless to say, the process of demolishing a building or number of buildings is particular, and demands the greatest care, combined with an abstract knowledge of building construction; so that the superintendent, director or foreman, at least, must be experienced in the work to guard against possible collapses or the endangering of the lives or limbs of the men working under him. So many lives, indeed, have been lost, and so many accidents occurred already, as to cause the governing authorities in cities to enact stringent laws and rules regulating "demolition." Let us quote one of them:

"When plans and detailed statements are filed in the Department of Buildings for the erection of a new building, if an existing building or part of an existing building is to be demolished, such fact shall be stated in the statement so filed.

"In demolishing any building, storey after storey shall be completely removed. No material shall be placed upon the floor of any such building in the course of demolishing, but the bricks, timbers and other structural parts of each storey shall be lowered to the ground immediately upon displacement. The owner, architect, builder or contractor for any building, structure, premises, wall, platform, staging or flooring to be demolished shall give not less than 24 hours' notice to the Department of Buildings of such intended demolition. Buildings condemned as unsafe, untenatable, or dangerous, may be removed without demolition permits. The condemnation documents being equivalent and mandatory."

Demolition permits are then granted and the work may proceed, of course under the surveillance of the inspector of buildings in charge of the district in which the building is located.

Now as to the actual procedure of the work. As the building was commenced at the bottom, so it must be torn down by commencing at the roof, but it is usual to first remove all projecting ironwork, such as fire escapes, cornices, leaders, balconies or any detail which would cause all or any walls to overturn when torn down to beam level. Then chutes are constructed of wood, outside the walls, for the purpose of expeditiously and cleanly transferring all old plastering and debris to the waiting carts and wagons on the street below. Next the tin or roof covering is carefully cut in sections, rolled, tied and lowered with block and tackle to the street; next the cornices and sashes and window frames are removed.

At this point I might state that most "demolishers" combine this occupation with the business of selling second-hand building materials, so that each and every

detail is removed as far as possible intact and uninjured, so as to have a marketable value to be used again.

Brick chimneys are taken down before the roof boards are taken off, also all parapet walls, copings and flashings and the walls, too, to the level of the bottom edge of the roof beams. This being done, the stairs are taken out, if valuable, and replaced by rough ladders. Then the roof boards are levered off with crow-bars, bundled and lowered; then the bridging knocked out, and finally the roof beams themselves, thus giving a safe opportunity to cut down the top storey brick walls, which must not be thrown or barred down in heavy sections, but knocked apart with light hammers, course by course of bricks, as constructed. It is usual to first take out all fixtures, such as trimmings, basins, plumbing, etc., before demolishing the brick and timber-shell, so as to prevent injury, but this depends on their condition and value. From the top storey down all are demolished, but the walls must be closely watched, and if any show evidence of bracks, bulges or unsafe conditions they must be either shored or tied back with cables to guard against fall. No materials should ever be thrown into the street, and a platform or roof should be erected over the sidewalk to guard pedestrians from injury by possible falling materials. To keep down dust and make the debris shovable, a hose should be kept spraying the debris as it is piled, and not too much weight should be piled in one place, lest a floor be strained or overloaded. Collapses have occurred by neglect of this precaution. Heavy girders, steel beams, and columns must be lowered with a derrick, windlass and tackles to save their condition and maintain safety. It is a serious error to drop a heavy weight on the floor of an old building, as the impact is liable to cause disaster.

It is better to pile stuff close to the walls of a building and not in the middle of the beams. Partitions, especially those running fore and aft, should be let remain in position until the beams above are ready for removal, to prevent the latter sagging. All workmen should be careful not to drop tools or materials on those at work underneath. When demolishing old wrought iron or cast iron structures all details should be suspended from the derrick before cutting out rivets or removing bolts; besides, they can be at once lowered, thus avoiding delay. As the constituent details and materials of buildings are so different and multifarious, I will close this article by repeating the old warning that "Eternal vigilance is the price of safety," especially in this hazardous work of "demolition," which has now become a permanent factor in building operations and demands as much supervision as construction itself.—National Builder.

No modern building is now complete without a heating system that requires the storage of fuel in the basement, and it becomes necessary to provide an efficient opening for getting this fuel into the basement. The "Majestic" and "Model" coal and wood chutes, manufactured by the Down Draft Furnace Company, Limited, Galt, Ont., should be specified by every architect and used by every house builder. They have a neat and finished appearance and embody the most up-to-date features of construction.

Placing Concrete Under Water

There is undoubtedly a strong prejudice in the engineering profession against laying concrete under water, says the "Engineering News." Millions of dollars are spent every year on cofferdams and caissons, in order to lay foundation concrete in the dry. Notwithstanding this, it is entirely possible to lay concrete under water which will be as sound and solid as the best concrete laid in the open air. As our readers will recall who have followed the construction of the Detroit tunnel, a large amount of concrete has been deposited around the submerged steel tubes. We recently examined a core from this concrete, which had been taken to determine its quality. The core was as sound and solid as a natural conglomerate rock. Tests of samples of this concrete have shown a strength as high as or higher than the best specimens of concrete laid in the open air. This concrete is deposited through a tremie, or long tube with its upper end in the open air a considerable distance above the water surface, and its lower end at the point where the concrete is to be laid. Concrete put in place by such methods is forced in under a pressure far greater than is possible with any hand ramming ever used. There is no space for voids and no opportunity for the entrance of air. Furthermore, the concrete is never dried out in the process of hardening, and has always available all the water that it needs for its final set. These reasons are all of importance in explaining the high quality of concrete laid in this way.

Of course, "one swallow does not make a summer," and to offset this case, plenty of examples can be quoted where concrete has been laid under water with very disappointing results. But it all depends on how the work is done and the conditions under which it is carried on. Cases like that at Detroit deserve the attention of engineers as showing that there are alternatives to the construction of expensive cofferdams and pneumatic caissons. It is entirely possible that by more intelligent work in laying concrete under water, the cost of many pieces of submarine foundation work could be greatly reduced.

Paints that will Resist Fire

The "Painter's Magazine," speaking of paints for interior woodwork, says that experience has shown that paints consisting mainly of linseed oil, driers, and pigments, are not fire-resisting, and certainly not fireproof. Repeated coatings of silicate of soda, however, will add to their safety. Three coats of silicate of soda, 33 degrees Beaume, should be applied to the wood, and before the last coat has set hard, thin lime wash should be added, which will unite the silicate of soda, forming silicate of lime, which is an insoluble substance.

Another fire-resisting water paint consists of the following ingredients: Eighty pounds powdered silic, 40 pounds bolted china clay, and 20 pounds air-slaked lime, mixed with 60 pounds liquid silicate of soda, 33 degrees Beaume, and then thinned to painting consistency. It may be colored with any earth color, such as ochre, umber, sienna, or red oxide, but not with chemical colors. Two coats of this paint are necessary in the application. If the paint is to be pure white, add, in place of any color, sufficient dry zinc white, using additional silicate of soda in the first mixing.

A new department has been created by the Provincial Government of Alberta. Hon. W. A. Buchanan is the first Minister of Municipalities. He will have charge of all roads, bridges and local improvement districts.

The Maintenance of Dirt Roads

In an address before the Cornell Society of Civil Engineers, Mr. Charles H. Hoyt, superintendent of road construction, United States Office of Public Roads, discussed dirt roads as follows:

A word about the long abused dirt road, and by dirt road let me explain that I mean the ordinary country roads that have been built and worked by town officials for the past centuries through any kind of material that happened to be encountered from sods, gravel, sand, boulders, clay, soil or mud.

The dirt road is a good road so long as it is dry, smooth and hard—three conditions that we do not get all at once for very long periods of time. It is beyond the province of man to say when it shall rain or when it shall not rain; therefore, to a certain degree it is not possible for us to keep an earth road dry.

It is possible for us, however, to put our earth roads in such locations and to build them of such cross-section, and to build ditches and culverts of such design as will keep the water away from the road as much as possible.

The great trouble with miles and miles of earth roads throughout this country is the stupidity of their location and their care. You just look at a poor stretch of earth road and you will often find that it is lower than the surrounding land on either side. That is, the road is a natural ditch, built by man, for acres and acres of surrounding land. Water that falls in the road cannot get out except by evaporation or soaking into the ground, and just as much lower as the road is than the adjoining land, it is just so much more wet. The water from the adjoining land runs or sinks into the road and stays there until it dries out.

Do you wonder that the road is muddy, spongy and soft, and that an empty wagon is about all that a team can draw over a road that is in this condition for various lengths of time throughout the year? Another condition is when the road dries hard, the ruts are deep and the road is rough. This rough condition often occurs in the fall of the year when the road freezes after a muddy spell.

Suppose these ruts had been levelled off with a split-log drag before the road baked or froze hard. Then the road would have been smooth and hard and in good condition for a time. The split-log drag is a very simple affair; costs about \$2 to build, is economical to use, and every farmer or teamster living along a country road, who is interested in having the road pass his place kept in good condition and is also interested to keep highway taxes down, should have a split-log drag.

Suppose that every such farmer or teamster had one of these drags and would drag the road in front of his own property after each rain or when ruts had formed. It might take him from one-half hour to an hour occasionally throughout the season. After the road has once been built in proper shape it is surprising how good the road may be kept by using split log drags as suggested.

Now, the practical lesson of all this is—study the drainage of your road: keep the water away from it by ditches and culverts, and don't look just in the road. Study the surrounding land and turn the water away from the road before it gets into the road. Open up ditches for hundreds of feet away from the road, if necessary.

Grade your roads up higher than the adjoining ground. Keep the centre of the road 6 to 8 inches higher than the sides, and from 1 to 2 feet higher than the side ditches, so that the water will run from the road to the side ditches, and then along the road in the side ditches and

not in the road. Give the dirt road a chance with intelligent care and it will surprise you.

It is an easy matter to talk about our country roads, and no one appreciates more keenly than I do, the difficulties and the responsibilities that our town highway officials have been struggling with during the past years. We must recognize conditions as they exist and meet them in a practical way, otherwise our talking will do

no good. The average amount appropriated for repairing country roads in the United States is about \$37 per mile. This is not enough, especially if it is worked out by day labor. There may be places where less than \$37 per mile will do very well, but there are a great many places where \$37 per mile is not sufficient. It is useless for us to talk about better roads unless necessary funds and skilled supervision are provided.

Points in Favor of Concrete Culverts

Economical in Cost, Profitable to the Contractor, Inexpensive in Maintenance — Methods Employed and Interesting Costs

Concrete culverts are economical from the standpoint of the taxpayer, desirable on the part of the highway commissioner and profitable for the contractor, says a writer in "Concrete." The citizen gets a good culvert for little money, the roadmaster is given a material that is easily handled and, once made into a culvert, requires no repairs, and the contractor is allowed to take a legitimate profit by using local labor and local materials.

We have an interesting account of the building of a 32-foot culvert in Nebraska. The superintendent says:

"We started with the following material on hand: 8 cubic yards crushed stone, 6 cubic yards sand, 44 sacks of Portland cement and two patented culvert forms, 4-foot x 10-foot.

"We tore part of the old wood bridge away, cleared a base for the foundation, which was 4 inches thick, made of concrete mixed 1:2:3, cement, sand and stone. One of the culvert forms was put in place and the reinforcing rods and wire were bent over it. The form was then covered with a layer of concrete 5½ inches thick, with the reinforcement embedded in the concrete. Wood forms for the wing walls, and the retaining walls beyond them, were placed and the concrete tamped in them. On the second day we withdrew the form from the first part of the culvert tube and concreted the second portion, continuing the operation until the full length of 32 feet had been constructed. The other wing walls and retaining walls were then built.

"The reinforcement consisted of ⅝-inch steel rods, cut in 6-foot lengths, spaced 18 inches apart, bent and arched over the forms, with hog wire fencing placed over the top. After the concrete had been placed and all forms removed, 10 inches of earth were placed over the culvert and 48 hours after the structure was in commission.

"In this culvert we placed 13 cubic yards of concrete, using 44 sacks of cement and 120 square feet of hog wire fencing. The forms for the retaining walls and wing walls were built of boards from the old wood culvert. The labor cost was \$33.75, and \$8.10 was spent for reinforcing."

This account illustrates one of the chief arguments for concrete culverts. Ordinarily sand and gravel can be taken from the bed or banks of the stream. Cylindrical forms and Portland cement are the only materials that must be carried to the job. There are no long waits for freight shipments of steel girders or corrugated iron culvert tubes. Local labor, under intelligent supervision, will make a good job. What money is spent is spent right in the county. The concrete culvert will stand for decades without repair. These are some of the points to be urged by contractors bidding on this class of work. The fact that the road is not blocked for more than a very few days will appeal to the farmers.

Cost figures in culvert work are interesting. An ordinary 2-foot wood culvert requires 800 feet, board measure, at \$20 per M.; labor costs at least \$4; total, \$20. This culvert must be rebuilt in five years.

A concrete culvert of the same size will cost about \$30 and will last 60 years. Result: In 60 years wood culverts will have cost \$240, while concrete structures will have cost but \$30.

The cost of concrete culverts varies in different localities, due to fluctuations in cement prices, proximity of sand and gravel, etc. The following table will be found useful in figuring on culvert jobs, the cost of which can easily be learned, given the local prices of materials:

Material for Ten Foot Culvert Without Wings

Culvert. Size of	Cu. ft. of Concrete.	Cu. ft. of Stn. or Gvl.	Cu. ft. of Sand.	Sacks of Cement.	Reinforcing Wire.	Reinforcing ½ or ⅝ rods.
1 ft.	14	12½	6½	2½	18 sq. ft.	None
1½ ft.	18½	16½	8½	3½	22 sq. ft.	None
2 ft.	24½	22	11	4½	30 sq. ft.	None
3 ft.	53	47½	23½	9½	45 sq. ft.	5 pcs 4½ ft.
4 ft.	70	63	31½	13	60 sq. ft.	5 pcs 6 ft.
5 ft.	118	106	53	24	75 sq. ft.	7 pcs 8 ft.
Concrete in 1-foot, 1½-foot and 2-foot.....						4 in. thick.
Concrete in 3-foot and 4-foot						6 in. thick.
Concrete in 5-foot						8 in. thick.

Toronto Engineers' Annual Banquet

The ninth annual banquet of the Engineers' Club of Toronto was held on Thursday, Feb. 17th.

The chair was occupied by Mr. A. B. Barry, president for 1909, the present president, Mr. C. M. Canniff, acting as vice-chairman. "The Profession," proposed by Mr. Canniff, was replied to by Dr. John Galbraith, Dean of the Faculty of Applied Science in the University of Toronto. "Sister Societies," proposed by Mr. A. F. Macallum, City Engineer of Hamilton, was responded to by Mr. A. F. Wickson, president of the Ontario Association of Architects; Mr. H. W. Selby, vice-president of the Ontario Land Surveyors; Mr. R. G. Black, and Mr. J. C. Murton, of the Engineering Society of the University of Toronto. Messrs. C. M. Canniff, R. A. L. Gray, C. W. Heaton and others contributed to the programme of songs and recitations.

Mr. Angus Smith, city engineer of Regina, has resigned to accept a similar position at Moose Jaw, Sask., made vacant by the resignation of Mr. Darlington Whitmore. Sixty-one applications were received by the Moose Jaw council.

Paving Work along Street Railway Tracks

Features of Recent Practice Adopted at Indianapolis—Use of Asphaltum Filler—Need for Cheap Cementing Material

BY THOS. MACMATH

The pavement in street railway tracks is subject to additional destructive conditions besides those encountered on ordinary streets. The concentrated wheel loads of the modern cars distort and deflect the rail. This breaks any contact the pavement may have with the rail and provides entrance for water into the body of the paving. Heavy, stiff rail with good fastenings and solid ballast reduce deterioration of the paving but do not prevent the vibration of the rail. This cannot be eliminated.

During the past year in Indianapolis several features in track paving have been studied. The reconstruction of track in the business centre of the city presented opportunity for improving the track construction. Two blocks of track on Pennsylvania street between Washington and Ohio streets, were rebuilt, using every care to make the work as permanent as possible.

The 9-inch girder tram rail, 90 pounds to the yard, was laid on 6x8-inch by 8-foot white oak ties, spaced 2 feet. The subgrade was excavated to a depth of 10 inches below the bottom of the ties and rolled till compact. The track was raised on blocking to the proper grade and line and the excavation filled with Portland cement concrete to within 5 inches of the top of the rail and allowed to set for 10 days. Brick surface was applied on a sand cushion. At the street intersections where traffic could not be kept off, the brick was filled with asphaltum filler. The balance of the paving was grouted with Portland cement, every effort being made to fill the joints completely with grout.

The new features of this track construction are the increased thickness of Portland concrete base under the ties, and the use of the bevelled edge Nelsonville stretcher brick outside of the track.

Objection may be made to the use of the stretcher brick outside the rail, as this may start a rut along the rail. The bevel stretched in combination with the wood strip under the head of the rail is intended to keep the rail from direct contact with the brick and to reduce the effect of vibration and prevent the paving being crushed by wide tread wheels.

Asphaltum filler has been used on brick paving in Indianapolis and has its advantages in cases where traffic cannot be kept off the paving or tracks for sufficient time to permit cement grout to fully set. Several makes of asphaltum filler have been tried, as well as coal tar pitch. Later we will have some data as to their relative merits.

About 8,000 square yards of brick paving was filled with asphaltum filler during 1908. This paving is subjected to heavy traffic and great effort was made to do as good a job as possible. The work was done with every precaution suggested by the representative of the asphaltum, the city engineer, and the engineering department of the street railway to make it first class. Two blocks of the same stretch of track are grouted with Portland cement. A direct comparison of results can be made. At present both stretches of paving are in fine shape.

The wear on brick paving starts from the breaking of the edges of the brick at the joints, rounding the edges

till the brick resemble cobble stones. This is noticed especially when the wear is from the shoes of the animals, the wear from wheels being practically uniform across the face of the brick. The round edge commonly used is a mistake. Brick should have as little rounding as possible on the edges.

The greatest possible effort should be made to fill the joints full with the best grout. Ordinary grouting is the ruin of a brick. Five cents a square yard spent on good grouting is the best investment on the job. In going over pavement it will be seen that the best paving is that in which the grouting is best. The city engineer and myself have seen parts of brick pavement that have kept smooth under heavy traffic when the balance of the paving was worn rough; the only explanation for the different condition was the grouting.

The following method is suggested for grouting: Mix 1 to 1 cement and sand in a box, using always a measured amount of sand, cement and water. Mix thoroughly and dump the box. Sweep the grout on diagonal lines and use a rubber squilgee instead of a broom. After the grout has settled down in the joint go over it again, repeating until the joint is full and flush after the initial set.

The price paid for brick is probably too low; a smaller brick more uniform in structure and burn is preferable. Such brick should be very closely inspected; possibly 40 per cent. of the brick now classed as No. 1 should be rejected. If the size were smaller these brick would be used in building, thus providing against loss by the maker. The manufacturer should grade his product to give the customer the qualities needed and himself reject the poor brick.

Inspection for quality as the brick are laid is unjust to both parties. As the eye can only decide shape, color and possibly absorption of water, many brick that would be satisfactory are rejected and unsatisfactory brick are scattered throughout the paving. The inspector should have the advantage of judging the brick from their position in the kiln. A better market for second class brick will have to be found before the manufacturer can be expected to grade closer or else the price must be better. Both the manufacturer and his customer should be insured against the expense of freight, unloading, hauling and storage on rejected brick.

Up to the present time no granite or stone block pavement has been used in Indianapolis. The traffic, however, on several streets now paved with brick is so heavy that a block pavement is needed. The street railway has 8,000 square yards of block pavement under construction on Kentucky avenue, south of White River.

The block selected is from quarries 60 miles east of Pittsburg and known as Ligonier block. This is a very tough limestone. The block is laid on concrete foundation and the joints filled with pitch. The pitch to be used will be hydrolene, 80 per cent., and residuum oil, 20 per cent. The stone blocks are smoothly cut and the pavement will not be materially rougher than brick. The block does not glaze or get slippery under traffic. Block will eventually cobble where exposed only to horse travel, but if laid smooth will remain so under wheel traffic.

if fully grouted. The secret of a good block pavement is in the cutting of the blocks with smooth faces and square edges; the block must be laid close with the joints filled with filler. If the pavement be as smooth as brick the noise would be obviated largely and the pavement would continue smooth even when worn by traffic.

For railway track paving, stone block has the great advantage that the paving can be replaced after track repairs at small expense and the general condition of the street is not impaired as in asphalt or brick surface.

The maintenance of track and paving always presents the difficulty that a minor repair to track cannot be made without a large paving expense. In other cases reconstruction of the paving cannot be made because the condition of the track will not justify it and enough money to rebuild both is not at hand. In other words, a worn out pavement on a street with a two-thirds worn out track presents a difficult financial problem. There should be some cheap pavement invented to use for such short time work. This problem is frequently presented on interurban lines in small towns in which ordinary T-rail construction should be paved.

The success of pavements of the bitulithic class seems to indicate that something can be expected in this direction. Assuming that the track roadbed is good enough for a foundation, if a 4 or 5-inch layer of bituminous macadam could be cheaply laid and cheaply and easily be repaired by ordinary section men it would solve this trouble. The patents seem to tend to prevent the use of the usual forms of such pavements under these conditions.

One proposition of this kind is presented by an asphalt contractor. He suggests a layer of clean macadam laid and rolled in place with a light roller, then poured with a hot asphalt. This is to be followed with a layer of $\frac{1}{4}$ -inch stone, also poured with hot asphalt, then coated with sand and cement and rolled with a heavy roller.

For this proposition no great plant would be required. A closed heating kettle of two tons capacity with a hand agitator can be purchased for \$700. The grading of the macadam can be cheaply done. It has been estimated that such a pavement could be laid at 50 cents per square yard, and subsequent patching could be done by section men at the same cost. This would give a pavement suitable for light travelled streets where the traffic largely avoids the car tracks. The cost of maintenance would be so small that it would not be neglected.

The need of to-day for small towns is a cheap yet reasonably durable pavement that can be repaired when necessary by ordinary labor with a small expenditure for plant. The macadam country road fails under automobile traffic. The need is now for a cheap cementing material.

Paving Material in Various Cities

Wood blocks or asphalt for heavy traffic and bitulithic and a light type of asphalt for lighter traffic is the advice which the city council of Victoria, B.C., has received in the matter of street pavements. Assistant City Engineer Bryson, who was commissioned by the city council to look into the types of pavements in use in eastern cities and report thereon, submitted his report at a recent meeting of the council. Mr. Bryson's investigation is set forth in the following report:

Ottawa, Ont.

In Ottawa, Ont., the pavements chiefly in use are asphalt, bitulithic, sandstone and wood blocks. Sandstone blocks being used on heavy grades. The principal thoroughfares are paved

with asphalt. Where car tracks exist, the allowance is made with sandstone blocks. On several streets bitulithic has been successfully used. Various bridges are paved with wood blocks, but this class of pavement is not used for streets. The city owns its own asphalt plant and does all repair work and is in a position to submit competitive tenders with contractors.

Montreal, Que.

In Montreal, where heavy grades exist and where traffic is exceptionally heavy, granite and scoria blocks are used. The principal thoroughfares are paved with sheet asphalt blocks, this class of pavement giving every satisfaction. Hassam has been used in two blocks.

Toronto, Ont.

In Toronto the paving materials chiefly used are wood blocks, bitulithic, brick, sheet asphalt, asphalt blocks and concrete. Sheet asphalt (heavy, medium and light) is used for all classes of traffic, but not on heavy grades, vitrified brick being used on streets where heavy grades exist. Bitulithic is laid down when a fully signed petition is received from property owners asking for this class of pavement, which has proved very satisfactory, being less slippery than asphalt. There are not many streets paved with wooden blocks, but where this pavement has been laid it is satisfactory. Concrete is used for paving lanes and small thoroughfares. The city has a complete asphalt plant which carries on its own repair work. The city also submits tenders against contractors.

New York, N.Y.

In New York the principal paving materials in use are asphalt, granite blocks, Belgian blocks, asphalt blocks, wooden blocks and brick. Sheet asphalt and granite blocks may be regarded as the standard paving material for this city and are used in all classes of streets, granite blocks being used where traffic is heaviest. Wooden block pavements are also popular and are giving good results.

Calgary, Alta.

In Calgary, wood blocks, bitulithic, asphalt, granitoid have all been laid. In the case of the wood block pavements the blocks were imported from the States and laid by an American company, and the pavements are in first-class condition. The bitulithic pavements are laid on concrete base and are also in good condition and popular. Granitoid pavements are used on the subways and streets where grades are heavy, and are standing well. Asphalt here is laid on a concrete base and also the Worswick asphalt concrete pavement, both of which are giving extra satisfaction. The latter type is satisfactory for residential streets where the subsoil is firm and resistant, and is considerably cheaper than that laid on a concrete base.

From my own observations and information gathered from the various city officials, I am of the opinion that granite blocks, sandstone blocks or brick are the most suitable pavements for heavy grades.

I consider the most suitable pavement for Victoria to be wooden blocks and asphalt (heavy type) for the heavier traffic and bitulithic and asphalt (light type) for lighter traffic. I would recommend in all cases where street railway tracks exist that that track allowance be paved with vitrified brick, sandstone or granite blocks when asphalt or bitulithic is used.

In conclusion, I wish to express my thanks to J. R. Barlow, City Surveyor of Montreal; Mr. Child, City Engineer, Calgary; N. J. Ker, City Engineer, Ottawa; C. H. Rust, City Engineer, Toronto; Geo. A. Johnson, S. W. Whinery and Rudolph Hering, consulting engineers, New York.

Permits issued at Port Arthur, Ont., during 1909 amounted to \$584,810. This total only covers buildings erected inside the first fire limits, for which permits are necessary. The value of buildings outside these limits, we are informed by City Engineer Antonisen, would probably amount to \$300,000. A very busy season is in prospect.

Criticism of New Quebec Bridge Plans

"Scientific American" Terms Design "Commonplace" and Inferior to that of the Forth Bridge Built in Last Generation

The new plans for the Quebec bridge are a fruitful source of criticism on all sides. In a recent issue of the "Scientific American," a writer reviews the conditions relating to the partly completed structure that collapsed, and deals with the circumstances leading to the expenditure of \$150,000, and the consumption of eighteen months' time, to produce the present plans. Of these the writer asserts that the design is "commonplace" and adds that there is a general professional opinion that both structurally and aesthetically it is distinctly inferior to the Forth Bridge, which was completed nearly twenty years ago. The writer then continues:

"If the bridge is built according to the proposed plans, it will not only be of inferior merit, considered from the bridge engineer's standpoint, but will also be the ugliest bridge of monumental proportions among those hitherto proposed or built. It presents the appearance of a monotonous mesh of triangles and straight lines. From abutment to abutment there is not one graceful line in the whole structure; not the slightest attempt to combine the beautiful with the useful. The faulty structure which collapsed had at least the redeeming feature that the outlines were structurally and aesthetically correct; and although the Forth bridge has been made the subject of much criticism by the artist and the architect, it must be regarded as having distinct claims to beauty when compared with the new plans for the Quebec bridge."

"It would seem, however, that the Board has some doubts as to the merits of its own work; for it now invites competitive plans from contractors, which are to be filed by May 1st, 1910, the plans to be drawn at the contractor's own expense. But if the Board has taken 18 months' time and spent \$150,000 to produce the present plans, the public will naturally ask, 'How can the Board expect responsible firms to furnish them with new plans in one-sixth the time and for nothing?'"

Forth Bridge Design

"Those of us who knew the late Sir Benjamin Baker, the builder of the Forth bridge, and were familiar with his cautious methods, will agree that, could he have been consulted, it is more than probable that he would have disapproved of the present design; as he would surely have condemned the old one had it been submitted to him. In his Forth bridge the width at the base of the towers is 120 feet for a span of 1,700 feet, which gives a ratio of 1 to 14. This large width at the towers is necessary to ensure the stability and lateral rigidity of the entire structure under wind pressure during high gales; and particularly is this provision necessary to ensure safety during erection. The bridge which failed was only 67 feet wide, and this small width was a large contributing cause to the twisting of the structure during erection, which preceded its collapse. This important fact does not seem to have been given sufficient consideration; for the new structure has a width of only 88 feet, or 1-20th of the proposed length of span of 1,758 feet, as against 1-14th in the Forth bridge."

American Experience

"It may be claimed that experience with American practice in cantilever railroad bridges has shown a proportion of 1 to 20 to be sufficient; but it is a question how far their immunity from disaster during erection was due to the fortunate circumstance that no strong winds were experienced—such as frequently occur at the Forth bridge, and may occur at Quebec—which would have twisted its trusses out of shape

before they had been connected up. Moreover, we believe it is a fact that there is not a large cantilever railroad bridge on this continent over which trains dare run faster than 25 miles an hour. The vibrations, due to the narrow width, would become excessive, and at faster speeds would create danger of derailment. On the other hand, the advantages of great width in proportion to length are shown by the fact that the fast and heavy express trains in the north of Scotland pass continually and with absolute safety over the Forth bridge at their full speed of from 50 to 60 miles an hour."

Weight for Weight's Sake

"Another element in the specifications upon which bids are invited, which is puzzling engineers and contractors, is that the maximum height of the towers has been limited to 290 feet above the masonry. It really would seem as though the board of engineers who drew up the specifications were desirous to put weight into the new bridge merely for the sake of having it there; for it is well understood that the stresses in the top and bottom members of a truss, and therefore the amount of steel necessary to meet these stresses, increase inversely as the depth, and hence the shallower the bridge, the greater will be its weight. In view of these facts, it is extraordinary that in the specifications the maximum height of the towers above the masonry should be limited to 290 feet. This height in the Forth bridge is 330 feet, and in the Quebec bridge which fell it was 315 feet. The low height of 290 feet necessarily increases the weight of a cantilever, and if used for the towers of a suspension bridge would result in a flat catenary, requiring unusually heavy and expensive cables and anchorages. The great height of the towers and trusses in the Forth bridge has an important bearing upon its rigidity under fast trains."

The Structural Weight

"The effect of low height and narrow width in raising the weights is shown in the fact that the amount of steel to be put into the Quebec bridge in a length of 2,800 feet is estimated at over 66,000 tons. The total amount of steel in the Forth bridge in a length of 5,300 feet is 63,000 tons. In other words, the narrow Quebec structure would require the enormous average amount of 24 tons of steel (about half of which moreover is nickel steel) per lineal foot, whereas the wide and rigid Forth bridge required an average of only 10 tons of carbon steel per lineal foot. It is true that the train loads assumed for the Quebec bridge are about three times as heavy; but it is well understood that the weight of steel in any bridge of great span does not increase in anything like the same proportion as the live load."

Architects, engineers and contractors will be interested in a new line offered by the Barrett Manufacturing Company, New York. This is a reinforced felt called "Tartex," specially adapted for use for waterproofing where tensile strength is considered an important feature. A sample of tartex was sent to the "Contract Record" last week. It is pliable and appears to contain all the qualities of a woven fabric and high grade tarred felt. Our readers may obtain sample by addressing the Barrett Manufacturing Company at New York, Philadelphia, Boston or Chicago, mentioning this journal. "Tartex" is claimed to be well adapted for use where the application of material is difficult and where laps must be exposed while other work is in progress.

Estimating Plaster and Painting Work

In estimating plaster work, the first thing to be considered is the amount of mortar and lime required for every superficial yard of surface plastering, and the amount of time in its preparation and manipulation. The carriage of material is also an important matter, and the facility for its application upon the different parts of the building. There are some buildings which require more scaffolding than others, and although the plasterer in general does not supply the main scaffolding or that for his own special use, yet it is incumbent upon him to remove it from place to place as necessity demands. This requires considerable time, so must be allowed for according to the exigencies of the case. Again, the different loads of plaster require a certain time to be properly performed, and it is for the plasterer to consider this in estimating. Then there is the moulding of the stucco cornices and ornaments. The time in their preparation, as well as the material used, and the labor entailed in their setting up and mitring are to be duly considered. The making and setting up of plaster columns and pilasters, and the formation of arches should be carefully calculated as to the time employed in their construction. The formation of all heads, enrichments, arrises, mouldings and centrepieces should be calculated according to the labor expended and the material utilized. There are a few kinds that the plasterer would do well to give his careful attention to, as they will enable him with greater facility and accuracy to come to a proper estimate of his work.

Estimating Painters' Work

In the estimating of painter's work the first consideration is the material to be painted, then the necessary preparatory work, and the time and paint materials, and every requisite for the proper execution of the work. There are some materials which require more time in preparation than others and their constituent elements and the manipulation of the same may produce a smoother surface and therefore the painting may be done with greater facility and be more effective. When we consider first the interior woodwork of a building, we must take note of the "knotting" and "puttving" required to be done on wood where there are knots and cracks or other blemishes. The time and material used in these processes have to enter into the calculations in estimating, also the accessibility for performing the work. In general, ordinary steps may be used for the painting of interiors of houses, but in churches, halls and public buildings sometimes extensive scaffolding has to be erected. Such should be made a separate item, and priced according to the time and material employed in erection and removing same. There is also greater time occupied in painting work at high altitudes, and where scaffolding is used, than in doing work upon the ground, as the more perilous the position the greater caution is to be exercised. The interior decorations require considerable time in their execution and according to the complex or simple character of the design and the dexterity with which it can be performed, will the calculations be made in estimating. All exterior work, in general, requires more time in execution, especially in roof work, where ladders are frequently to be removed and caution exercised. It depends greatly upon these important features for consideration, and the distance to be travelled to and from the job, that an approximate estimate may be obtained of the work to be executed.

Permits issued at Vancouver, B.C., last month totalled \$631,311, covering 144 applications, as against a total of \$865,630 and 109 permits during the corresponding month of 1909.

Notes on School Plumbing

By A. C. SHAVER, Inspector of Plumbing

Sanitation in our public schools is receiving far more consideration than at any time in the history of architecture. Not only is this true in regard to the modern systems of heating and ventilating, but also in the wonderful improvement in plumbing, both as regards the drainage system, water supply and fixtures. While formerly plumbing fixtures were placed in badly ventilated, poorly lighted, out-of-the-way places and used only as a necessity, they now occupy a more prominent place and have become a luxury as well as a necessity.

When it comes to a question of plumbing, the schools where the boys and girls of to-day are learning the responsibilities of the men and women of to-morrow, it ought to be a self-evident proposition that the best can be none too good. A city's educational institutions should reflect the very highest state of knowledge and practice of sanitary engineering—partly because they are educational examples of public buildings as well as places of where education is imparted; also because children have no power of choice in the design or construction of the plumbing in the schools they attend. The municipality is morally responsible for the health and comfort of the children who attend its places of public instruction.

It is not enough that the plumbing fixtures be sanitary; they must be such that the children take pride in them and feel a sense of responsibility in keeping them clean. The public drinking cup has always been a source of trouble on account of the possibility of the spread of disease, but this has been overcome by the introduction of the bubbling pedestal drinking fountain in which no cup is used; the child, leaning over, drinks out of a bubbling stream of water, no part of the lips coming in contact with the fountain. The improvements in plumbing fixtures have driven out the old latrine closets and the more antiquated systems with their large fouling surface, and have created a demand for the more sanitary and up-to-date work; the individual, seat-action, syphon jet closet, with its tank and bowl of vitreous ware, is probable giving the best satisfaction, and when installed in a well-lighted, well-ventilated room is a model of sanitation. If the privilege of using modern fixtures in a clean, ventilated room shall teach our children anything toward cleanliness and care of property and do anything toward raising the standard of sanitary knowledge, any extra amount paid is well invested. The policy of putting high-grade material in rooms to be used for toilet purposes has often been assailed by unthinking persons, and probably often will be; but it is certainly a step in the right direction, as it is a saving in repairs, length of service and the ease with which it is kept in a cleanly condition.

Owing to the nature of the waste that enters the urinal, it is the most difficult of all toilet-room fixtures to keep in a clean and sanitary condition, and the foul air noticed in many public toilet rooms is due largely to this fixture; but this can be overcome by the proper selection. A urinal should be of a non-absorbent material such as slate or solid porcelain, and the water so delivered as to have a scouring effect on all parts; the local vent so arranged as to draw the air downward across the bowl or trough, as the case may be, and exhaust back of the urinal slab in a foul-air flue installed for that purpose. With this installation we do not get the foul odor, as they are drawn downward and never reach the level of the face.

Mr. Owen W. Smith, formerly of Messrs. Galt & Smith, Toronto, has moved to Winnipeg, Man., where he will be identified with a large contracting firm.

Functions of a Live Builders' Exchange

To Bind the Employers Together, to Promote and Protect Their Interests and to Extend the Present Sphere of their Influence

By GEO. S. GOULD, Secretary, London Builders' Exchange

The social department of the Builders' Exchange work is one of the chief factors to be considered, consequently it becomes one of the first duties of every organized exchange to provide suitable rooms for the use of its members—for social as well as for business purposes. These rooms should be made so attractive and comfortable, that the members will gladly avail themselves of the use of them in their leisure hours. Provision should be made for as many modes of recreation as the space in the rooms will permit, and for those who desire more quietude, a reading room is most desirable. In a word, the exchange should provide all the advantages of an ordinary club membership—without its bad features.

Besides the ordinary benefits to be derived by any other club membership, exchange members have this in common: that they must derive their business through the same channels. Consequently, by meeting together frequently, in a social capacity, they learn to know each other better. Confidences are exchanged, valuable information imparted, and close friendships formed between competitors in the same calling. This would never occur by their meeting only as rivals in business.

As all the members have to derive their living from the same sources, it is to the interest of each, to see that the avenues to those sources be kept clear of all obstructions; for whatever diverts a legitimate tender from receiving its just consideration and award, is an obstruction to the best interests of every exchange member. Whenever a principle, that makes for "fair competition," is assailed, it should be dealt with at once, by the Builders' Exchange. If this were more general, the result would be that improper interference with the awarding of contracts would soon be abolished.

It is necessary for the discovery of attempted wrongs, that each member place full confidence in the other. Misrepresentations are often made by unscrupulous clients, and contractors are apt to be misled unless they are wise beforehand. If in the making and submitting of his tender, the bidder is governed by fair and honest principles, he should not be averse to making comparisons immediately after the time for receiving prices has expired. Such comparisons frustrate malpractice in contract awards.

Combined with the element of good fellowship, the work of the Exchange is educational. In none of the gatherings is talking shop barred, and an observant listener can always pick up useful information when the different practices employed in his own branch of work are being explained.

Young beginners in contracting, especially, are benefited by regular attendance at the meetings, and even contractors who have grown grey in their calling, can still be learners as well as teachers in the rooms of a live Builders' Exchange. In addition to any information that may be derived locally, they will find on the tables many valuable trade journals, whose business it is to cater to the building trade. The editors of these journals keep in touch with all that is to the best interests of contractors, and their columns contain most valuable information.

In addition to the advance news concerning proposed building construction, tenders wanted, and contracts awarded, some very interesting and profitable articles will be found in their pages, such, for instance—to quote recent topics—as: "The best methods to be employed for estimating"; "Shall contractors be remunerated for figuring?"; "The best methods of keeping builders' accounts"; and "Should a tender

be awarded to the lowest bidder, or to the lowest but one?" A careful consideration of such questions as these will certainly develop thought. These journals also keep contractors in touch with trade difficulties and labor disputes, and generally, are a source of much help to a Builders' Exchange.

The educational work of the Builders' Exchange should not be confined to its own members, but should be far reaching, extending even to the legislative halls. Realizing, as builders do, the ever growing need of skilled labor for building construction and being cognizant of the decadence of the apprenticeship system, they should lend their influence towards establishing trade schools in different sections of the country, where, in connection with a public school education, our boys might receive elementary instruction in all branches of building construction and a sufficient practical knowledge of each to admit of their being readily placed out with reliable contractors as students under instruction for one year, and improvers for the second year, with a diploma for proficiency at the termination of the third year. The legislative committee of every exchange should press this matter strongly upon their representatives in Parliament.

The social and fraternal privileges of an Exchange are not entirely local. Any member in good standing, who may have to do business in any place where there is a sister Exchange, will receive a fraternal greeting and courteous treatment while there, and in addition, may enjoy all the privileges and benefits of the Exchange rooms in that city.

The question is sometimes asked, "What good is the Builders' Exchange?" What would be thought if one of our merchants or bank managers should ask, "What good is a police force?" The Builders' Exchange exercises services for the building contractor, somewhat similar to those performed for the general public by the police department.

The Federated Builders' Exchange affords the only protection the builder can ever get against the unjust demands of a united labor party, such as trying to compel a contractor to have the "union label" on every job; limiting the number of hours a man may work; limiting the amount of work to be done, and demanding increased rates per hour. The Federated Trades and Labor Council take their demands right to the Provincial and Federal Parliaments. They have the loyal support of every member, and consequently their measures are likely to be passed without much trouble unless strong opposition is brought to bear against them by the employers interested.

The Exchange does more for a contractor than merely to protect the rights and privileges that he already enjoys. Its great aim is to secure for every building contractor every advantage possible to enable him to carry on his business successfully. This means carefully watching the changing conditions and methods in building construction and keeping the members abreast of the time. It also means that they have not only to resist all unfair legislation but to promote and advocate laws that will be both just and advantageous to the contractor. Further, it means that a careful supervision must be kept on all local practices relating to the client, his architect, and the contractor himself.

The Builders' Exchange of London, Ont., since its formation, has been the means of benefiting every contractor in business, financially, as well as in other ways, and it is still performing the good work. It is not yet 15 years since it was very unsafe for a contractor, who had any means, to at-

tach his name to any of the contract forms that the architect used. It simply meant that a man handed the key of his strong box over to the client or his agent and left himself completely at their mercy. Now he can fearlessly sign his agreement knowing that its provisions are just. Then, he paid from one-half of one per cent. to one per cent. for fire insurance on every job he took. Now, he pays nothing—a saving of at least \$50 a year. Then, he had a worthless lien law; now, he is properly safe-guarded in that law. But I think I have advanced proof enough to show that the Builders' Exchange has been a benefit to the industry in London.

There is abundance of work to be accomplished, and I would urge every non-exchange contractor to overcome any prejudices he may hold against any members of his Exchange, bury past differences and take his right place in the ranks of a United Employers' Association of Building Contractors.

Mr. Arthur E. Nutter

City Architect, London, Ont.

Mr. Arthur E. Nutter, city architect of London, Ont., hails from the greater city of the same name. His professional career commenced in 1892, when he was articled to C. R. Ashbee, M.A., a well known architect



Mr. Arthur E. Nutter, City Architect of London, Ont.

with a reputation as an artist and author. While serving his articles, Mr. Nutter enjoyed the advantage of Mr. Ashbee's high class practice and of being associated with the erection of numerous large town and country residences, and public buildings. After touring Great Britain and the Continent in the acquisition of ideas pertaining to his work, Mr. Nutter engaged in a country practice of architecture and land surveying with Mr. F. G. Hughes, of Hampton-on-Thames. Later, he was engaged by the Archaeological Survey in connection with ancient manor houses and churches in the county of Surrey. Following this, he undertook various architectural work at Plymouth, and later located at Liverpool, in practice with Mr. T. M. Shallcross. In 1901, he was elected an associate of the Liverpool Architectural Society. While at Liverpool, Mr. Nutter designed, among other important buildings, the Liverpool Artillery Volunteer Headquarters.

The fortunate year in Mr. Nutter's career was 1907, when he purchased a partnership at London, Ont. On February 3rd of the following year he was appointed city architect and deputy inspector of buildings. In 1908, Mr. Nutter designed and supervised the construction of the Victoria Isolation Hospital at a cost of \$52,000. This building is considered by the provincial authorities to be one of the best of its kind in Canada. In the same year, the Victoria Hospital laundry, costing \$6,000, and fire halls Nos. 4 and 5, costing \$14,000, were erected according to Mr. Nutter's plans—these in addition to other public work. 1909 witnessed the erection of the Smallpox Hospital and the Wortley Road public school; also additions and alterations to many city buildings.

Mr. Nutter, like most good men, has a hobby: he is fond of aquatic sports. At Liverpool he had the reputation for being a keen and able yachtsman. He was then the owner of two trim yachts, of 10 and 15 tons respectively.

Progress and Future of Good Roads Movement

Interviewed in Toronto last week, prior to his departure for Ottawa, Mr. A. W. Campbell, the new Deputy Minister of Railways and Canals, said in part:

"Road improvement is one of the most important matters which the Province of Ontario has to face, as well as many older countries. The weakness of the present situation is every year becoming more apparent to the public. Statute labor with municipal money grants have for a century been employed, but township systems, based on this method, have proven inefficient. There is a most important work for the province as a whole, cities and towns, to perform in this regard."

The Key to All Transport

"This is the view which has been forced upon me by a close study of the transportation question," continued Mr. Campbell. "While engaged in the battle for good roads, a careful study of the entire field has been necessary. Railways and canals are necessary in their place, but they are not by any means the whole equipment of traffic. Without good roads for primary transportation, railways and canals are useless. They are of service only in so far as they are fed by the greater network of country roads, and the volume of railway and canal traffic is an index to the condition of the country roads. In a period of bad roads, railways are comparatively idle. When the country roads improve, the volume of railway traffic expands proportionately."

"Since taking up the question of better roads some years ago, it is gratifying to me to reflect that something of a permanent nature has been accomplished; that the pioneer stage has been successfully passed, and that the way has been prepared for a satisfactory outcome. In the initial stage of the good roads movement, all discussion of the question was met with opposition and prejudice. It was an important but, at times, almost discouraging task to convert this prejudice into sympathy, and sympathy into action and co-operation."

Unfavorable reference to statute labor was at first a dangerous matter before many audiences; while such a thing as a county system or provincial aid was impossible as a suggestion.

An Educational Campaign

"In this work, it was not possible, nor have we sought, to force new systems and methods upon the people. Until they themselves saw and understood the wisdom of a change, they were not in a position to ef-

fectively use the means of carrying the new methods into effect.

"To briefly summarize, however, we may say that about one-quarter of the townships of the province have discarded statute labor. One-half of the eligible counties have established county systems of main roads; and the principle of provincial aid to road construction has been established. In every part of Ontario, even where statute labor is retained, the campaign of education has had its effect, and improvements of an important kind are to be observed.

Systems of Management

"Criticism is occasionally heard," added the Deputy Minister, "as to the success of county road systems. That is to be expected. No merely human creation can be perfect. But undoubtedly the country road system is the most successful that has been undertaken. The roads built are not uniformly good, but that they are improved to a degree reasonably commensurate with the expenditure upon them, is undeniable. The aim has been to establish good systems of management, and get the best results from the expenditure made. Counties which spend only \$600 a mile cannot build as good roads as those which are spending \$2,000 a mile, but there has been improvement proportionate to the outlay.

"County roads are only a beginning, not the end. Under the township systems there was a series of patch-work. No real commencement was made, and the result was that little was accomplished. County roads, aided by the province, form a substantial beginning on a methodic basis that will eventually result in the permanent improvement of all the roads. They are object lessons; and as an argument for extension, a completed system of main county roads is an invincible argument.

"It is to me a matter of regret that I am leaving the more active field of operation in behalf of the Good Roads Movement," concluded Mr. Campbell. "But, on the other hand, it is gratifying that I am still to be engaged in the great question of transportation, of which good waggon roads are at one end, and canals and railroads at the other. And in undertaking my duties as Deputy Minister of Railways and Canals, and Chairman of the Intercolonial Railway Commission, I look forward to a more intimate and practical knowledge of the entire field of transportation.

"While going to the larger field, my energies and sympathy will always be retained by the Good Roads Movement, and wherever I may be in Canada it will be a pleasure to lend my assistance to those who remain to carry on the work."

Canadian Field is Extensive

The fact that the Canadian field is one of great possibilities for all substantial commercial lines of business, has again asserted itself in the case of the Tungstolier Company of Canada, Limited, Toronto. Since the organization of the above company some four months ago. Mr. R. B. Basham, general manager, with the benefit of his twelve years' experience as a lighting expert, has developed a business which has grown to such magnitude as to require larger and more complete quarters.

The head office of the Tungstolier Company is now located at 96 King street west, suite 20, instead of 100 King street west, where the many conveniences of larger offices, more complete in their appointments, provide for the rendering of a most complete service. The new offices will be equipped with apparatus for demonstrating correct and scientific illumination, and inspection is invited. In correct illumination, a proper reflection and diffusion is as important as the type of lamp used.

The Late Thomas Douglas, Toronto

We regret to report the death of Mr. Thos. Douglas, of the firm of Douglas Brothers, Toronto. The late Mr. Douglas was born in Ireland 65 years ago and came to Canada at 15 years of age. In 1872 he commenced the business with which his name has ever since been associated. As a sheet metal contractor he was held in high esteem in building circles. Among the important buildings in connection with which the Douglas firm obtained contracts are the Parliament Buildings, City Hall, Union Station, St. James' Cathedral, Canada Life Assurance building, Canadian Bank of Commerce and Customs House, Toronto; Dominion Parliament Buildings, Ottawa, and the Grand Trunk Offices, Montreal. In later years Mr. Douglas branched out in Montreal, where he secured many important contracts connected with such buildings as the Macdonald College, the harbor sheds and the Windsor hotel.

One of Mr. Douglas' earliest contracts was the roofing of the St. James' Cathedral spire. The spire had to be covered with iron from the outside. Rather than ask any of his men to undertake this task, which was one of hazard and responsibility. Mr. Douglas did the work himself, and for several weeks he could be seen suspended by a single rope upwards of 300 feet above the sidewalk. It goes without saying that the work was completed satisfactorily.

Cost of Manufacturing Cement in England

In a paper on the design and operation of modern cement plants in England, read before the Junior Institution of Engineers, by Mr. Harry Horsburgh, Assoc. M. Inst. C. E., the writer states that the rotary kiln has been the means of bringing down the price to a very low figure; in fact, Portland cement can now be made on the works for \$2.64 to \$2.88 per ton, according to Mr. Horsburgh, this sum, of course, being exclusive of interest on capital, depreciation of plant, and sales expenses, etc. For a dry process rotary plant working on marl the figures run as follows: Labor, 90 cents; coal (kiln), 90 cents; coal (power), 88 cents; repairs, (materials), 30 cents; manufacturing sundries, 24 cents; oils and grease, 6 cents; extras (lighting, labor, office expenses, etc.), 32 cents; total, \$3.10 per ton. The figures for item labor are based on the following rate of wages: Laborers, 9 to 10 cents per hour; stokers and drivers, \$6.72 to \$7.68 per week of 56 hours; burners, 18 cents per hour. For fuel for burning the coal would be charged at \$2.88 per ton delivered, and on a quantity consumed equalling about 80 per cent. of the clinker made, weight for weight, the figures being taken on the wet coal. Coal for power varies very considerably, the 38 cents being based on steam power. On gas power a plant can be run at 24 cents per ton of cement. With regard to manufacturing sundries, in a works using material chemically perfect for making cement, this expenditure is avoided. Chalk, gypsum, and other sundries have, however, in most cases to be used. The items for oils and grease open up the question of supplying by contract. It is becoming a common custom for oil, belts, etc., to be supplied at so much per ton of cement produced. Taking oil, for example, 5 cents per ton is considered a fair figure. After allowing for everything, including interest on capital, depreciation etc., \$3.60 per ton (about 45 cents a barrel) is a very low price, and one at which only a few manufacturers can supply cement at the present day. For a Schneider kiln plant the figure is nearer \$4.32. It is reported, however, that with an efficient system of induced draught cement can be made in these kilns at \$3.12 per ton.

Personal News and Notes

During 1909 buildings to the value of \$101,000 were erected at Grand Forks, B.C.

Mr. Geo. A. Crain, ex-president of the C.N.A.B., is taking a holiday at Hamilton, Bermuda.

At Chatham, Ont., during 1909, permits were issued to the total value of \$105,371, compared with \$63,842 for 1908.

Building permits issued at Ottawa last month showed an increase of nearly 150 per cent. over the corresponding month of 1909.

Last year a million dollars was spent in erecting school buildings in Alberta, an increase of half a million over the previous year.

In the United States, the total expenditure for building for 1909 was \$857,530,669, a sum larger by \$231,082,594, or 86.9 per cent., than in 1908.

The Vancouver Board of Works has decided that the minimum wage paid by all city contractors to their workmen shall be 28 cents an hour for an 8-hour day.

Mr. A. J. B. Halford has been appointed Chief Engineer of the Provincial Public Works Department at Toronto to succeed Mr. R. P. Fairbairn, the new Deputy Minister of Public Works.

At the meeting of the Toronto Island Association last week, Mr. Arthur Dinnis was elected president and Mr. Fred Armstrong vice-president. Mr. Dinnis was also placed upon the Civic Island Committee.

During 1909 over \$1,000,000 was spent in constructing 114 grain elevators in Alberta alone, providing 51 new towns and villages with storage facilities. Alberta now has 245 elevators with a total capacity of 8,050,400 bushels.

The city of Ottawa is conferring with Mr. Allen Hazen, the New York expert, in regard to its problem of pure water supply. Mr. Hazen, it will be remembered, designed the Toronto filtration plant, now under course of construction.

Toronto Island is being re-surveyed by City Engineer Rust's department with a view to showing the shore line, which has shifted to some extent since the last survey was made in 1897. The new survey will also show improvements on the Island.

The building permits issued at Halifax, N.S., during

1909, which totalled \$630,379, included eight public buildings, one bank building, eleven business buildings and 97 residences. The best month's total of the year was that for March, which was \$109,490.

Ex-Ald. Balfour, of Vancouver, a prominent contractor who built many of the bridges on the C.P.R. western system in early days, died recently. He settled at Vancouver in 1885, and built the one million dollar structure over the Fraser river at New Westminster.

Mr. A. W. Campbell, the newly appointed Deputy Minister of Railways and Canals, left Toronto for Ottawa last week. Before his departure, the members of the departmental staff at Toronto expressed their appreciation of him by presenting him with a handsome loving cup.

Contract work has beaten the day labor system in Vancouver, and will be adopted in the carrying forward of that city's scheme of street improvement, block grading and sidewalk laying. The Board of Works has adopted recommendations of the city engineer involving expenditures of \$212,615.

Hamilton, Ont., recently experienced the novelty of having a mechanic's lien placed on one of its public buildings for the non-payment of an account. Drake & Drake, carpenters, took this method of collecting \$168 for work on the new Beach pump house, being unable to obtain the amount from the general contractor.

The annual meeting of the Manitoba Pressed Brick Company, Limited, was held in the company's office at 215 McIntyre Block, Winnipeg, last week. The director's report showed a most satisfactory state of affairs, with a very bright outlook. The company is at present doubling the capacity of its plant at Beausejour, Man. Officers were elected as follows: President, Mr. Angus Browne; Vice-president, Mr. J. J. Vopni; Secretary-treasurer and Manager, Mr. W. Findlay.

Mr. R. P. Fairbairn has been appointed by the Provincial Government of Ontario to fill the position of Deputy Minister of Public Works made vacant by the promotion of Mr. A. W. Campbell. Mr. Fairbairn is an experienced engineer, who has been in the department for 30 years and had charge of much work on bridges and colonization roads. Prior to entering the provincial service, he was employed in the office of the city engineer of London. In 1880 he was appointed assistant to Mr. K. Tully, architect of the department, who was then at work on the new Parliament Buildings. In 1903, when Mr. Robt. McCallum succeeded to the position of City Architect of Toronto, Mr. Fairbairn followed him as Chief Provincial Engineer.

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Tenders

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aldermere, B.C.

A waterworks plant has been ordered and it is expected will be put in during the coming summer.

Boissevain, Man.

On the 14th March the ratepayers will be asked to vote on a by-law to raise \$5,000 for granolithic walks.

Charlottetown, P.E.I.

The Water and Sewerage Commissioners will ask the Legislature for authority to issue debentures to the amount of \$15,000 for the purchase of a new pump of the most improved type.

Fredericton, N.B.

Application will be made at the next session of the Legislative Assembly for an act authorizing this city to issue debentures for pavements to cost \$30,000. J. W. McCready, city clerk.

Hull, Que.

At a meeting of the Hull Waterworks Committee, composed of Ald. Caron, Gravelle, and Mayor Fontaine, it was decided to reduce the size of the intended extension of the pump house from 40 feet by 60 feet to 40 feet square, so that the tenders may come within the amount of the appropriation for this work. The lowest tender received on the last specifications was \$20,000, and the appropriation is only \$16,000.

Ladner, B.C.

This municipality, south of Vancouver, is securing plans for a new water system, to cost \$125,000. Springs in East Delts will be tapped and the water conveyed in wire-wound pipes throughout the municipality.

Moose Jaw, Sask.

The city engineer has been authorized to prepare specifications for paving the following: Main street as far as Ominica; River street, Tenth to Eighth; High, Tenth to Eighth; Fairford, from one block east of Main to fire hall; Ninth avenue, from River to Fairford. Estimated cost, \$140,000.

Ottawa, Ont.

Tenders are being called until March 15 for the supply and delivery of waterworks fittings, etc. Newton J. Ker, city engineer. For further particulars see advertisement in this issue.

City Engineer Ker has recommended to the Water Commissioners that the Billings bridge site be secured for a reservoir, and that a water purification or filtration plant be constructed in conjunction with it; probable cost, \$400,000 to \$500,000.

Penticton, B.C.

This municipality is considering estimates submitted by Messrs. Kilmer & Tracy, Vancouver engineers, for a domestic water supply, as follows: From Pen-

ticton creek, \$108,707; from Chute creek, \$131,838; pumped from Okanagan Lake, \$110,736. It is thought the amounts can be halved if the area to be supplied is judiciously planned.

Saskatoon, Sask.

Tenders addressed to J. H. Trusdale, city clerk, will be received until March 14th for furnishing the following: Cast iron pipe and specials; fire hydrants, gage valves and valve boxes; sewer pipe and junctions, and until March 21 for furnishing material for and erecting a steel stand pipe.

Toronto, Ont.

Tenders addressed to G. R. Geary, Chairman, Board of Control, will be received until March 8th for the construction of sewers on the following thoroughfares: Lane, Hugo, Follis, Mavety, Boulton avenue, Beresford, Seymour avenue, Baxter street. Specifications at office of City Engineer.

The board has recommended that the city engineer be authorized to construct and build the foundation of the proposed electric pump building at high level pumping station.

Tenders were called for the further extension of the up-turned end of the waterworks intake pipe and received as follows: Toronto Shipyards, \$895 or \$935 for quick delivery; John Inglis Company, Limited, \$995; Polson Iron Works, Limited, \$1,325. The contract was recommended to the Toronto Shipyards.

Woodstock, N.B.

Application will be made to the legislative assembly to authorize the borrowing of 10,000, to be expended in building permanent streets. J. C. Hartley, Town Clerk.

Winnipeg, Man.

It has been decided to call for tenders for 2,500 feet of water pipe, also for 150 valves and 50 hydrants.

AWARDED.

Saskatoon, Sask.

The following is a list of successful tenderers for supply of waterworks material: Sewer pipe, American Sewer Pipe Company, Akron, Ohio; water meters, Neptune Meter Company, New York; iron pipe, Jas. Robertson Company, Toronto, Ont.

Toronto, Ont.

The following contracts have been awarded by the city: Supply of cast iron pipe, 8 inch and 10 inch cast iron pipe, 8 inch and 18 inch special castings, D. Y. Stewart & Company, Glasgow, Scotland, the lowest; 10 inch special castings, Canada Foundry, the lowest. Laying outfall sewer, Miller, Cumming & Robertson, Toronto, \$59,750, the lowest. Weirs, recommended to City Engineer. Iron castings, Joseph Williamson, Wellingborough, Eng., the lowest. Structural steel, Canada Foundry Company, the only tenderer. Sludge valves and penstocks, Ham, Baker & Company, London, Eng., the lowest. Cranes, Advance Machine Company, Walkerville, Ont., the lowest. Cast iron pipes, Stavely Coal & Iron Company, Chesterfield, Eng., the lowest.

Winnipeg, Man.

The tender of the Robert Mitchell Company for the supply of brass goods for the waterworks department has been accepted.

Railroads, Bridges and Wharves

Brockville, Ont.

On the 14th March the freeholders of Brockville will be asked to vote for the third time on a by-law to raise \$16,000 by debentures for the reconstruction of six bridges within the bounds of the corporation.

Belwood, Ont.

Tenders addressed to Thomas Goodall, township clerk, will be received until March 14th for the erection of a pile bridge across the Irvine river. Plans at office of the above mentioned.

Calgary, Alta.

Among the improvements announced by the C. P. R. for this centre are: Addition to new station building, cost \$80,000; new machine shop, \$20,000; freight car repair shop, coaling plant, new water services and sand tower are also included. Plans are ready for freight shed, 600 feet in length.

Goderich, Ont.

As a result of a conference between the C. P. R. and municipal representatives, the Government will be urged to complete the breakwater. That done, the C. P. R. will proceed to erect their freight sheds immediately. Mayor Cameron and Superintendent Osborne are interested.

Gaspé, Que.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, will be received until March 18th for the construction of a landing pier. Plans, etc., at office of J. G. Sing, District Engineer, Confederation Life Building, Toronto; A. R. Decary, District Engineer, Quebec; J. L. Michaud, District Engineer, Merchants Bank Building, St. James street, Montreal, and on application to the local postmaster and to the Department of Public Works, Ottawa, Ont.

North Sydney, N.S.

C. E. Bernasconi, government engineer, has been sent to conduct a survey of the ballast grounds, on which, if reports are favorable, a wharf will be built. Estimated expenditure, \$50,000.

Quesnel, B.C.

Quesnel Conservative Association is requesting the Provincial Government to construct a bridge across the Fraser river here.

Regina, Sask.

The Grand Trunk survey party have left to lay out the route for a new line between this city and Moose Jaw. The intention is to ultimately continue the line to Calgary. The Moose Jaw Regina section of the line will be built this year.

Sault Ste. Marie, Ont.

Tenders are being called until April 15 for the clearing, grading and bridge work on the 31-mile section of the Algoma Cen-

tral & Hudson Bay Railway between Hawk Lake Junction, A. C. A., and Hobon, C. P. R. Plans, etc., with C. N. Boburn, chief engineer, A. C. & H. R., Sault Ste. Marie.

Toronto, Ont.

The residence of Sir William Mortimer Clark at Wellington street and Clarence Square has been sold to the Canadian Pacific Railway Company.

Victoria, B.C.

A local company is being formed with the purpose of arranging for additional dock accommodation. After the excavating and dredging have been accomplished it is proposed to erect solid cement dock-age facilities. Estimated cost, \$4,000,000.

Winnipeg, Man.

The Board of Control are to request the council to memorialize the Dominion Government for a wharf on the Red river. Probable cost, \$150,000.

AWARDED.

Winnipeg, Man.

Contracts for supplies for the Alberta & Great Waterways Railway totalling upwards of \$3,000,000 have been awarded by President W. R. Clarke, including 40,000 tons of 56-pound steel rails, to the Algoma Steel Company; bolts, the Toronto Bolt Company; spikes, the Peck Rolling Mills, Montreal; and fishplates and angle bars, the Nova Scotia Steel & Coal Company. The steel will be sufficient to cover the entire line to Fort McMurray.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

According to the plans prepared by City Engineer Speakman the proposed pasteurizing plant will cost \$12,000.

The executive of Brandon College have decided to raise \$150,000 for the new addition. Rev. Wm. Reid, of Lethbridge, and J. Kennedy, of Winnipeg, are interested.

Chilliwack, B.C.

A new hospital will probably be erected here in the near future. L. W. Paisley is interested.

Blantyre, Ont.

Tenders will be received by Thos. Ashby until March 15th for new cement walls for a new shed at Knox Church, St. Vincent, work to be completed by July 1st.

Brockville, Ont.

Plans are being submitted for remodeling the opera house, at a cost of \$22,000.

Boissevain, Man.

On March 14 the ratepayers will vote on a by-law to raise \$12,000 for a new town hall.

Brantford, Ont.

A meeting of the general committee of the Brant Anti-Tuberculosis Association will be held in the City Hall on the 23rd ult., to formulate plans for building operations.

Davidson, Sask.

A money bylaw to issue \$17,000 debentures for a new town and fire hall has been carried.

Fort William, Ont.

The city will be given an industrial school for boys by the Government on the condition that a site and half of the cost, \$20,000, is contributed.

Gretna, Man.

U. R. Eade, architect, Union Bank Building, Winnipeg, has been instructed to pre-

pare plans, etc., for a new public school here.

Grand Forks, B.C.

The City Clerk has been instructed to ask the Provincial Government to set about establishing an isolation hospital near here.

Halifax, N.S.

Messrs. Ross & MacFarlane, architects, Montreal, have completed plans for the new Y. M. C. A. building and tenders will shortly be received for its erection.

Hull, Que.

C. Brodeur, 141 Bridge street, school architect, is preparing plans for the new St. Jean Baptiste school. Tenders will probably be called March 8th.

Hamilton, Ont.

Tenders are being called until March 12 for the various trades required in the erection of a school at Fruitland, Saltfleet Township. Plans, etc., at office of the architects, Munro & Mead, this city.

Lindsay, Ont.

Tenders are being called for the erection of a Nurses' Residence for the Ross Memorial Hospital. For further particulars see advertisement in this issue.

Leamington, Ont.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, will be received until March 10th for heating apparatus for public buildings here. Plans, etc., on application to Mr. Samuel O. Roach, clerk of works, this place, and at the Department of Public Works, Ottawa.

Moose Jaw, Sask.

Tenders for alteration to the city hall ranged from \$4,635 to \$3,760. A. G. Bunyard, architect. Tenders were referred to the committee in charge.

Montreal, Que.

Architect A. F. Dunlop expects to have a portion of the school plans, which he is preparing, far enough advanced to ask for tenders in the course of another week. Noted in issue of February 16th.

Mr. James E. Adamson has prepared plans and is receiving tenders for the erection of a new Presbyterian Church on Darnley avenue, Outremont, Que.

Mr. James E. Adamson, architect, is preparing plans, etc., for the erection of a church, hall and flats on Mance street, for Mr. Cassels.

Mr. James E. Adamson, architect, Coristine Building, has completed plans for erection of large Baptist Temple and Sunday School, on Park avenue and Mance street, Montreal; for Baptist congregation. Work on Sunday School building will be commenced this spring.

A rumor is current to the effect that the civic legislators of Montreal will advise the erection of a commodious City Hall building on the present site of the Plateau Academy.

The Catholic School Commissioners will apply to the Legislature for authority to contract a loan not exceeding \$300,000 for the purpose of building schools.

North Portal, Sask.

The United States detention house and immigration hall and other buildings were destroyed by fire on the 20th ult. Total loss, \$15,000.

Nelson, B.C.

The city council has adopted estimates for the year amounting to \$158,600, and has decided to take up the question of a central fire hall in a new location.

New Westminster, B.C.

The site for the new Y. M. C. A. building has been chosen, and March 10th set as the date to start campaign to raise building funds (\$30,000).

Oak Bay, B.C.

The Church of England will likely take definite steps towards the erection of a new church. Rev. Mr. Barton, rector.

Ottawa, Ont.

John Henderson, city clerk, has called for tenders for the carpentry work required in Howick Hall for Horse Show purposes. W. E. Joffke, architect, 26 Central Chambers.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, will be received until March 7th for restoration of and additional storey to Military Stores Building, Ottawa. Plans, etc., at this Department.

Plans for the proposed alterations to the city hall will be submitted to the Board of Control, and as soon as approved by the city council tenders will be called for.

The Public School Board endorsed raising \$60,000 more debentures for the erection of Breeze Hill Avenue School and Ottawa South School, making altogether over \$100,000 for the two schools which will be erected this year.

Orillia, Ont.

It is stated that construction on the new church of the Angels Guardian and on the new Methodist Sunday school will be started shortly. New tenders for the proposed public library will be called for as soon as the Library Board has secured plans in accordance with Mr. Carnegie's requirements.

Portage la Prairie, Man.

On March 22 a by-law to raise \$22,000 for a new school in the north ward will be voted on.

It is proposed to erect a Y. M. C. A. building in this city. Ald. J. J. Garland, E. A. McPherson and E. W. Thompson, of Regina, are interested.

The building of a new church for St. Cuthbert R. C. congregation is being considered. Estimated cost, \$20,000 to \$25,000. Probable site, Campbell street.

Rodney, Ont.

The proposition to build a joint municipal building has been endorsed by the ratepayers. Building committee: Reeve McLean, Deputy Reeve Campbell, and others.

Starbuck, Man.

Tenders will be received until March 11th by Robt. Houston, secretary-treasurer, for all trades, except excavation, for the erection of a brick school building. E. D. Tuttle, Winnipeg, architect.

Saskatoon, Sask.

The University of Saskatchewan are calling for tenders until March 21st for the different buildings. For further information see advertisement in this issue.

Strathcona, Alta.

The University Senate has approved of plans for the Methodist college to be erected this year to cost \$100,000.

Toronto, Ont.

The Government has bought the site on Bloor street east from the Board of Education for \$90,000. It is understood that the new Government House will be erected there.

The new University Y. M. C. A. will be situated on the southeast corner of Hoskin

avenue and St. George street. Of the \$75,000 and more required for it, the students have raised over \$16,000.

At the annual meeting of the local branch of the Victorian Order of Nurses, the need of a new home was emphasized by the speakers, Lieut.-Governor Gibson, Mr. D. E. Wilkie, and Mayor Geary.

The following building estimates have been prepared by the Board of Education: Technical School, \$100,000; Oakwood High School, \$150,000; Manning Avenue School, \$90,000; Frankland School, \$60,000; additional to Humberside Avenue High School, \$40,000; additions to Public Schools, \$300,000. Total, \$740,000.

A new cottage is needed at the Victoria Industrial School, and the Board of Management have decided to ask the Ontario Government for a loan of \$25,000.

Victoria, B.C.

The Alexandra Club of this city has decided to buy a central site and erect a handsome modern steel and concrete club home to cost approximately \$75,000. The building will be of either three or four storeys. Mr. H. Croft, president.

Vancouver, B.C.

The First Presbyterian Church, now occupying the corner of Hastings street east and Gore avenue, has secured a new site on the northeast corner of Pender and Dunlevy avenue. No details have yet been settled as to the date of building. Rev. Dr. Fraser, the pastor, will return from Honolulu on March 10th.

The plans drawn up by Bryon & Watson for the new club house for the Royal Vancouver Yacht Club have been approved and tenders recommended for acceptance, cost \$5,000. Noted in issue of January 5th.

Winnipeg, Man.

C. P. Walker, of the Walker Theatre, has purchased the Winnipeg Theatre for \$120,000, and will erect modern theatres here, at Fort William and Saskatoon.

Manitoba's legislative buildings will be reconstructed at a cost of \$400,000.

A permit has been issued to the Dominion Government for interior alterations to the old post office building at a cost of \$42,000.

Yorkton, Sask.

Tenders addressed to W. E. Pinkerton, secretary-treasurer, Yorkton Collegiate Institute, will be received until March 15th for the several trades required for the construction of a collegiate institute. Plans at office of the Builders' Exchange, Winnipeg, or at office of W. W. LaChance, architect, Saskatoon, Sask.

AWARDED.

North Sydney, N.S.

Wm. F. Kiely, parish priest, writes that the contract for the church on Archibald street, has been awarded to Michael McMillan, of this town, at \$18,397. Rhodes, Curry & Company, of Sydney, tendered at \$18,900.

Victoria, B.C.

The Department of Public Works has awarded the contract for an eight-room school house to A. J. Prudhomme at \$26,000.

M. M. Heavens & Son, hardware, Welwyn, Sask., have dissolved.

Blue & Deschamps, saw mill proprietors, Rossland, B.C., have dissolved.

Independent Shingle Company, Limited, New Westminster, B.C., have sold out.

Residences

Montreal, Que.

Mr. Joseph Perrault, architect, 2106 Park avenue, has completed plans for St. George's Apartments to be erected at the corner of Park and Fairmount avenue. Tenders close at his office on March 5th.

Hutchison, Wood & Miller, architects, Royal Insurance Building, have prepared plans for a residence to be erected for Dr. H. M. Church at the corner of St. Antoine and Mount Stephen streets, Westmount.

Tenders will be received until March 4 for the erection of flats and stores for Mr. Wilfrid Bessette. Alphone Venne, architect, 15 St. Lawrence Boulevard.

Saxe & Archibald, architects, 59 Beaver Hall Hill, are preparing plans for a residence to be erected on Ontario avenue for Mr. J. M. Wilson.

Mr. Alphone Venne, architect, 15 St. Lawrence Boulevard, is preparing plans and specifications for a residence for Notary Hetu, Ville Emard. Tenders will be received until March 15th.

Tenders have been received by Hutchison, Wood & Miller, architects, Royal Insurance Building, for the erection of a residence at Hudson Heights, for Mr. J. W. Pike; the contract will shortly be awarded.

Tenders have been received for the construction of a residence on St. Luke street for Mr. A. J. Darling. J. Rawson & Gardner.

Tenders close March 3rd for the erection of two flats on Westmount Plateau for U. Beaupre & Sons. MacDuff & Lemieux, architects, 212 Merchants Bank Building.

Tenders are being received for the erection of a residence on Westmount Boulevard for Mr. Walter J. Sadler. Mr. James E. Adamson, Coristine Building, architect.

Mr. James E. Adamson, architect, is preparing plans for a residence for Mr. Ernest Latter to be erected in Westmount, and tenders will shortly be called.

Plans are being prepared for two houses to be erected on St. Catherine road, Outremont, for Donald Munro, Esq. Tenders will be called for about end of March. Mr. Jas. E. Adamson, architect, Coristine Building.

Plans have been prepared for erection of semi-detached villas on Rockland avenue, Outremont, for J. F. McLean, Esq. Mr. Jas. E. Adamson, architect, Coristine Building.

Welland, Ont.

As soon as the weather opens up Contractor Oliver will commence the erection of four or five houses on Regent street. He may also put up a store there.

AWARDED.

Montreal, Que.

John A. Gordon, 301 St. Antoine street, has been awarded the sub-contract for the plumbing and heating of a residence on Cedar avenue for Mr. J. Eard Birks. Geo. J. Hyde, architect, 157 St. James street.

Mr. Walter Livermore, 72 Anderson street, has awarded contracts as follows: In connection with the shop, dwelling and stables being erected at the corner of Sherbrooke and Decarie streets. Notre Dame de Grace, for Mrs. Charles Thompson—masonry and brick, A. Charette; carpentry, J. & W. Morrison; roofing, Campbell & Gilday; plumbing, heating and wiring, D. A. Bethune; painting and glazing, E. S. Edington; plastering, H. Oram.

Business Buildings and Industrial Plants

Bowmanville, Ont.

It is announced that a Canadian Good-year Tire & Rubber Company has been formed, and that the factory will be located here. Branches will be opened in important centres, that in Toronto being at 85-87 Queen street east. Mr. F. Hodgins, local manager.

Bridgeburg, Ont.

Mr. C. W. Vaney, of the Board of Trade, is authority for the statement that the Lantz Company, of Buffalo, manufacturers of interior furnishings, have decided to locate here, probably at Amigari.

Brockville, Ont.

The Ottawa Vacuum Cleaner Company has written to the council making enquiries regarding facilities, etc., towards locating here.

Cobalt, Ont.

The building occupied by Frank Smithers was destroyed by fire on the 22nd ult. Loss, \$3,000.

Chatham, Ont.

It is stated that the Dowsley Spring & Axle Company's plant will be extended this year. Proposed expenditure, \$15,000. W. T. Sampson, manager—also of Gananoque Carriage Company.

Hamilton, Ont.

The Tuckett's Cigar Company and Baynes Carriage Company are contemplating building big additions to their factories.

Hazelton, B.C.

The leading hotel here was destroyed by fire on the 24th ult. Estimated loss, \$15,000.

Iroquois, Ont.

Two buildings owned by Mrs. Serviss were destroyed by fire on the 22nd ult., also other buildings gutted. Estimated total loss, \$10,000.

Kamloops, B.C.

Mr. Dalton, architect, 615 Hastings street, Vancouver, is preparing plans for the erection of the Imperial Bank branch here on the corner of Victoria street and Second avenue.

London, Ont.

The council may take up later the proposal of the Board of Trade to provide a site for union station for traction lines by disposing of the present city hall.

It was suggested at the Board of Trade that a joint stock company be formed to purchase land outside of the city as factory sites to induce manufacturers to locate here. Mr. T. B. Escott, 146 York street, is interested.

Murray Bay, Que.

The planing mill and residence of Trefle Bergeron were destroyed by fire on the 20th ult. Total estimated loss, \$70,000. Mill and residence will be built at once.

Montreal, Que.

Tenders are now being received for the concreting and excavation work for the new Windsor street station viaduct. W. C. Painter, architects, C. P. R. Windsor street station.

The premises of the Dominion Shoe Supply Company and Montreal China & Glass Decorating Company, 53 and 55 St. Paul street, were damaged by fire on the 26th ult.

Messrs. Geo. G. Gales & Company, 481 St. Catherine street west, have purchased

outright the premises which they at present occupy and will make alterations to their property. Hogle & Davis, architects, 80 St. Francois Xavier street, have the work in charge.

The warehouse of the Montreal Cotton & Wool Waste Company, 151-159 Common street, was damaged by fire on the 24th ult. Estimated loss, \$7,000.

The Lowney Company of Canada, Limited, have under consideration the erection of a factory building that will double their present capacity. Sketches have been prepared by Messrs. Hutchison, Wood & Miller, and it is expected that this work will be proceeded with in the spring.

Mr. James E. Adamson, architect, Coristine Building, is preparing plans for a factory building to be erected near Aqueduct street.

Plans for the Willis Building to be erected at the corner of Drummond and St. Catherine streets, will be completed in about five weeks. Messrs. Ross & MacFarlane, architects, 1 Belmont street.

The National Trust Company is said to have under consideration the erection of a modern hotel on the present site of the Protestant school on Peel street, upon which property they are reported to have secured an option.

The Crescent Manufacturing Company will also extend their factory premises, and Messrs. Findley & Spence are preparing plans for a new structure to be erected close to their present office at the corner of William and Inspector streets.

New Westminster, B.C.

The Great Northern intend to erect a new depot here, also to extend their ferry wharf.

Orillia, Ont.

The E. Long Manufacturing Company are planning the completion of their new factory in Simcoe avenue.

Ottawa, Ont.

It is announced that Mr. George Bryson, has bought the Crown hotel, which will probably be improved.

Mr. Max Werner, George street, is having the store at the corner of Sussex and George streets remodelled as an up-to-date hotel.

The Crown Hotel property, on the corner of Bank and Sparks streets, was damaged by fire on the 24th ult. Loss, about \$2,000.

The Shepard & Morse Lumber Company are installing two double cut band mills in preparation for enlarged operations next summer.

Portage la Prairie, Man.

The Rogers Wholesale Fruit Company, it is understood, are negotiating in regard to a building site for a branch warehouse here.

Prince Rupert, B.C.

A company is seeking a charter to operate a smelter and gas plant here. That granted, construction will immediately start. Major Nicholls, Victoria, is interested; Mr. Walters, company's engineer. Noted in last issue.

Quebec, Que.

The Bank of Quebec will open a branch here in temporary offices. A local realty firm are looking for a suitable site for a permanent office.

The saw mill of J. H. Gignac & Company was damaged to the extent of about \$70,000 on the 25th ult.

Sydney, N.S.

Mr. M. F. Derrick, late of Glasgow, Scotland, is the practical man in connection with the construction and operation of the National Rolling Mills. Noted in issue of January 12th.

Saskatoon, Sask.

W. W. LaChance has plans prepared for the new Ferguson block which will be erected this summer. Plans call for three storeys, full basement, frontage 50 feet, depth 90 feet; cream terra cotta will be used in the front.

Swan River, Man.

P. McKay's general store and a milliner store were destroyed by fire on the 19th ult. Estimated total loss, \$29,000.

Summerland, B.C.

It is announced that the C. P. R. will begin construction of its new wharf and warehouse shortly. Expenditure, \$50,000.

Tatamagouche, N.S.

There is a movement on foot among the residents here to establish a fine summer hotel on Campbell's Hill.

Truro, N.S.

It is understood that Mr. Dounall Henderson has charge of the work in connection with the Lewis factory on the Railway esplanade.

Toronto, Ont.

The premises of the Art Wall Paper Shop, Limited, were badly damaged on the 22nd ult. Loss to building, \$4,000. Ryrie Bros. also lost \$2,000 on building.

Mr. George Weston has purchased the northwest corner of Richmond and Peter streets, where a 4 storey biscuit bakery will be built.

The building occupied by Green & Company, 25 Front street east, was damaged by fire on the 24th ult. Estimated damage to building, owned by Toronto General Trusts Corporation, \$2,500.

Victoria, B. C.

The Canadian Bank of Commerce have purchased a building site on the corner of Bay and Douglas streets. It is expected that the branch will be erected by mid-summer.

It is reported that Mackenzie & Mann are acquiring a site at the Esquimalt harbor and iron properties on the island, with the idea of establishing steel works. In this connection H. F. Bullen, of Bullen Bros., proprietors of the Marine Railway Company, Esquimalt, is now in Ottawa.

Vancouver, B.C.

John Hanbury, of Brandon, who has mills at Cranbrook and Elko, will rebuild at a cost of \$25,000 his mill on False creek, which was burned down two years ago.

Winnipeg, Man.

J. McDiarmid Company, Limited, have a permit for the erection of the office on Donald street at the end of Princess street for \$80,000. Work will be rushed.

The Federal Investment Company have purchased the corner of Notre Dame street and Albert, on which, it is stated, in all probability a costly building will be erected.

Buildings forecasts are as follows: Veterinary hospital on James street, cost \$17,000; W. W. Blair is completing plans for the Farmer block on Portage avenue, cost \$70,000, to be erected this spring, also plans for number of residences; Cadham & Crayston have completed plans for a \$60,000 business block to be erected in Calgary;

James Chisholm has rough plans for four large blocks; V. W. Horwood has plans drawn for two blocks to be erected here this summer.

The premises of T. D. Deegan, 556 Main street, were damaged to the extent of about \$8,000 on the 23rd ult.

Tenders are being called until March 5 for the different trades for the erection of a brick building containing six stores. Plans at 602 Ellice avenue.

AWARDED.

Goderich, Ont.

The contract for the concrete annex to the Goderich Elevator & Transit Company's plant, has been awarded to J. H. Tromanhauser, Temple Building, Toronto. Work will be started immediately.

Montreal, Que.

Contracts for the erection of a seven storey building for the St. Lawrence Sugar Refining Company, Limited, have been awarded as follows: Steel erection, Dominion Bridge Company, Lachine. Further contracts have not yet been awarded.

F. & W. S. Maxwell are the successful competitors among the six architects who submitted plans for the 10 storey office building for the C. P. R. on St. James street.

E. G. M. Cape has been awarded the general contract for the erection of the Beardmore Building, at the corner of Lemoine and St. Peter streets. H. C. Stone, architect, 84 St. Francois Xavier street.

Winnipeg, Man.

The contract has been let to Phillip Burns by the Paulin-Chambers Company for their building. Work will start at once. Cost, \$31,000. Frank R. Evans, architect.

Power Plants, Electricity and Telephones

Camrose, Alta.

This municipality is open until April 16 to receive propositions from companies or individuals for the installation of an electric light and power plant on a ten-year franchise basis. O. B. Olson, secretary-treasurer.

Calgary, Alta.

The Calgary Water Power Company have placed an order with the Robb Engineering Company, of Amherst, N.S., for a 1,000 horse-power vertical cross compound condensing engine complete with condenser, heater and pump. They have also placed an order with the Canadian Westinghouse Company, of Hamilton, Ont., for a 600 kw. alternating current generator, complete with exciter and switchboard.

Guelph, Ont.

A preliminary survey of the proposed People's Railway between Hespeler and here, with a branch to Puslinch Lake, has been made by Engineer Warfield.

Hamilton, Ont.

The Hamilton, Waterloo & Guelph Railway have placed an order for ties and rails for the construction of the road to Galt.

The Dominion Power & Transmission Company, Limited, have placed an order for 30 cars of cedar ties with the Long Lumber Company of this city.

Moose Jaw, Sask.

Steps are now being taken for the organization of a local corporation to negotiate with the city council for a street railway franchise.

Montreal, Que.

Tenders have been called for the electric lighting by arc lamps, style "magnetite" (last model), of 1200 to 1500 candle power, the contract to be for one hundred lamps, with privilege for the town to increase that number. M. G. Erement, secretary-treasurer, town of Maisonneuve.

The Railway Committee has passed the Montreal Central Terminal bill with the elimination of clauses authorizing the acquisition of lighting and power companies.

A company with twenty million dollars capital has been organized under the name of the Montreal Elevated & Underground Railway Company, to build elevated and underground railways in the city and Island of Montreal.

Ottawa, Ont.

The city engineer's department has completed the surveys and levels for the proposed subway and overhead bridge in the neighborhood of Concord street and Hawthorne avenue for the proposed extension of the street railway line to Ottawa East. Plans and estimates will be ready at an early date for submission to the street railway extension committee.

The City of Ottawa municipal electric department has called for tenders on meters, transformers, incandescent and arc lamps, wire, globes, carbons, hardware and sundry supplies. J. E. Brown, Superintendent.

Orangeville, Ont.

The Dufferin Light & Power Company, Limited, (T. R. Huxtable, manager), has purchased the Shelburne and Orangeville lighting plants and a water power at Horning's Mills capable of developing 1,000 h.p., which it intends developing the coming summer.

Parry Sound, Ont.

It is proposed to install at the municipal electric light plant a series street lighting system; it is also proposed to put the whole system on meters this year. G. Groves, Superintendent.

Regina, Sask.

Tenders addressed to S. O. Porter, Deputy Minister, Department of Railways and Telephones, will be received until March 10th for telephone supplies. Information obtained on application to the Department.

Summerside, P.E.I.

A new street lighting contract has been made between this town and the Sun Electric Company to install twenty 80-candle power and forty-six 32 candle power tungsten lamps, with all modern equipment, at an estimated cost of \$1,500.

Saskatoon, Sask.

The council have appointed a special committee to arrange terms with the Saskatoon Power Company.

Sydney, N.S.

The recommendation of the Board of Works to grant permission to the Dominion Railway and Plaster Company to build and operate a tramway on certain streets of this city was adopted by the council, with certain provisions.

St. Mary's, N.B.

The Fredericton Street Railway Company is said to be considering a plan to construct an electric railway, which will connect St. Mary's, Gibson, Maryville and Nashwaaksis on one side of the river and Springhill and Victoria Mill on the other side.

Toronto, Ont.

The Toronto Railway Company are prepared to go on with the work of extending

the street car service north into Rosedale. The company will commence the work immediately if an understanding can be reached with the city whereby the extension can be made upon the same terms as the Avenue road extension.

Victoria, B.C.

The necessity of enlarging the city's electrical plant to permit of increased service in street lighting is a topic which will soon be considered by the electric light committee.

Waterford, Ont.

Tenders will be received until March 8th by James Ross, village clerk, for lighting the streets of this municipality.

Winnipeg, Man.

It has been decided to erect a wireless station here.

The Board of Control will shortly call for tenders for the equipment of their terminal power station.

AWARDED.**St. Thomas, Ont.**

The City Council has awarded the contracts for installing the Niagara power to the Westinghouse Company, of Hamilton. The company will install the machinery in five months' time for the sum of \$18,000.

Saskatoon, Sask.

J. H. Trusdale, city clerk, has sent the following list of successful tenderers for the electrical supplies required by the city of Saskatoon: Electric light meters, Packard Electric Company, Toronto, Ont.; electric light meters, Canadian General Electric Company, Toronto; copper wire, Canadian General Electric Company, Toronto; transformers, Packard Electric Company, Toronto, Ont.; electric supplies, Northern Electric & Manufacturing Company, Toronto.

Miscellaneous**Fort William, Ont.**

This city is calling for tenders for gas franchise until April 1st. For further particulars see advertisement in this issue.

Guelph, Ont.

In the report of the Government Commission a new dairy stable is recommended for the Agricultural College here.

Moose Jaw, Sask.

Tenders for stone crusher and street sprinkler have been received. For the latter, prices ranged from \$500 to \$5,200, which latter was for motor sprinklers; for the former, \$275 to \$530. Tenders were referred to committees in charge.

Montreal, Que.

The construction of an elevated boulevard and drive on the south shore of the St. Lawrence river, from Lamberts, Que., to La Prairie, P.W., is contemplated. Estimated cost, \$175,000. Geo. A. Simard, manager Franco-American Chemical Company, is interested.

Recent building permits include: G. De-forge, 435 Breboeuf street, one dwelling house, \$2,500; E. Dufault, 13 Beaubien street, one dwelling house, \$2,500; E. Belanger, Ste. Rose, Laval County, one house containing three dwellings, \$3,300; Wilfrid Duquette, 2578 St. Lawrence Boulevard, factory building, \$14,000; E. Chameau, 1030 Bordeaux, house containing three dwellings, \$2,800; J. Dorion, 838 DeGaspe, house containing two dwellings, \$2,000; J. D. Gibb Estate, 157 St. James street, alterations to dwelling, \$2,000; E. Brails, 709 St. Lawrence Boulevard, alterations to store and dwelling, \$2,500.

Ottawa, Ont.

Tenders are being called until March 15th by the city for civic supplies, broken stone, brick, etc. For further particulars see advertisement in this issue.

The report of the engineers of the Public Works Department with reference to the dredging of the Riviere des Prairies (Back River) at Montreal, places the cost of dredging a five-foot channel at \$63,849. The principal items are: dredging from Lake of Two Mountains to Cartierville, \$7,000; Bordeaux to Ile Visitation, \$32,000; Ile Visitation to the rapids opposite the Village of Riviere des Prairies, \$22,221, and head of rapids to Bout de l'Isle, \$1,050.

Recent building permits include: James Davidson, brick veneer apartment house, Albert street, \$6,000; Jas. More and Isaac Cowie, brick veneer dwelling, Centre street, \$2,000; John E. Wilson, brick veneer dwelling, Spadina avenue, \$2,000; T. J. Somerville, two detached brick veneer dwellings, Spadina avenue, \$3,000; David Beggs, brick veneer dwelling, Florence street, \$2,500; H. A. Leach, brick veneer dwelling, Thornton avenue, \$2,200; S. Miller and D. E. Eptsein, brick addition to shops and dwelling, Elgin street, \$5,000.

South March, Ont.

Tenders will be received until March 15 for dredging work on the Carp river. For further particulars see advertisement in this issue.

Victoria, B.C.

Recent building permits include: Mark Cozner, dwelling on Leighton road, \$2,000; W. J. Gilliland, dwelling, Pembroke street, \$2,300; H. W. Davies, apartment block at the corner of Johnson and Quandra streets, \$6,000; John Valo, combined store and dwelling at Bay and Government streets, \$4,000.

A \$13,000 brick block to be used as a carriage house and stable will be erected on Johnson street by Dr. Gareeshe. Brick and concrete will be the materials used. G. C. Mesher & Company, architects.

Winnipeg, Man.

At the request of Alloway & Champion, the Board of Control have decided to extend the time for receiving tenders for asphalt to March 10.

AWARDED.**London, Ont.**

The contract was awarded to the Cleveland Rubber Company, the lowest tenderers, for the supply of 2,000 feet of hose at 97 cents per foot. Other tenders were as follows: Gutta Percha Rubber Company, Dunlop Rubber Company, Canada Rubber, a New York rubber company and an English firm. The purchase of 600 feet of Maltese brand of chemical hose at 40 cents a foot from the Gutta Percha Rubber Company was recommended.

Victoria, B.C.

Tenders received and awards made by the fire warden were as follows: Hydrants—Hutchinson Bros. at \$44 each and the Victoria Machinery Company at \$47.50, contract awarded to the former. Steel wire for alarm system.—Hayward & Hawkins at \$12.40 per cwt. and the Hinton Electric Company at \$34.75 per mile. The contract will be awarded to the lowest tenderer, the city electrician to decide which is the lowest. Pole top fittings and brackets for alarm system, 250 fittings and 375 brackets.—W. Grimm & Sons, Robertson Iron Works, Hutchinson Bros., and Victoria Machinery Depot. The fire chief will decide which is the lowest tenderer.

Tenders and For Sale Department

County of Elgin

Tenders for Bridges

Sealed tenders addressed to the undersigned will be received until noon SATURDAY, MARCH 5th, 1910, for the construction of Reinforced Concrete Abutments for a 133-foot span of a Roadway Bridge with Sidewalk, to be built over the Otter Creek in Pt. Burwell.

Also for a 60-foot Arch Bridge to be built over Kettle Creek, in Lynhurst, adjoining St. Thomas. Plans and specifications may be seen at this office and forms of tender obtained.

The committee reserve the right to reject any or all tenders.

JAS. A. BELL,
County Engineer.

St. Thomas, February 21, 1910.

9

Tenders For Gas Franchise

Bids, sealed and endorsed "Gas Franchise," will be received by the City Clerk of the Corporation of the City of Fort William, up to APRIL 1ST, 1910, for the letting of a Gas Franchise, including construction of Plant, Mains, etc., and operation.

Conditions, specifications and form of tender, on which bids must be submitted, can be obtained from the undersigned.

JOHN WILSON,
Assistant City Engineer,
Fort William, Ont.

12

Notice to Contractors

Civic Supplies

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Ottawa, will be received by registered post only, up to 12 o'clock noon, TUESDAY, MARCH 15, 1910, endorsed tender for Broken Stone, Brick, Stone Curb, Stone Setts, Cement, Plank and Cedar, Sand, Vitriol Clay Pipe and Asphalt, as the case may be.

Specifications, form of tender and full particulars may be obtained on application to the City Engineer's Office, City Hall.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, February 23, 1910.

9

Notice to Contractors

Water Works Supplies

Sealed tenders addressed to the Chairman of the Water Works Committee, City Hall, will be received by registered post only, up to 5 p.m., TUESDAY, MARCH 15, 1910, for the supply and delivery of Brasswork, Castings, Cast Iron Pipe, Hydrants and Valves, Lead Pipe and Pig Lead, Oils and Greases, required by the Water Works Department.

Specifications, form of tender and full particulars may be obtained on application to the City Engineer's Office, City Hall.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, February 23, 1910.

9

Factory for Sale, Rent or Exchange

1 storey, light, three-sides, 3,500 square feet floor space. Prominent corner on Queen Street, five minutes from Yonge Street, Toronto. Address Box 920, "Contract Record," Toronto. 9

For Sale

A 45-Ton Marion Steam Shovel in good state of repair. Apply to GEORGE A. BEGY, St. Catharines, Ont.

9

Plant for Sale

For Sale: The following Second-Hand Plant, located at Durham, Ont., or portion thereof. The whole lot at a reduced price.

25 No. 3 American, square pan, wooden hub, Wheel Scrapers.

28 No. 3 K. & J., round pan, iron hub, Wheel Scrapers.

6 No. 3 Western, square pan, with doors, Wheel Scrapers.

7 No. 2, K & J, round pan, iron hub improved, Wheel Scrapers.

55 Doors and Gates, for No. 3 Wheel Scrapers.

27 Slush Scrapers.

15 Light and Heavy Plows.

Located at Three Rivers, Que.

One Large Travelling Clam Shell Derrick.

One Steam Pile Hammer (Cram Patent), with Steam Hose.

One Thomas Automobile (Model 31), 60 h.p., thoroughly overhauled and painted; location, Toronto.

THE RANDOLPH MACDONALD CO., LIMITED,
14 Crown Life Building, Toronto, Ont.

TENDERS

University of Saskatchewan

Sealed tenders, addressed to the undersigned, will be received not later than the 21ST DAY OF MARCH, 1910, for the different trades required in the erection of the College Building, Students' Residence, Power House, Live Stock Pavilion, Agricultural Engineering Building, on the University Grounds in Saskatoon.

The right to reject any or all tenders and to waive any defects or irregularities therein, is to be at the discretion of the Board of Governors.

Tenders are to be made on forms furnished by the architects.

Each tenderer is to enclose with his bid an accepted cheque for 10 per cent. of the amount of his tender, which deposit will be forfeited if the tenderer fails to execute the contract and bond when requested, and will be returned to the unsuccessful bidders when the contract is signed.

Plans and specifications may be seen at the office of the University, Saskatoon, Sask., or at the office of the Architects, David R. Brown and Hugh Vallance, Canada Life Building, Montreal, Que., and at the rooms of the Builders' Exchange, Winnipeg, Man.

WALTER C. MURRAY,
President.

Saskatoon, Sask., February 21st, 1910.

11

Tenders For Nurses' Residence

Tenders marked "Tender," will be received by the undersigned until MARCH 10, 1910, for the whole or separate trades required in the erection of a Nurses' Residence for The Ross Memorial Hospital, Lindsay. Plans may be seen and copies of specifications obtained at the office of The Flavell Milling Co., Lindsay. No tender necessarily accepted.

J. D. FLAVELLE,
Lindsay. 9

Tenders for Dredging

Sealed tenders addressed to Thomas Richardson, Clerk of the Township of March, South March, Ont., will be received up to 12 o'clock noon of the 15TH DAY OF MARCH, 1910, for Dredging Work on the Carp River within the Townships of March and Huntley, in the County of Carleton, to be done in accordance with the report, plans, profiles, specifications and estimates of J. H. Moore, C.E., filed with the Township of March, on the Carp River, Drainage Improvement Scheme. Tenders must be accompanied by a marked cheque for \$1,000.00, payable to the Treasurer of the Township of March. The above plans, profiles, specifications, etc., may be inspected and full particulars and form of tender obtained from J. H. Moore, C.E., Smith's Falls, Ont., or from the Township Clerk, South March, or at the office of Messrs. Beaumont & Armstrong, 25 Sparks Street, Ottawa.

The lowest or any tender received not necessarily accepted.

THOMAS RICHARDSON,
Clerk.
South March, Ont.

10

Position Vacant

WANTED—TWO DRAUGHTSMEN to work in a Toronto architect's office. State experience and salary expected. Apply Box 933 "Contract Record."

Business Notes

Ricard & Lalonde, electricians, Montreal, have dissolved.

Walter Ryan & Company, contractors, Montreal, Que., have dissolved.

Dunn Bros., builders' supplies, Winnipeg, Man., have dissolved partnership.

Walter Walker, dealer in cement blocks, Gilbert Plains, Man., it is stated, has assigned.

A winding-up order has been given in the Barron Brick Company, Limited, Weston, Ont.

W. L. Martin, lumber dealer, Wapella, Sask., has been succeeded by Corona Lumber Company.

Jos. Martial, Son & S. Johnston, bricklayer contractors, Montreal, Que., have dissolved partnership.

The B. C. Gazette gives notice of the incorporation of the following companies:—Manquam Falls Power Company, Limited, capital \$100,000; the Standard Hardware Company, Limited, capital \$30,000; International Electric Company, Limited, capital \$1,000,000.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
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Municipal Progress, Advance Information

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto March 2, 1910

No. 9

Can They Afford To Fight Us

Various constructions have been placed upon the note recently addressed by President Taft to British Ambassador Bryce. There are two main interpretations, and each is diametrically opposed to the other. One is that the United States are assuming a dictatorial position and threatening Canada with the application of the maximum tariff, and the other that they are desirous only of opening up neighborly negotiations with a view to arriving at a just and equitable settlement. Naturally enough those who take the former meaning out of the note entertain strong feelings of resentment. They are opposed to the idea of having Canada put forward to show cause why the extreme penalty should not be imposed. Those who look at the matter from the other viewpoint are confident that a satisfactory adjustment will be made. The majority of those who are really competent to express an opinion in the matter find no cause for anxiety in the situation. The question arises: Can the United States afford to discriminate against Canada? Is it not probable that the outcome of the tariff war with Germany will have some bearing upon the course taken by the American legislators?

In so far as the field covered by this journal is concerned, the result, whatever it may be, will really be of small consequence. From the report of the Department of Trade and Commerce we find that for the eight months ending November, 1909, imports from the United States of materials entering into building and construction work represented a total of over thirty-four millions, while the value of our exports of the same kind was only slightly in excess of three millions. This particular showing is, of course, exceptionally favorable to Canada. But, however much or however little the question may affect the various industries, the matter is one in which all thinking Canadians should take some interest. It has been said that Canadians are

too busy to be particularly interested in the United States tariff, high or low. This is hardly the case. The situation would be defined more correctly by saying that Canadians are too dignified to concern themselves over hints, and too confident in the resources and future of their country to manifest any sign of dependence upon the United States.

Probably, those who anticipate trouble will live to learn that their fears were groundless. In any case, however, there should be no anxiety in Canada. In the light of past experience it is clear that the ultimate advantage would be with us if a tariff war were proclaimed. A small percentage would feel the rub at the outset, but the great bulk of our people would not suffer one iota. It is contended by not a few that a tariff war would have a good influence, in that it would tend to make Canadians more self-reliant and resourceful. Canada is one of the United States' best customers, and our trade is increasing by leaps and bounds—which considerations bring us back to the point: Can they afford to fight us?

Vancouver Correspondence

The Vancouver correspondence inaugurated in this issue will doubtless be read with avidity by those who regard the West in general, and the Coast in particular, as the land of opportunity. It is the aim of the publishers to make the CONTRACT RECORD truly national in its sphere and usefulness. This work will be facilitated greatly by the manifestation of a little more practical interest on the part of our Western friends. If they will send us timely notice of new contracts, as they receive them, and occasionally draft out a description of the methods employed on some recent job, sending photographs whenever possible, they will not only help to establish the CONTRACT RECORD as the connecting link of the building trades in Eastern and Western Canada, but they will contribute something to the cause of their own section in directing the attention of the "wise men of the East" to the illimitable resources and untold opportunities of a country which, as yet, has barely crossed the threshold of its career.

The Contract Record and the Architect

It is not very long since a prominent architect told the writer that the CONTRACT RECORD was devoting too much attention to practical work, and that he thought this was a mistake. We have had many indications, however, of the general success of our policy, and the gentleman in question is in the minority. The idea that an architect cannot read with considerable profit articles dealing with the practical side of his work and the most up-to-date developments therein, is hopelessly out of date. The following extract culled from an editorial which appeared recently in the "American Architect," perhaps the most widely-read architectural journal on the continent, has a distinct bearing upon this question:

"To be an architect in the fullest sense of the word, a man should speak with just as much authority concerning methods and materials going into the actual construction of the building as he can regarding the architectural design and treatment. Clear, complete and definite plans and specifications are of great importance, but a comprehensive knowledge of materials and construction are no less necessary if the best results are to be obtained."



Beauharnois Power Development—Showing Canal Lock Entrance to Forebay

Power Development on Beauharnois Canal

A Brief Definition and Description of this Interesting Work up to its present stage—Facilities provided by the Contractor

One of the most important additions to the industrial forces of the metropolis of Canada was put under way on the 7th of September last, when the Canadian Light & Power Company entered into a contract with George W. T. Nicholson, of Montreal, for the construction of a part of their hydro-electric plant at the village of St. Timothee, Quebec, in the county of Beauharnois. The contract with Mr. Nicholson provides for the building of a coffer dam, 980 feet long; clearing and grubbing of power house site and forebay; the excavation of the tail race, power house, spillway and headwall; the excavation of the intake and canal prism for the distance of 1,000 feet, and the building of the earth embankments for a large forebay or regulating basin, as well as the concrete for the power house substructure, the headwall and intake, also the raising of lock No. 13 on the Beauharnois canal.

Work was commenced on Sept. 10, the first step being the building of the coffer dam, to dam the Cedar rapids from a large bay on the edge of which the power house will stand. This bay has an area of 312,000 square feet, and when dammed contained eleven million gallons of water. The construction of the coffer dam was timber ripped on the outside, being, when completed, 20 feet wide on the top and serving as a temporary highway road during construction of the works. In a short time

the coffer dam was completed and water all pumped out of bay, which permitted a start being made on the excavation of the power house; tracks were laid and a steam shovel put into operation, the material from the excavation being placed in the forebay banks, when it is spread in 6-inch layers and rolled before another layer is placed.

Since the above date to the present time, work has been carried on in this excavation without interruption, and concreting is about to be started for the foundations for three power units. Work was started on the intake excavation on November 6th, and continued for ten days, when it was shut down for the winter. The quantities to be excavated are estimated as follows: Earth excavation, 215,000 cubic yards; rock excavation, 31,600 cubic yards; concrete in power house, headwall, intake, abutments and raising of lock No. 13, 32,000 cubic yards.

In order to complete the work under contract by the specified time, it has been necessary to provide an extensive and modern plant for the handling of the large quantities of materials. Steam derricks, steam shovels, numerous locomotives and dump cars are being employed in the excavations and an elaborate layout of tracks enables the convenient and quick disposal of the excavated material to any desired point on the works. The principal feature of the plant, however, is the stone



Power House Excavation in Progress



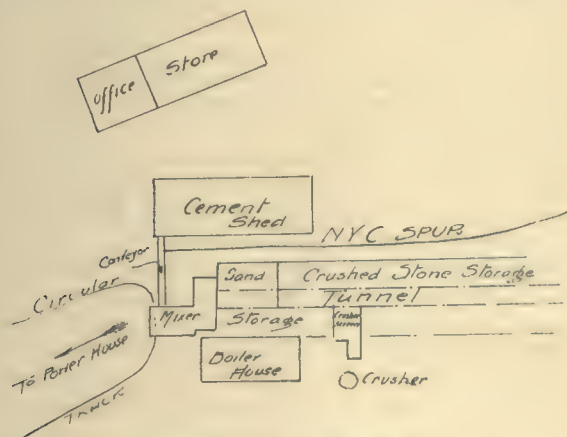
Beauharnois Power Development—Operations on the Embankment for Forebay

crushing and concrete mixing plant, which has been specially planned, and is without doubt the most modern of its kind in Canada.

The stone crusher is sunk into the ground to the level of the tracks in order that the stone may be dumped into the same, directly from the cars. After passing through the screens, the stone falls directly on the top of a tunnel. This tunnel is provided with traps which

in skips placed upon cars, which run on a circular track leading from underneath the mixer. These skips are lifted off the cars and delivered to place by means of steam derricks. The circular track layout enables the trains to pass each other without delays and permits of a continual operation.

The development at present under construction consists of 20,000 horse power. It is estimated that the plant will be in operation by December 1st, 1910. The



Layout of Mixing Plant.

permit the broken stone to feed as required into a belt conveyor which runs in the tunnel and connects with the conveyor to the mixer. The sand deposit is also reached by this tunnel and conveyor, which permit the sand being handled in the same manner as the stone.

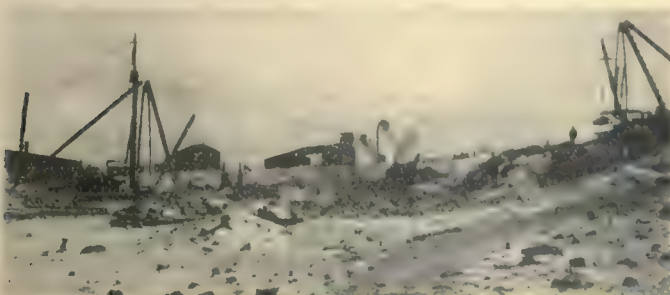
The cement is fed to the mixer by a separate conveyor direct from the cement storage. The mixer is elevated and provided with storage bins and measuring hoppers, and an elaborate steam heating system has been installed in mixing compartments to permit concrete being placed during winter months. The concrete is conveyed from the mixing plant to the power house



Coffer Dam With Highway Crossing

total capacity of this plant when fully developed is estimated at 100,000 horse power.

The offices of the Canadian Light & Power Company are located in the Eastern Townships Bank Building, Montreal. Mr. Nicholson, the contractor, has his offices in the same building. Associated with Mr. Nicholson on the work are Mr. E. H. Drury, C.E., and Mr. F. N. Finlay. The engineering and supervision on behalf of the company is in the hands of Messrs. J. G. White & Company, who are represented on the works by Mr. J. D. Evans, C.E., resident engineer.



Power House Site from West End



View of Crusher Plant

Cost System for Engineering Construction

Advantages to be derived from a uniform method of keeping accounts—Complete Details of a simple and satisfactory arrangement*

The desirability of contractors throughout the country adopting a uniform system of keeping their accounts is very great. The main advantage is that gradually all engaged in contracting work will become familiar with what it actually costs them to do their work, and the very wide variation of bids which are now submitted at almost all lettings will eventually be done away with. It should prevent all but the most reckless from making proposals below cost. If these very desirable results are finally attained, the contractor's business will become a more stable one, and one in which banking houses especially would have more confidence than they have at present.

Six Main Heads for Contract Work.

The uniform system adopted should be simple, inexpensive to keep, and should have wide flexibility to permit its application to contracts of all kinds. The author has for a great many years been using a system deduced from the book keeping methods of our railroad companies, which he has found to be satisfactory in all respects. There are six general headings into which all contract work must be divided. They are as follows:

First—Materials of Construction; second—Labor; third—Supplies; fourth—Plant; fifth—General Expense or Administration Charges; sixth—Profit.

All general heads into which any contract is classified, such as excavation, concrete, masonry, etc., must be subdivided into such detail as may be desired, keeping constantly in mind the above headings.

For the purpose of explanation it is probably better to take an example of actual work. Let it be supposed that the construction of a reinforced concrete retaining wall is to be undertaken, the work to consist of excavation, concrete and steel reinforcement. The heading "excavation" would be divided as follows:

Labor.—(1) Excavating in Trench; (2) Hoisting Excavated Material; (3) Trucking; (4) Backfilling; (5) Shoring and Sheet-piling.

Supplies.—(6) Coal; (7) Oil; (8) Water; (9) Miscellaneous.

Plant.—(10) Cost Delivered; (11) Maintenance; (12) Removal.

General Expense.—(13) General Expense.

Profit.—Expenditures, during the execution of the work would be distributed as Excavation Nos. 1, 2, 3, etc.

"Concrete" could be divided as follows:

Materials of Construction.—(1) Cement Delivered; (2) Sand Delivered; (3) Stone or Gravel Delivered; (4) Facing Material Delivered; (5) Lumber for Forms Delivered; (6) Cement Bags.

Labor.—(7) Mixing Concrete; (8) Transporting Concrete; (9) Depositing Concrete; (10) Making Forms; (11) Erecting Forms; (12) Facing.

Supplies.—(13) Coal; (14) Oil; (15) Water; (16) Miscellaneous.

Plant.—(17) Cost Delivered; (18) Maintenance; (19) Removal.

General Expense.—(20) General Expense.

Profit.—

It should be noted that in each of the above subdivisions the general headings are always included.

The "general expense" or "administration account" should be subdivided, for example, as follows:

General Expense.—(1) Engineering; (2) Bookkeeper, Stenographer; (3) Timekeeper, Storekeeper; (4) Telephone, Stationery, Sundries; (5) Rentals; (6) Legal Expense; (7) Surety Bond; (8) Liability Insurance; (9) Watchmen; (10) Interest and Discount.

In preparing a bid for work of this character the cost of each one of the above items should be carefully estimated with the best data available, and the charges for the general expense, plant and profit should then be apportioned to the various items of the work as above indicated in accordance with their relative value. In this way the unit price that should be submitted for the excavation, concrete and steel reinforcement can be determined. If such a method of computing would be adopted by all competitors, then there would be but little variation in their bids, and surely the low bidder could not be very much too low. The method which is used by so many contractors at the present time of jumping at the price that they should submit is one that cannot be too strongly condemned.

When the work is started, ledger accounts should be opened with each item as above enumerated.

The general expense account should be kept separately with subdivisions as above suggested, and then at intervals, by means of journal entries, should be transferred to the excavation, concrete and reinforcement accounts, using the same percentages of apportionment which were used in making the proposal. By simply adding up all the accounts of any one class and dividing them by the amount of work done, the cost of execution at any stage of the work can readily be determined.

No Complicated Books Required.

The books required for such a system of accounts are of the simplest character, and can be purchased at any stationary store. They consist of cash book, ledger, journal and voucher book.

The voucher system should be used. As is well known, under this system all bills and pay rolls are inclosed in a blank, on the back of which is a place for distributing the amount to the proper accounts.

If it is desirable to keep a running account with the parties with whom much business is done, their vouchers can be credited to them, charged to the voucher account, and placed among the paid vouchers.

In the case of a contracting concern carrying on a number of contracts at the same time, ledger accounts should be started with the contracts themselves, each given a number and a subsidiary set of books kept for each contractor.

In order to aid in the distribution of the pay roll a system of cards may be used, upon which are placed the amount of labor expended under each head for each day. This work is usually done by the assistant engineer from the reports of the time keeper and the foremen of the various gangs. One set of cards is used for each week. These cards are very valuable for keeping track of labor costs, checking the pay roll, and should, if properly kept up, prevent all disputes or padding of pay rolls.

*A paper by Mr. Gustave Kaufman, read at the January meeting of the American Society of Engineering Contractors.

As can be readily seen, the above system as outlined can be used for any kind of contract work, the headings being arranged to suit the work on hand. These headings can be subdivided to any refinement desired by the contractor.

The system is very inexpensive, as it requires no elaborate forms and no more help than is usually required. As far as the author, aided by many years of experience, is able to judge, it meets all the requirements that a uniform system of accounts can need.

Cost of Concrete Buildings

Reinforced concrete will generally run from 5 to 15 per cent. higher in first cost than first class mill construction, and will be from 10 to 20 per cent. lower than steel construction fireproofed. A large warehouse in Brooklyn was begun in May, 1908. At that time new construction work was scarce, and all contractors figured very closely. The successful reinforced concrete figure was \$30,000 lower than the best bid on the same plans in fireproofed structural steel. A large factory in Philadelphia was designed in steel. The architects considered an alternative in reinforced concrete and saved \$60,000. A large publishing house and loft building was recently completed in Springfield, Mass., of reinforced concrete throughout, thereby saving \$40,000 over the probable cost in steel. These three instances represent respectively savings of 12, 25 and 10 per cent. In competition with mill construction the percentage depends almost entirely on the size of the building. For structures costing \$40,000 and less, and of a height of four storeys or less, the brick and wood construction will run about 15 per cent. less than concrete. On larger buildings, however, concrete gets closer to the cost of the mill construction. The designers of a very large hardware building in Minneapolis were surprised to find concrete figures slightly under those of mill construction. A similar case occurred in Toledo, Ohio. Both of these propositions exceeded \$150,000 in value.

In considering the costs of different types of construction the initial cost should not be the only criterion. There are certain fixed charges which enter into the relative values of buildings. These may be briefly summarized as follows: Insurance, maintenance, depreciation, amount of light available, freedom from vibration, elimination of vermin, and the assurance that a fire cannot destroy the building. It is difficult to put an exact monetary value on these different items. Each plant manager would have his own views and local conditions would alter materially any assumptions. If, however, due consideration be given to the saving which can be obtained on each of these items by the use of reinforced concrete building, it will be generally found that even though the concrete structure cost complete 10 per cent. more than mill construction, there will be a saving annually of from 1½ to 2 per cent.

These conclusions were drawn by Mr. J. P. H. Perry, of New York City, in an address on the use of reinforced concrete for textile mills, at a convention of the (American) National Association of Cotton Manufacturers.

The Toronto branch of the Canadian Society of Civil Engineers met on Thursday evening, February 24th, in the Chemistry and Mining Building at Toronto University. Mr. W. S. Kinnear, Chief Engineer, Detroit River Tunnel Company, delivered an interesting lecture on the construction of the Detroit river tunnel. Mr. A. W. Campbell, chairman of the branch, presided.

An Improved System of Bricklaying

Concrete has made such rapid progress during the past few years, and has, in so many cases, proved such an important competitor to bricks as a building material, that it is of the greatest importance that all interested in the use of bricks should use their best endeavors to reduce the cost of bricklaying to a minimum, without in any way decreasing the stability of the structure, if this is at all possible.

A number of variations from the ordinary practice which have been made by Frank B. Gilbreth in the United States are of more than passing interest. Mr. Gilbreth has for some years had a high reputation for rapid erection, and is one of the most successful contractors in America, and he has brought to bear upon the subject of bricklaying a wealth of ideas and suggestions that are remarkable not only for their novelty, but for their practical value. His national reputation for the execution of large contracts in a phenomenally short time is a guarantee of the success of his methods.

The Scaffold

In the first place, the scaffold used by Mr. Gilbreth is arranged in such a manner that the bricklayer does not need to stoop unduly over his work; the argument being that as a carpenter does not stoop to the floor to plane a piece of wood, but works with the wood on a bench, so the bricklayer should work in a position best calculated to enable him to work with the greatest possible speed and with the least waste of energy by unnecessary movement. The Gilbreth scaffold is so constructed that it can be raised and lowered so readily that the workman does not need to stoop an inch lower than the height best fitted for his work.

The Fountain Trowel

A further saving of time is effected by the use of a special trowel, which is as different from an ordinary one as a fountain pen is different from a pen of the ordinary kind. Just as a writer may increase the speed of writing by using a fountain pen and so avoiding the frequent journeys to the inkstand, so the bricklayer working on the Gilbreth system may save nearly a quarter of his time by discarding the ordinary trowel and using one with a much larger supply of mortar—in other words, a fountain trowel. Such a trowel is in the form of a long can, somewhat resembling a shoe, one end of which is flattened so that it may be used to scrape or scoop up the mortar in order to fill the trowel, whilst the other end has an opening so adjusted as to give a stream of mortar of the correct width. It is claimed that this device enables the mortar to be spread much more rapidly and evenly than usual, and it permits the mortar to be used sufficiently soft to fill the joints better than usual, particularly in the middle of the wall.

The "Packet" System of Bricklaying

In the ordinary method of bricklaying, a large amount of time is lost by unnecessary handling of bricks by the bricklayer. Much of this is avoided by Mr. Gilbreth in what is termed the "Packet" system. This consists in the substitution of a definite arrangement of the bricks directly they leave the cart which delivers them on to the site, so that, with a minimum of handling, they are ready for laying.

For this purpose a small wooden pallet or tray is filled with bricks on edge in two rows of ten each, this work being done by laborers. The "packets" are then carried to the bricklayer, who picks up the bricks, one at a time, and places them on the wall. The time saved by the layer not having to select his bricks (front

bricks can be piled in separate packets) nor to pick up parts instead of whole bricks is very great, as the sorting can be done by less highly paid laborers, each kind of brick being placed on a separate packet. Mr. Gilbreth states that he has proved by long practice that a bricklayer's output may be doubled by the adoption of this simple system, and the saving on the cost of laying is still further reduced by the saving in handling the bricks in packets as compared with the ordinary method.

Thus, everyone who has watched a bricklayer at work knows that he turns a brick about in his hand before laying it. This is necessary for him to find the

best face, and to grasp the brick properly for laying. In the "packet" system, the bricks are so laid as to be in exactly the right position for laying, and all this unnecessary handling is avoided.

In these ways the system of working adopted by Mr. Gilbreth is capable of effecting a mild revolution in bricklaying, and one which is not likely to be resented by any one, as the bricklayer works less although he lays more bricks, and no reduction in actual wages takes place. The great difference is that time and energy which are now wasted, are devoted to bricklaying, and consequently the employer benefits as well as the men.

The Design of Reinforced Concrete Beams

Careful Investigations of the subject result in the production of a new Reinforcing Bar and a Unit System with rigid connections

BY E. CANNES

The writer has noticed in designing reinforced concrete beams that the ordinary method of bending up a part of the main horizontal rods and of ending the remainder at the supports does not always give the same satisfactory results, when heavy beams, as for instance for railroad and highway bridges, are concerned. The maximum vertical and horizontal shear then take place when the drive wheel is near the support of the beam and is very large. The number of rods sufficient to

resist the bending moment are not sufficient to take up the vertical and horizontal shear as well. The horizontal shear or strain tends to make the rods slip in the concrete just as in the case of a steel plate girder, it tends to cause the flange angles to slide horizontally past the web. The rivets counteract this tendency. The rods counteract this tendency.

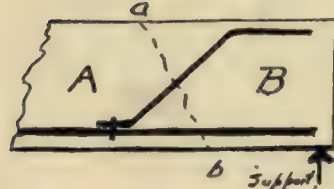


Fig. 1—Detail Showing Need of Rigid Connection of Shear Member

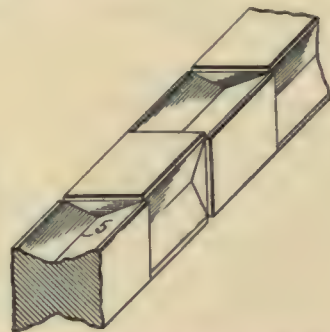


Fig. 2—Detail of Specially Rolled Bar.

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In a reinforced concrete beam, the bond between concrete and rods takes the place of the rivets of the steel girder. As this tendency is maximum at the supports, it is necessary to have a certain amount of rods end at the support and develop the necessary bond to resist this tendency. The remaining rods are not sufficient then to take up the vertical or diagonal shear and vice versa. Certainly this difficulty can be in a certain measure overcome by increasing the number of the rods in making them of a smaller size, but this increases the cost of the beam and often leads to the increase of the size of the beam itself. This method is also wrong from a theoretical point of view, since we are limiting the number of rods necessary to take up one stress (shear) by the amount of rods found suffi-

cient and necessary to resist another stress (flexure). A steel girder is not designed, this way; the thickness of the web is determined independently from the section of the flange angles. The rational design of a reinforced concrete beam would therefore be to have all the horizontal main rods end at the supports and have separate bars inclined at an angle of 45 degrees to take up the diagonal shear. These latter will have to be rigidly anchored top and bottom in order to develop their usefulness, as it may be seen from the accompanying sketch, Fig. 1.

The failure of a concrete beam by diagonal shear takes place along the line a-b. Part A tends to break away from part B. In placing rods in the opposite direction and normal (right angle) to a-b, this tendency will be counteracted and the rods will hold the parts together. It is evident that this can only be accomplished when the rods are rigidly anchored top and bottom. These diagonal rods can be made of any length and rigidly attached at points determined by computation. They may be attached at the bottom to the main horizontal rods and either prolonged at the top in the concrete long enough to develop their strength, or rigidly attached to another rod placed at the top of the beam. This latter does not need to run from end to end of the beam, but only a certain distance from each end of the supports.

Although such a design would be an ideal one for reinforced concrete, its realization seemed to be impossible, as rods now in use are not adaptable for such rigid connections. The writer had, therefore, made up his mind to design a rod and device which would make such a design possible.

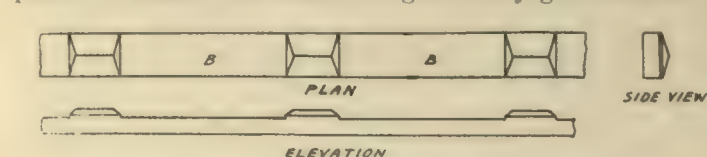


Fig. 3—Details of Specially Designed Section for use as Shear Members.

The bond especially seems to be perfect as all the three rods tested could not be pulled out from the concrete, but broke outside the concrete at the following pull:

No. 1 bar broke at 48,100 lb.

No. 2 bar broke at 49,150 lb.

No. 3 bar broke at 47,880 lb.

The tests were made with $\frac{3}{4}$ -inch rods imbedded 20 inches and after 28 days. The features of this rod are such that diagonal shear rods can be rigidly connected to it. Fig. 3 shows the shear rod in plan and elevation. It is of a flat section and is provided on one side with projections shaped to conform to the shape of the depressions of the main rod, so that the two rods can be interlocked. A collar and a wedge keep them firmly together. As the width of the collar is equal to the distance between the projections of the main rod and the collar is inserted between these projections, it is evident that any sliding or relative longitudinal movement of the rods is impossible. The connection is thus rigid and perfect.

Fig. 4 shows this connection in elevation plan and section, A is the main rod, B the diagonal shear rod, C the wedge and E the collar.

A rigid connection can be made also with two main rods. A special plate having projections shaped to fit the depressions of the main rods and which interlock with them is used. One or two collars hold them firmly together. Nevertheless, the writer is of the opinion that the use of the special shear rod will prove to be more economical and more practical.

Fig. 5b shows the application of the design with rigid connections in its simplest form. The diagonal shear rods are rigidly connected at the bottom of the main tensile rods and anchored at the top in the concrete. Fig. 5a shows the design where the top end of the shear

rod and having projections shaped to conform to the shape of the depressions of the same rods are placed at the top and bottom of the main rods, one opposite the other and the whole held firmly together by bolts. In placing these separators at the bottom and top of the beam, as shown in Fig. 5a, several units are joined and held firmly together. A "multiple unit" system is then obtained. In this figure (5a), A are the main rods, B the shear rods, E the collars with wedges, and G the bar separators. The advantage of such a "multiple unit" system cannot be denied, as the separate parts forming the skeleton of a beam can be put together at the mills and shipped as a unit to the place of the construction work. It can be easily lifted if it were necessary.

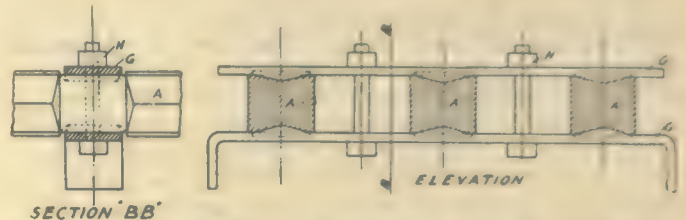


Fig. 6—Sketch Showing Arrangement of Spacing Saddles to Secure Exact Placement of the Steel.

with a derrick to any height in the same way as it is done with a steel girder.

This design with rigid connections can be also applied to reinforced concrete columns. The vertical rods are rigidly connected to each other by diagonal rods. It is a well-known fact that concrete columns fail often by diagonal shear at an angle of 45 degrees. The diagonal rods will take up this shear and the strength of the column will therefore increase.

In summing up, the writer will say that the use of separate diagonal shear rods rigidly connected to the main tensile rods will put the design of reinforced concrete beams on the same rational basis as is the design of a steel girder. The flange stresses will be taken up by the horizontal rods and as all these rods end at the supports the horizontal shear, which tends to make the rods slip in the concrete, will be amply taken care of. As to the web stresses, they will be taken up by the separate inclined rods rigidly fixed, top and bottom. Their length, their number and their spacing as well will not be arbitrary or dependent on the shape of the horizontal rods, but will be determined by rational computation only.

This design will do away also with the vertical stirrups, the usefulness of which is rather doubtful. Such a design is certainly to be desired and will be an ideal one.

Rivalry Saves Money on Concrete Building

The practical value to the contractor of introducing the element of competitive sport, or rivalry, into the layout of work for his labor gangs has seldom had a more emphatic illustration than is afforded by the experience last summer of the Aberthaw Construction Company, of Boston, in erecting a pair of identical buildings for the Winchester Repeating Arms Company at New Haven, Conn.

Except that there was a steel-frame plaster-walled storage building to go on the roof of one, the two buildings were duplicates and were connected by a corridor which opened off the elevator well and toilet rooms which served both buildings. The plan of the work was a letter "H" with the toilet and elevator building the

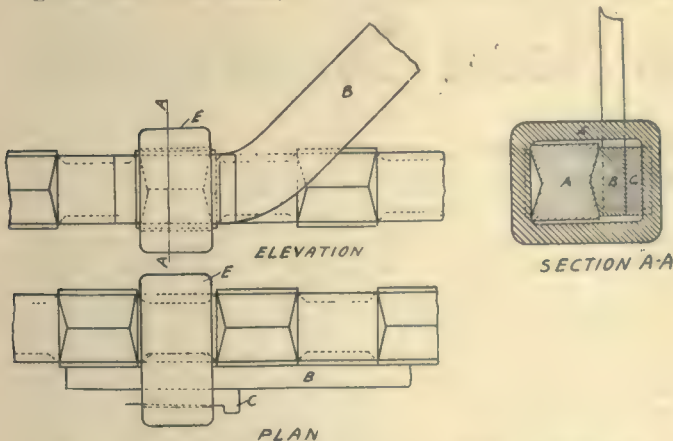


Fig. 4—Rigid Connection of Shear Members Secured by Specially Rolled Sections.

rod is also rigidly connected to a main rod placed at the top of the beam. A real "unit" is thus obtained.

Every concrete engineer knows how important it is to be able to hold the steel in the right place during the process of concreting. The writer is using for this purpose special bar separators, as shown in Fig. 6. Two plates fitting between the projections of the main ten-

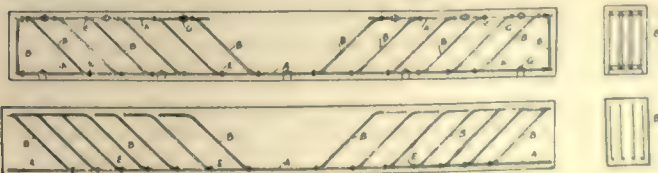


Fig. 5—The Upper Sketch (5A) Shows a Reinforcing Unit with Rigid Connections at Both Top and Bottom. The Lower Sketch (5B) Shows a Rigid Connection Below Only. Upper Anchorage Dependant Upon Bond.

connecting bar between the two verticals. Each of the buildings was 300 feet long and 60 feet wide, two storeys high, with the columns spaced 20 feet by 24 feet and built heavily enough to provide for two additional storeys in the future. The interior construction was of flat slab concrete floors built on the Turner mushroom system, supported by steel columns. A beam ran between the exterior columns and supported a brick panel under the concrete window sill. A tunnel ran under both buildings and there was no choice as to the amount of work on each of the buildings.

A very careful estimate of the exact amount of work involved in each building was made, and a dividing line drawn 6 feet, 8 inches one side of the centre line of the connecting corridor. The figures were shown the foremen who were to be put in charge of the two buildings, and they agreed that the division was an absolutely fair one. The foremen snapped up a cent for choice of sides. Duplicate equipment was furnished for the two sides and it was agreed that the foremen should have the selection of their labor bosses, carpenter foremen, and within reason a free hand in the number of carpenters and laborers that were employed on their buildings. The company offered a bonus of a certain amount of money to the men in charge of the two buildings in a given proportion according to the economy shown in getting the work into place.

From the very start of the job, rivalry between the two sides began to grow. The amount of centering placed by the carpenters on one side was carefully noted by the men on the corresponding work of the other building. The north had started two days ahead of the south building and any marks set by the men on the north side drew corresponding speed from the men

on the other building. At the first of the job it was considered that a good day's concreting had been done when two bays of length of floor had been cast the width of the building. At the last of the job the men had put in three bays in eight hours, an increase of over 50 per cent., part of which could be charged to experience in handling the work to better advantage and a large amount to pure rivalry.

In computing the saving on labor costs due to this competition of working gangs, the basis of comparison is necessarily somewhat a matter of opinion. The Aberthaw Company adopted as a basis the unit labor costs per yard of concrete, per square foot of forms, and per ton of steel, in two other concrete buildings of about the same size as those at New Haven. Using this standard it appeared that the saving in labor costs on the New Haven job was 19 per cent. on the concrete labor, 5 per cent. on the labor on forms, and 22 per cent. on the labor on steel erection. The total saving on all labor items was 10.8 per cent. of the labor cost for the job as it would have been without competition, figured from the other buildings taken as standard work. In any such estimate there is, of course, room for differences of opinion, because the labor cost in concrete buildings is so largely influenced by matters of design, and in estimating the weight to be assigned to such differences judges might not exactly agree. But with all reasonable allowances on this head it seems evident that by this competitive system the Aberthaw Company did get out of their New Haven job with an outlay for labor about 10 per cent. less than that outlay would have been without the rivalry between the working gangs. There was less than \$400 difference in the labor cost of the two wings.

Use of Tar in Macadam Road Construction

English Methods of Tar Painting, Mixing and Grouting—Preparation and Use of Material—Pros and Cons and Cost Data

In a paper read before the Northern District Meeting of the Institution of Municipal Engineers, Mr. Wm. Wade, assistant surveyor to the Northumberland County Council gave the following information, drawn from his own experience, regarding the use of tar:

Tar Painting.—Tar painting may be used on either an ordinary road, made in the usual manner, or upon a new stretch of metal. In the case of tar painting, a stretch of road which has carried traffic for some time, it is essential that all dust should be removed from the road before the liquid is applied. After the removal, the road is then ready for the application of the tar, which is heated in tanks of various sizes. These tanks are fitted with distributors or jets, and tar at the proper temperature is applied by pressure so as to secure a certain amount of penetration as well as equal distribution. The tarred surface has then granite, spar or other suitable screenings sprinkled over it. The cost of tar painting works as follows: One gallon of tar will cover an area of from 10 to 20 square yards, at a cost of from 1d. to 1½d. per square yard.

Tar Macadam.—I have now to deal with the second method—viz., that of thoroughly mixing the stone with tar and pitch previous to its being laid on the highway. This is perhaps better known to you as tar-macadam. As it is absolutely essential that all stone should be perfectly dry and free from moisture, you will readily see that a shed or some covered-in structure will materially help in getting the work done in a speedy and efficient manner. The stone used is of three sizes—2½-inch, 1½-inch and ½-inch—and should be free from dust and moisture. The tarring may be done by hand or by machinery. The latter method is much cheaper, and I find that machine-tarred stone is superior to that mixed by hand. After the stone is tarred it is stacked in separate heaps. The best results

are obtained when the tarred material is allowed to be undisturbed from one to three weeks before it is applied to the road. I omitted to mention that the proportion of pitch must be greater for the bottom coat than for the two succeeding ones.

The 2½-inch stone is first put on the road foundation. Above this the 1½-inch is placed, and the ½-inch is used as a finishing coat, over which is sprinkled ¾-inch dry granite screenings free from dust. Each layer of stone is well rolled before the one above is put on. It is very necessary that more than ordinary care should be taken in the consolidation of the separate layers. When completed, the combined thickness of the three coats gives an average depth of 4 inches, the depth of material, of course, being greater in the centre than on the sides of the road. A 15-ton roller is preferable, especially if the traffic be heavy, for if a light steam roller be used, when traffic heavier than the roller passes over the road, the result will, in all probability, be disastrous for the road. One ton of barred stone will cover an area of 6 square yards, and the average quantity of tar required for 1 ton of stone is 8 gallons and 20 pounds of pitch.

The 8 miles of tar-macadam laid by the Northumberland County Council cost on the average 2s. 2d. per square yard, inclusive of mixing plant, etc. The roads treated were structurally weak—a penned bottom of 6-inch whinstone was laid down on the existing road to give a good foundation, on which the tarred stone was placed. Good drainage and strength of structure are important factors in the laying down of a successful tar-macadam roadway. The cost of reconstructing a road by means of penning it with 6-inch of whinstone varies from 10d. to 1s. 6d. per square yard, according to the distance the stone has to be brought.

Tar Grouting.—And now I come to deal with the third method, that of tar grouting the stone with tar and pitch when the road is being coated.

Before beginning tar grouting it is necessary to take into consideration the weight of roads and the nature of the traffic the road is likely to be called upon to carry. This will altogether determine the size of the broken stone, its quality and the thickness of the coat to be laid on the surface. On roads that carry heavy traffic 3-inch hand-broken whinstone should be used, while on those where there is no motor wagon or locomotive traffic, I would recommend 2½-inch.

After the stone is laid on, it is slightly rolled. The pitch and tar are together heated in tanks to boiling point and a quantity of creosote oil is added. Stirring is necessary to enable the ingredients to be thoroughly well assimilated.

The boiling matrix is poured in the interstices by means of a specially made can and distributor. Each individual stone is thus thoroughly well grouted and embedded in or surrounded by the mixture. While still hot, ¾-inch slag or whin chippings are applied and properly consolidated with a 15-ton roller until an integral crust is formed.

I have given a very brief outline of the preparation and use of material for the three different methods of treating a road with tar as a binder. I now propose to deal with, in as concise a manner as possible, the various advantages and disadvantages connected with these respective modes of road making and repairs. At the outset, let me say that I consider wet rolling will shortly be a thing of the past on our main highways where motor traffic has to be dealt with.

Tar painting may with great advantage be used on suburban roads where the traffic is light or where the dust nuisance is greatly felt and watering has to be resorted to. The tar acts as a protection, and protects the life of the road surface so long as it is dry. It has this great drawback, being only externally applied, it breaks up in wet weather, and the combined action of the wheels and horses' feet soon puts the roads into an uneven and dirty condition. This, of course, applies to roads where the traffic is heavy. To sum up, tar painting is not to be compared with either tar-macadam or tar grouting as far as lasting properties are concerned. The tar in this case is not so much a binder as a protection to the road surface.

Advantages of Tar-Macadam

(1) The small stone of which the crust is composed being well tarred before being laid on the road gives a compact and smooth surface.

(2) The tar-macadam road is perfectly sanitary and almost dustless, so that cleansing is reduced to a minimum.

(3) It is easily repaired and the cost of maintenance is 30 per cent. less than that of ordinary macadam.

Tar-macadam, as no doubt you are aware, is not without its drawbacks. The chief of these, so far as road authorities are concerned, is the heavy initial cost. From the point of view of those using the road, the slippery nature of the surface, especially during hoar frosts, is an objectionable feature. However, this remedies itself in course of time by the tar gradually leaving the road dry by evaporation. Locomotive traffic tends to cause the top layer, which is only 1½ inches thick, to become separated from the layer below. This, of course, means the break up of the road so far as the crust is concerned. This is the reason why tar-macadam is not adapted for heavy loads.

Tar grouting differs from tar-macadam in these respects:

(1) By broken stone being applied in one coat.

(2) The stone is of a uniform size.

(3) Owing to a larger quantity of pitch being mixed with the tar, the mixture quickly solidifies and adhesion is instantly secured, in much the same way as is done in the wood or granite paving.

The Northumberland County Council has this year (1909) tar grouted 15,436 tons of broken stone on a stretch of upwards of 14 miles of main road in various parts of the county. This work, I find, can be carried out very satisfactorily by doing one-half of the road at a time. I may say I did not receive a single complaint while the work was in progress. Furthermore, there was an entire absence of loose stones—generally an annoying feature on ordinary newly-rolled patches. In September last I supervised the work of making the road approaches over a new bridge. Clay was used in order to bring the road way to the required level. You are all aware of the difficulty of making a satisfactory highway over newly-filled clay. Yet, after these approaches had been penned with rubble whin, and then coated with 2½-inch hand-broken whinstone, I found that by tar grouting I was enabled to get a firm and permanent road at once. The cost of tar grouting is no more than that of repairing a road by the old waterbound method.

A tar grouted highway is, as yet, the nearest approach we have to an ideal road. It is certainly for mixed traffic superior to the other methods I have mentioned. Yet, at the same time, I must not omit to say that the surface is not quite so suitable for motors as that of tar-macadam.

The World's Record in Masonry

More masonry was placed in the Ashokan dam at Boreo Station, near Kingston, N.Y., during the last month than has been laid in the same length of time in any other similar structure in the world. Not only was the record surpassed, but the mark was placed so far beyond any other achievement that it is likely to stand for some time unless it should be eclipsed at the Ashokan dam itself in the near future.

The figures for the monthly estimate of the contractors show that 35,259 cubic yards were placed, adding to the dam a mass of masonry about 800 feet long, 120 feet wide, and 19 feet high. The nearest approach to these figures in any similar case is the record made a year ago at the Croton Falls dam, when about 26,000 cubic yards of masonry were put in place in one month. In the irrigation work of the reclamation in the west, the highest monthly progress was 18,000 cubic yards on the Roosevelt dam.

The enormous amount of work done at the Ashokan dam in so short a time is considered by those in charge of the work as indicative of the adequacy of the plant and equipment. The masonry in the dam was begun the last of September, 1908, and up to the present time about 150,000 cubic yards have been laid. The completed structure will contain about 500,000 cubic yards.

Concrete Paving Work

Concrete Pavements have been laid upon a number of streets and bridges in Memphis, Tenn., according to the "Municipal Journal and Engineer." In one place 500 feet of street were paved with 1:2:4 concrete, 6 inches thick, consisting of Portland cement, sand and equal parts of crushed limestone and crushed granite; after seven years' use the pavement is said to be in excellent condition except for a width of 4 inches along the rails of a street car line. Another section was laid in 1903 upon a reinforced concrete bridge and the surface was finished with granolithic top, 1½ inches thick; up to the present time it is said that no repairs have been necessary. Three other bridges and a number of streets also have been paved with concrete within the last two years and have shown no appreciable wear. An experimental strip, 4,300 feet long, was put down between the rails of a street car track and for 2 feet beyond the outside rails; it consisted of a concrete foundation on which was placed a 3-inch concrete wearing surface. This construction, it is stated, has not been entirely satisfactory and all concrete is now made monolithic.

Trade Enquiries

The Dominion Government Trade and Commerce Reports contain the following trade enquiries. Readers of the CONTRACT RECORD may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

138. Representative.—An important firm in London, manufacturing constructional steel work, is desirous of appointing a reliable Canadian engineering firm to represent them.

139. Agents.—A London manufacturer of gilt mirrors and overmantels, etc., wishes to appoint Canadian agents.

188. Agents.—A Scottish firm of hydraulic and general engineers is desirous of appointing agents in all parts of Canada.

189. Agency.—A Cheshire firm of engineers manufacturing a new steam turbine of the high, low and mixed pressure type; also blowers, compressors, pumps, etc., wishes to introduce this machinery into Canada.

228. Slate Battens.—A Manchester firm wishes to correspond with Canadian exporters of slate battens.

268. Agents.—A London firm manufacturing bitumen, asphalt and damp course, seek suitable Canadian resident agents to handle these goods.

The Vancouver Portland Cement Company, whose quarry and plant are situated at Todd Inlet, Vancouver Island, have just installed a new No. 6 type K roll crusher of 60 tons capacity capacity. The machine was purchased from Allis-Chalmers-Bullock, Limited, of Vancouver. This addition to the company's plant will almost double the former capacity, and is warranted by the great demand for the brand of cement manufactured.

The Imperial Car, Dry Docks & Shipbuilding Company have commenced building operations on their extensive waterfront, age acquired in North Vancouver.

Trade News from Montreal

Good building season in prospect—Harmony between Labor and Capital—Contract Reform under way

Office of the CONTRACT RECORD,
Montreal, Feb. 28th, 1910.

With the month of February passed, a noticeable stir in the different building trades can soon be expected.

As far as new building prospects are concerned, the outlook is particularly bright and architects are rapidly completing plans for structures to be commenced in the spring. From the outlying districts reports received seem to point to a building boom.

There is an active demand for houses in the Verdun district and local contractors expect to commence the construction at an early date of a number of residential flats on the Lower Lachine road.

In Maisonneuve the town council are planning extensive improvements, and a large amount of concrete sidewalks and pavements will be laid. It is expected that Rosemount will be annexed to Maisonneuve in the present year, and this move should in time mean the extension of building operations in Rosemount.

In the Outremount district, building is expected to continue at least at the same rate as last year. The town council is now considering amendments to the building by-laws in order to insure the installation of efficient systems of plumbing, heating and electric lighting.

The Board of Trade in Lachine are this year making special efforts to boom the city and the advantages it offers to manufacturers who have in view the establishment of warehouses and factories.

No Labor Troubles Anticipated

This season there is very little prospect of trouble to contractors on the score of the labor question. Workmen generally are satisfied with the prospect of work in plenty with the opening of spring. The painters and decorators are said to be considering a new schedule of wages, but it is expected that this question will be amicably arranged without loss of time to either employer or laborer.

New Method of Letting Civic Contracts

With the time rapidly approaching when tenders for the present season's public work must be awarded, the Board of Control are actively engaged in improving the system of awarding this civic work. A former custom in connection with this street paving contract was to call for tenders for certain classes of pavement and then to award contracts before deciding where the work was required. This year City Surveyor Barlow will be asked to make a report outlining the streets where walks or pavements are required and also to recommend the style of material to be used. It is hoped also to call for individual tenders so that the contractor will know beforehand just what portion of the city's streets he is bidding on. This is not his privilege under the present system, and its unfairness to both parties is very perceptible.

Ice Palace Litigation

The ice palace completed for the Montreal Carnival Committee by Messrs. Corriveau & Brunet in the latter part of January is now forming the subject of a law suit. The winter carnival did not prove a financial success, and the promoters as a result were considerably out of pocket.

The contractors were unable, owing to the unfavorable wea-

ther, to carry out the construction of the ice palace on the scale intended, but they are, however, demanding \$4,000 from the committee which they allege is due them on their contract.

Discussion of Water Purification Methods

A lecture on "Water Filtration in Theory and Practice" was delivered recently at McGill University by Mr. G. C. Whipple, of the firm of Messrs. Hazen & Whipple, consulting engineers, New York. A number of the city of Montreal officials who are interested in water filtration were present.

The speaker enumerated various methods of purifying the water supply, including filtration coagulation, aeration and disinfection, the sand filtration system being the favored of these processes.

The choice between a sand process of filtration and a mechanical system was, according to Mr. Whipple, a more difficult problem. The former was perhaps more preferable, for although more expensive to install, its operation was very much simpler and less costly.

Proposed New Dry Docks

Considerable interest is manifested in Montreal in the negotiations which the Dominion Government have on hand at the present time concerning the location of dry docks in several of the Canadian seaport cities. There seems no reason to doubt that the Government authorities intend shortly to make a definite move towards the establishment of dry docks in Canada.

The cities which would be taken into consideration would probably comprise Montreal, Quebec, St. John, Halifax, Lewis, and Sydney, and it is felt here that Montreal would be one of the first to receive this addition to its harbor facilities.

Speaking generally, the cost of a floating dry dock would be about one-fifth of that required to build a similarly equipped permanent dock. A floating dock that would meet the requirements of the Montreal shipping trade would cost in the neighborhood of one million dollars, depending, of course, upon its lifting capacity. In conjunction with the dry dock the establishment of a ship-building plant would be necessitated, and one of sufficient proportions to meet the requirements would mean the expenditure of probably another million dollars.

The firm of Swan, Hunter & Wigham Richardson, Limited, of Wallsend-on-the-Tyne, England, who are represented in Canada by Mr. Clarence I. de Sola, of Montreal, have had on exhibition for the past week, in the Montreal Board of Trade Building, an excellent model, approximately 8 feet by 2 feet, of a self-docking and floating dock, which contains also the model of a steamer built for service on the Great Lakes and canals of Canada. The model of the floating dock is particularly interesting, and from a study of it an idea can be obtained of the principle by which these docks are operated.

Dominion Express Building

A short time ago an announcement was made in the CONTRACT RECORD to the effect that the block at the corner of St. James and St. Francois Xavier streets, the present site of the St. Lawrence Hall, had been sold to the Canadian Pacific Railway Company, who purposed erecting a large office or hotel building.

The railway company asked for competitive designs from different architects, and four sets of sketches were submitted from Montreal offices and one from a Toronto office. The designs submitted by Messrs. E. & W. S. Maxwell, of Montreal, have been accepted by the C. P. R. authorities, and the work of finishing up the plans will be proceeded with at once in order that tenders may be called as soon as possible for the construction of the building. The new structure will be devoted partly to offices for the Dominion Express Company, the C. P. R. Company and New York Central Railway, who will occupy the lower floor; while the upper storeys will be used for commercial offices. The building as designed will be ten storeys in height, and will be the skeleton steel frame type, fireproofed throughout. The estimated cost of this building is in the neighborhood of \$400,000, and the officials expect to see its completion not later than December 1911. The new building will extend from St. James street to Fortification Lane. The property immediately back of the site is also owned by the Railway Company, but for the present nothing will be done in the way of constructing a new building on this later site, although it would not be surprising to learn that an hotel building would be erected there in the future.

Mr. E. M. Read, of the engineering department of the Canadian Pacific Railway, leaves this week for Vancouver to superintend work in the West for the company.

Building Inspector Alcide Chausse has requested the city authorities to add three assistant building inspectors to his present staff. He has also asked for the appointment of an inspector of fire escapes and elevators, and for two men to inspect all electric wiring.

Vancouver Correspondence

Gratifying Activity in Building Circles—Basic Prices of Building Materials—Unfair Railway Discrimination

Office of the CONTRACT RECORD, Vancouver, B.C.

February 24th, 1910.

Vast as was the volume of last year's building operations, it was insufficient for the needs of this rapidly-growing city. Hundreds of new dwellings, scores of new business blocks, and a dozen or more large and modern office buildings, were erected, yet the demand remains unsatisfied, and consequently the building operations of the past twelve months must be duplicated upon a still more extensive scale. There is a great scarcity of dwellings, and hundreds of the new families arriving are compelled to lodge in small tenements and suites of three and four rooms—a mode of life that is both new and distasteful to them. The lack of homes has caused rents to soar out of all proportion to the service given, and has earned for the city the reputation of being an extremely dear place to live. It is hoped that by the end of the year this condition of affairs will have been remedied.

General Feeling of Prosperity.

Throughout the winter season building operations have been carried forward on a scale hitherto unprecedented in the wet season, and as a result the men of the different trades have had steady employment at good wages. This in itself has contributed in no small degree to the buoyant feeling of prosperity that is prevailing in every line of business.

While wooden homes continue to be erected as befitting the mild climate, the designs are tasteful and attractive, a considerable proportion being of the now popular California bungalow type, one and one-half storeys in height with dipped shingle exteriors, wide verandahs where the family spend most of their time in summer, and an interior with large reception hall, living room, dining room, den, and one or more fireplaces, in addition to bedrooms. These bungalows have cement basements with furnace and laundry, with stationary tubs and other modern conveniences. Some have the chimneys and verandah supports built of rough stone, the type admitting of much variety in architecture. Cement is now entering largely into construction work in Vancouver, and a number of the largest office buildings and business blocks recently erected represent the reinforced method.

The demand for brick became acute last year, owing to the large number of business blocks, warehouses and apartment houses under construction. The product of about half-a-dozen yards finds a market in the city, but the output is far below the requirements of contractors, and the bulk of the supply comes from Seattle, Wash. It is estimated that between 24,000,000 and 30,000,000 brick were used last season in Vancouver, in addition to a large quantity of the pressed article for facing purposes.

The use of wooden lath has fallen off greatly, and hair or wood fibre is now taking the place of lime plaster. Four years ago only about 10 per cent. of the new wall covering was used—to-day the proportion is about 90 per cent., and increasing. Much of the immense quantity used by builders comes from the United States, being lower in price—although no better—than the Winnipeg article, which is practically shut out of this large and growing market owing to the heavy freight charges. Practically the latter is only called for when there is a temporary scarcity of the competing article.

Patent roofings have been given a trial on large buildings, with unsatisfactory results, and the pitch and gravel kind is generally mentioned in the specifications for such. All dwellings are covered with shingles, applied in the green state. Very little hardwood flooring is used, fir being the favorite, owing to its cheapness and lasting qualities.

Prices of Building Materials.

(Delivered on Job.)

- Building paper, tarred, per roll, 90 cents.
- Building paper, plain, per roll, 75 cents.
- Bricks, common, per 1,000, \$12.00.
- Bricks, pressed, per 1,000, \$40.00 to \$62.00.
- Cement, (Vancouver), per barrel, \$3.20.
- Roofing felt, per 100 pounds, \$2.45.
- Fire brick, (Scotch), per 1,000, \$45.00.
- Fire brick, small quantities, \$48.00.
- Lime, per barrel, \$1.35.
- Sewer pipe, per foot—4-in., 18 cents; 6-in., 33 cents.
- Plaster of Paris, per ton, \$18.50.
- Putty, per pound, 5 cents.
- Tar, 4-gallon tin, \$1.25; per barrel, \$6.75.
- Hard wall plaster, per ton, \$17.50.
- Nails, base, \$3.25.
- Nails, cut, \$4.00.
- Mixed paint, gallon, \$2.00; 1/2-gallon, \$1.10; quart, 60 cents.
- Boiled linseed oil, gallon, \$1.20; barrel lots, per gallon, \$1.00.
- White lead, (genuine), 100 pounds, \$8.50.
- White lead, No. 1, per 100 pounds, \$8.00.
- Sash cord, per pound, 50 cents.
- Sash weights, per 100 pounds, \$3.00.
- Tacoma hair fibre, per ton, \$19.50.
- Fire clay, per ton, \$20.00.
- Plate glass, (35 per cent. off local tariff).
- Sheet glass, (10 per cent. off local tariff).
- Expanded metal lath, (Hays'), 28 cents per square yard; Herringbone lath, 18 cents per square yard.
- Ready roofing, (Sendor brand), 1/2-ply, \$2.25; 1-ply, \$2.65; 2-ply, \$3.40.
- Hexagon floor tiling, average 55 cents per square foot.
- Wall tiling, average 95 cents per square foot.
- Turpentine, per case, \$8.60.
- Rosin, per pound, 5 cents.
- Elephant lead, per 100 pounds, \$7.70.
- Pig-iron, Etc.
- Pig-iron, Eglinton No. 12, \$24.75 per 2240 pounds, ex wharf, Vancouver.
- Pig-lead, \$90 per 2240 pounds, ex wharf, Vancouver.
- Tin plate, I. C., 14 x 20, per box \$3.50, ex wharf.
- Canada plates, local, \$2.90; polished, \$3.10.
- Steel rails, 15-lb., \$50 per 2240; 30-lb., \$45 per 2240, ex wharf, Vancouver; 50-lb., \$45 per 2240 pounds.

As will be readily understood, the demand for lumber of all kinds and shingles is enormous, and a number of the local sawmills are kept busy supplying the contractors, who likewise receive frequent shipments from Victoria, up-country and Coast points. The consumption last season was estimated at 10,000,000 feet per month—this year it will be greater still.

More Competition Needed in Some Lines.

"You may take it for a fact," remarked a well-known contractor, "that no line of business outside the wholesale hardware men is making the profits being chalked up by the sash and door men these days. The hardware men are arrogant in their prosperity, and it

will be a real blessing when the new lines of railway bring about needed competition. One or two firms appear to imagine that even common courtesy is something that should be charged for, and some of the managers give away mighty little of it."

Enormous quantities of cement, sand and gravel are required to supply the needs of the city contractors, and the supply frequently fails and causes a temporary stoppage of work. Last year the city council found itself unable to obtain a sufficient supply for the granolithic walks being built by day labor, and some miles had to be held over for this year. Until about five years ago, there were few, if any, concrete buildings in Vancouver; to-day they are numerous, while others are under way or projected. Concrete walks were first laid on residential streets about ten years ago, when the corporation decided to put down no wooden walks wider than three feet. As a result, property owners commenced petitioning for cement walks, the entire cost being charged up to them. To-day cement pavements are found on all the principal thoroughfares, the narrow wooden planks being confined mainly to the outskirts.

Unfair Railway Discrimination.

The Northwest provinces, including British Columbia, are crying out for industries to supply the needs of the large population already within their borders. The growth of existing concerns is hampered and prevented owing to the fact that the railway rates imposed will not permit of shipments to any considerable distance from the point of manufacture, while Eastern shippers appear to enjoy rates which permit them to undersell the Western manufacturer on his home ground. Here in Vancouver, our wholesale men, who enjoy cheap water freights on many of the lines handled, find it almost impossible to get a footing in Alberta owing to the high railway charges on their consignments, while most of the city industries and our dealers in builders' supplies cannot ship with any margin of profit beyond Kamloops. The situation is intolerable, and it is little wonder that the people of the prairie provinces and British Columbia are hopefully awaiting the completion of the Canadian Northern and Grand Trunk Pacific lines as likely to break the strength of the present monopoly and afford at least some measure of relief in freight rates.

The situation throughout the entire Northwest is well expressed in the following item which recently appeared in "The Commercial," of Winnipeg, the well-known journal of the wholesale and retail trade:

The matter of freight rates was brought to the attention of the Brandon council last week at its regular session by the Brandon Windmill & Pump Company. It was claimed by the company that a discrimination in freight rates is being shown in favor of the Eastern manufacturer against the Western manufacturer. The Brandon Windmill & Pump Company claimed that the difference in the rates made it impossible to compete with Eastern manufacturers in selling their products in British Columbia. The local company have written to the Board of Railway Commissioners protesting against the alleged discrimination, asking for the privilege of presenting their case before the Board at its first sitting in the West, and have also asked for the co-operation of the city council in fighting against the alleged injustice. A resolution was passed to ask the aid of the Board of Trade in the matter.

The company claims that the freight rate from Woodstock, Ont., to Vancouver is \$1.33 shipped in carload lots, and from Brandon to Vancouver the rate is \$1.30, a difference of three cents from Woodstock to Brandon. The rate by local freight from Woodstock to Vancouver is \$2.00, and from Brandon to Vancouver it is \$1.92. The Brandon concern claims that the cost of manufacture is greater in the West than in the East, and that if such partial rates are to be given, the Brandon firm will be unable to sell its goods in British Columbia.

CITY AND COAST ITEMS OF INTEREST.

A new and handsome Y. M. C. A. building will in about eight months replace the present frame structure. The site has 70 feet on Blanchard street and 120 feet on View street.

Vancouver is to have a new Labor Temple to replace the present building on the corner of Dunsmuir and Homer streets. The plans call for five storeys, including basement, the material to be of stone, steel and brick. The estimated cost is between \$65,000 and \$70,000. It is proposed to hold the dedication ceremonies next Labor Day, September 5th.

Work is to be started in a couple of weeks on the immense plant of the Sumner Iron Works in Burnaby municipality, about ten miles southeast of Vancouver, where a site comprising twenty acres has been secured. The present name of the station on the company's property is Ardley, but it is the intention of the company to move the depot 1,000 yards east and rename it Sumnerton, in honor of the founder of the Sumner Iron Works, at Everett, Wash.

A great steel plant, to cost between half a million and a million dollars, is to be established in the near future at a point on the Coast—probably on Vancouver Island—by James A. Moore, president of the Irondale Smelting Company, of Washington, in conjunction with other prominent capitalists. Extensive coal deposits have been acquired on Graham Island, one of the Queen Charlotte group, in addition to enormous ore bodies on Quatsino Sound and Atlin, in the interior, where a rich magnesite mine was lately discovered. The steel plant, which is expected to employ about 2,000 men, forms only part of Mr. Moore's extensive scheme. The Irondale Company expects to find a market along the entire northern Pacific coast, and also anticipates shipping its products to the Northwest, where there is a constantly growing market for structural steel and other lines to be manufactured.

The Wallace Shipyards, North Vancouver, have been awarded the contract for the construction of the new North Vancouver ferry, to cost \$13,000. The vessel must be completed in six months' time.

Jens Orten-Boving & Company, hydraulic engineers, of London, England, have been awarded the contract to supply and erect 9,000 feet of pipe lines required by the Vancouver Island Power Company for its Jordan River plant for the supply of power to Victoria. The contract will figure out in excess of \$80,000. Work is to be commenced immediately, as the pipe line must be completed by October 1st of the present year.

The Victoria building figures for January amounted to \$128,985, an increase of 66 per cent. over the same month last year. Bank clearings for January aggregated \$7,390,767, an increase of 75 per cent. over the corresponding month last year.

The lasting qualities of the creosoted paving blocks supplied to the city by the Dominion Carbolineum Works, Vancouver, received a convincing demonstration the other day, when it became necessary to open up Dupont street, which had been paved with the company's blocks nine years ago. Despite the heavy traffic to and from the wholesale houses and the C.P.R. and Great Northern freight sheds, the blocks were found to be practically as good as when first laid, the edges being sound and showing very little evidences of wear. All were relaid, and the street appears good for twenty years to come. In England they have taken up wooden blocks laid in 1895, which were in good condition, excepting that their edges were worn off. They have taken those blocks up, trimmed them off, and are using them again.

The engineers who will oversee the construction of the new Cambie street bridge, crossing False Creek, Vancouver, will receive a lump sum of \$38,000. It sounds big, but the Granville street bridge experience went to show that the city would have been considerably ahead if the plan had been followed in that instance.

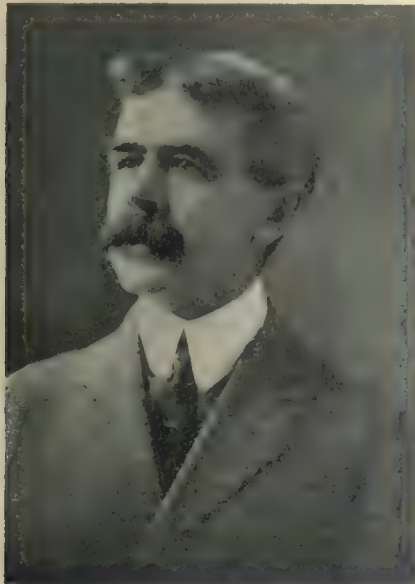
The Hudson's Bay Company's new stables, of reinforced concrete, are the first example of the Turner "mushroom" system in Western Canada. The building is also equipped with steel sash, which has only recently secured a footing in the West.

Work has been commenced on the Canada Life Assurance Company's new building on Hastings street, adjoining the handsome home of the Canadian Bank of Commerce. The building will be 44 by 120 feet, eight storeys high, absolutely fireproof with concrete floors. Carrara terra-cotta will adorn the Hastings street front, and pressed bricks the other sides. The Imperial Bank will occupy the ground floor.

Mr. Gillmor Brown, C. E.

Asst. Chief Engineer, Dept. of Public Works, Ottawa.

The subject of this sketch was born in Charlotte County, N.B., on September 25th, 1858. His education was obtained in various public schools and at the University of New Brunswick. Mr. Brown's professional career commenced in 1878. In this year and the following he was engaged on the engineering staff of the Kent Northern Railway in New Brunswick. His next experience was obtained in 1880 and 1881 with the Intercolonial Railway. A year later he fulfilled the duties of assistant engineer of construction on the Short Line Railway in Nova Scotia. For the next two years he was assistant engineer in charge of construction on the Cantilever Railway Bridge across the St. John river at St. John, N.B. In 1885 he had charge of the Government short line surveys in New Brunswick. Upon the completion of this work he accepted the position of chief



Mr. Gillmor Brown, C. E.

engineer on the steel truss railway bridge across the St. John river at Fredericton, N.B. The work occupied the better part of two years.

In October, 1889, Mr. Brown went to Wheeling, West Virginia, as engineer-in-charge of the Wheeling Bridge and Terminal Railway. Here he remained for a period of four years. The work comprised a double track steel railway bridge across the Ohio river. The structure had a total length of about 2,500 feet and a channel span of 525 feet, which, at the time, was the heaviest span on the river. In addition, there were numerous other bridges of less importance, a steel viaduct half a mile long, heavy retaining walls, and about a mile of double track tunnelling. Mr. Brown's next position was that of chief engineer of the Wheeling and Connellsville Railway survey. This was in 1892. In this year he became a senior member of the company of Brown & Hazlett, with head offices at Wheeling, Va. The firm had a good connection in Western Virginia, Ohio and Kentucky, and carried out a large amount of engineering work, including electric railway construction, structural steel work, surveys, and reporting on railway bridges. In 1899 and 1900 Mr. Brown was chief engineer of the Camden system of electric

railways and constructed the Parkersburg Electric Railway, the Ohio Valley Electric Railway, and the Camden Tri-State Electric Railway. In 1901 Mr. Brown returned to Canada and, as a member of the firm of Brown Brothers, was interested in the construction of the Beersville Railway, Kent County, N.B., and the reconstruction of the Central Railway. Six years later he was a member of the Commission appointed by the New Brunswick Government to examine and report on the branch railways of the province. In 1908 he was appointed resident engineer of the National Transcontinental Railway, and in March of the following year, division engineer on the same system. Mr. Brown was appointed to his present position in September, 1909.

A significant tribute to the abilities of Mr. Gillmor Brown was paid recently by the Hon. H. W. Emmerson, ex-Minister of Railways. Speaking from his seat in the House of Commons upon the question of the acquisition of branch railways by the Intercolonial, and referring to the report of the Commission, Mr. Emmerson said: "Mr. Brown is a civil engineer of practically an international reputation. . . . He now holds a position in the Department of Public Works which he fills with credit to himself, to the Government which he serves and to those who had to do with his appointment."

Annual Banquet Winnipeg Builders' Exchange

Four hundred and fifty guests sat down to the annual banquet of the Winnipeg Builders' Exchange on the 21st ult. The enthusiasm at the function indicated a united front on the part of the master builders of Winnipeg.

President T. R. Deacon replied to the toast of the Winnipeg Builders' Exchange. After discussing at some length the work of the Exchange, Mr. Deacon dealt with the attitude of the public towards the builder. The speaker said that for a long time there had been a habit of looking upon the contractor as a man who made great profits and made them dishonestly. Mr. Deacon refuted the idea and said that he could at least speak for the Winnipeg section as to honesty. The absence of litigation in Winnipeg building circles attested to the truth of this statement. Touching upon the various efforts put forward by the unions, Mr. Deacon stated that if these associations continued to demand higher wages, the contractors would have to charge higher prices and the public pay the difference. Under such circumstances, rents would go up to prohibitive rates, rendering investments precarious and turning the flow of capital elsewhere.

Mayor Evans paid a tribute to the good work of the local Exchange and then referred briefly to the part of the builder in the construction of a city. "The larger, patriotic view," said Mr. Evans, "is what the builders of a city should have. If a man builds without regard to the city as a whole, he contributes his part to the creation of a jumble. If, however, he seeks to erect structures in harmony with some characteristic principle, he will be helping to give the city both beauty and distinction. The speaker concluded by asking the builders to erect structures this year to the extent of fifteen million dollars—a request that was received with much enthusiasm.

Professor Brydone-Jack, replying to the toast of "Our Guests," discussed briefly the opportunities for builders in Western Canada. A congratulatory telegram was received from Mr. E. T. Nesbitt, president of the Canadian National Association of Builders.

Personal News and Notes

Mr. J. M. McIntyre has been elected to the directorate of the Dominion Bridge Company to fill the vacancy caused by the death of Mr. W. C. McIntyre.

Mr. Thos. Lewis, concrete manufacturer, Hamilton, Ont., was in attendance at the cement convention at Chicago last week.

City Engineer Jones, Brantford, Ont., returned recently from a holiday trip to Washington, Baltimore and Philadelphia.

City Engineer Speakman, Brandon, Man., has been elected a member of the American Society of Civil Engineers.

The estimated cost of engineering and construction work on the Panama canal was \$139,000,000. It is stated that the actual cost will be \$297,000,000.

City Clerk Littlejohn, of Toronto, who has been at Pinehurst, N.C., for five weeks, has left for Augustine, Fla. Mr. Littlejohn is on a two months' leave of absence owing to poor health.

Mr. Jas. Bell, city engineer of St. Thomas, Ont., has resigned. His resignation will take effect at the end of the year. Mr. Bell has occupied the position for more than a quarter of a century.

The annual meeting of the Ontario Good Roads Association is now being held in Toronto. The session opened on March 2nd and will close on March 4th. Mr. J. E. Farewell, of Whitby, Ont., is secretary.

At the annual meeting of the Granite Cutters' Union, Toronto, the following officers were elected: President, Wm. Nettleship; vice-president, Geo. Ray; secretary, Jas. Sevenright; treasurer, A. Dundas.

The British Columbia estimates for the current year are seven and three-quarter millions, compared with about four and a half millions last year. The main increase is for roads, bridges and wharves.

At a recent meeting of the Board of Trade of St. John, N.B., a resolution was passed asking similar bodies in the province to solicit the government to call a Good Roads' Convention during the coming session of the legislature.

Mr. J. V. Gray and Mr. A. F. Wells, formerly of the Bishop Construction Company, have opened offices in the Confederation Life Building, Toronto, to carry on a general engineering and contracting business under the name of Wells & Gray, Limited.

There was a record attendance at the annual banquet of the Winnipeg Builders' Exchange, held at Manitoba Hall, Winnipeg, on February 21st. The success which attended this convention reflected much credit upon the enterprising secretary, Mr. Thos. Buxton, Jr.

Mr. W. M. Somervell, architect, of Seattle, Washington, has opened a branch office at Vancouver, at 43 Exchange Building. Mr. J. L. Putnam, formerly associated with Messrs. Carpenter & Blair, New York City, is in charge. Plans are now being prepared in this office for a modern eight-storey commercial building to be erected at Vancouver.

The Toronto unions of the Amalgamated Society of Carpenters and Joiners are making arrangements to celebrate the jubilee of the organization on July 1st. The Toronto festivities will take the form of a big demonstration and picnic at Niagara Falls. All the unions in the city and province, as well as those of Buf-

falo and Western New York, will participate. The Society was formed in England in June, 1860.

The new schools' architect at Vancouver, B.C., is Mr. W. A. Leech, a medallist of King's College, London. Mr. Leech has been a resident of Vancouver for sixteen years, but formerly he lectured with much success upon architecture and engineering at technical institutes in England and South Africa. He is a member of the Architectural Society of London.

At the annual meeting of the Alberta Association of Architects held recently, the election of officers for the ensuing year resulted as follows: President, E. C. Hopkins, Edmonton; 1st vice-president, J. A. MacDonald, Lethbridge; 2nd vice-president, F. J. Lawson, Calgary; secretary, H. M. Whiddington, Strathcona; treasurer, C. L. Gibbs, Edmonton; council, R. Percy Barnes (Edmonton), Jas. Henderson (Edmonton), H. D. Johnson (Edmonton), R. W. Lines (Edmonton), J. E. Wize (Edmonton), G. Fordyce (Calgary).

Messrs. Haney & Miller, the contractors who constructed the water tunnel across the Toronto bay, have asked the Board of Control to release their bond of \$150,000, which is in a guarantee company. The city solicitor opposes this and says that if the conditions of the bond have been carried out satisfactorily the bond is null without being released. In other words, while the city is unable, after a lapse of over a year, to complain of the manner in which the work was carried out, they wish to be safeguarded against the contractors in case of an upheaval or some unforeseen development over which they will have no control.

Coming Cement Show at London, Ont.

The Second Annual Cement Show, which is to be held at London, Ont., from March 29th to April 1st, under the auspices of the Canadian Cement and Concrete Association, promises to be a most successful and representative exhibition. Applications for space have been pouring in to the manager, Mr. A. M. Hunt, of 425 Richmond street, London, Ont. The first allotments were made on February 28th. The remaining space will be allotted in order of application. Goods intended for exhibition must be plainly marked with the name of the exhibitor, number of space, and addressed to the Princess Rink, London, Ont. The show will be open to the public on Tuesday, March 29th, at 9 a.m. and each day thereafter at the same hour, closing in the evening at 10.30 p.m. Further particulars concerning exhibits may be obtained on application to Mr. Hunt.

We have received from the publishers, Messrs. John Wiley & Sons, New York, an excellent treatise entitled "The Water Supply, Sewerage and Plumbing of Modern City Buildings," by Wm. Paul Gerhard, C.E. Mr. Gerhard is the author of so many excellent technical works that any introduction at our hands would be superfluous. Suffice it to say that the various phases of the subject are treated in a most exhaustive and thorough manner. A great many special illustrations, drawn largely from the author's practice, and some interesting hydraulic tables and diagrams add considerably to the value of the work. There are 491 pages, 214 text illustrations, 15 tables and 25 diagrams. Price, cloth, \$4 net.

Building permits issued at Belleville, Ont., during 1909 totalled \$221,000. The amount spent on residences was \$100,000. The largest building was the Catholic school, costing \$60,000.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Arcola, Sask.

The municipal council are having plans prepared for extensions to the water supply of siphoning from the present source to the town.

Fort Erie, Ont.

The ratepayers will vote on a bylaw to issue \$50,000 30-year 5 per cent. waterworks debentures. B. F. Matthews, clerk.

High River, Alta.

This municipality will apply to the provincial government for power to borrow \$125,000, required for the construction of waterworks and sewerage systems. Noted in issue of January 5th.

Hamilton, Ont.

In City Engineer Macallum's report the total cost of the sewers required in the east end annex appear as \$160,000. Of this \$110,000 will be required immediately.

Kildonan, Man.

The council have passed bylaws providing for the issue of \$3,036.97 sidewalk debentures. F. Munroe, clerk.

Nanaimo, B.C.

A bylaw authorizing the council to borrow \$12,000 for the construction of a cement dam at No. 1 reservoir will be submitted to the ratepayers at an early date.

Ottawa, Ont.

The following tenders were received for the supply of 3,000 lineal feet of 42-inch steel intake pipe: East Jersey Pipe Company, Lockbar (Laurin & Leitch), \$29,760; Marsh & Henthorn, Belleville, \$21,400; Toronto Iron Works, Limited, Toronto, \$22,683; Canada Foundry Company, Toronto, \$21,500; Wm. Hamilton, Peterboro, \$19,815; Laurin & Leitch, Montreal, \$30,660; Chaudiere Machine Company, Ottawa, \$31,657; Gerald Lomer, Montreal, \$25,000; T. S. Kirby Company, Ottawa, \$19,998; Jenckes Machine Company, St. Catharines, \$31,500; W. Beverley Robinson, Montreal, \$19,953.33; Hyde & Webster, Montreal, \$20,947.40; John Inglis & Company, Toronto, \$23,900; Western Bridge & Equipment Company, Chatham, Ont., \$21,965; Power & Company, Ottawa, \$19,492; J. Coates & Company, Ottawa, \$21,000. Noted in issue of February 23rd.

Port Dalhousie, Ont.

The plan of the scheme for construction of waterworks which the council is considering is at Mr. Waugh's.

St. John, N.B.

F. W. Murdock, city engineer, has been instructed to prepare plans and estimates of cost for the renewal of pipes in the distribution system where such renewal is urgent. He will also prepare a report on the matter of additional hydrants.

Vancouver, B.C.

Tenders will be invited for the construction of five miles of concrete walks. W. A. Clement, city engineer.

Winnipeg, Man.

Tenders addressed to the Chairman of the Board of Control will be received until April 4th for supply of quantity of cast iron water pipe, valves and hydrants for extension of the waterworks system. Specifications, etc., at office of City Engineer, M. Peterson, secretary.

AWARDED.

Edmonton, Alta.

A. Butchart, water commissioner sends us a list of the following tenders: Brass Goods — Ross Bros., Edmonton, \$3,021.37; Standard Plumbing & Heating Company, Edmonton; Gorman, Clancey & Grindley, Edmonton; Northern Hardware Company, Edmonton; Mueller Manufacturing Company; McAvity & Sons; Canada Brass Goods Company. Galvanized Pipe — Jas. Robertson Company, Winnipeg, \$806.96; Ross Bros., Edmonton; Northern Hardware Company, Edmonton; Standard Plumbing & Heating Company, Edmonton; Gorman, Clancey & Grindley, Edmonton. Lead Pipe Northern Hardware Company, Edmonton, \$7,426.48; Gorman, Clancey & Grindley, Edmonton; Ross Bros., Edmonton; Standard Plumbing & Heating Company, Edmonton. Galvanized Fittings — Standard Plumbing & Heating Company, Edmonton. * denotes successful tenderer.

Toronto, Ont.

The Board of Control awarded to the Stanley Coal & Iron Company, Limited, the contract for cast iron pipe and specials for the main drainage works at \$17,642.

Vancouver, B.C.

The following were the successful tenderers for galvanized pipe: A. J. Forsyth & Company, \$2,622.50 (45,000 feet one-half inch at \$3.45 per 100 feet, 10,000 feet of three-quarter inch, \$4.55 per 100 feet, and 10,000 feet one-inch \$6.15 per 100 feet). Successful tenderer for brass goods: Crane & Company, \$3,356.50.

The following is a list of tenders received for wood block paving: Westminster avenue, Ninth to Sixteenth — Ironsides, Rannie & Campbell, \$56,833; Palmer Bros. & Henning, \$42,900; M. P. Cotton, \$46,282; T. R. Nickson & Company, \$47,832. Harris street — Carl W. Campbell; Ironsides, Rannie & Campbell, \$28,851; Palmer Bros. & Henning, \$22,900; M. P. Cotton, \$25,076; T. R. Nickson & Company, \$26,013. Seymour street, Georgia to Robson—Ironsides, Rannie & Campbell, \$8,709; Palmer Bros. & Henning, \$8,000; M. P. Cotton, \$8,158; T. R. Nickson & Company, \$8,291. Howe street, Georgia to Robson—Ironsides, Rannie & Campbell, \$6,001; Palmer Bros. & Henning, \$5,625; M. P. Cotton, \$5,992; T. R. Nickson & Company, \$5,642. Dunsmuir street, Granville to Howe—Ironsides, Rannie & Campbell, \$4,279; Palmer Bros. & Henning, \$4,000; M. P. Cotton, \$3,940; T. R. Nickson & Company, \$3,777. The award was recommended to the lowest bidders, which means that T. R. Nickson & Company get the Dunsmuir street work and Palmer Bros. & Henning the balance of the contracts.

Railroads, Bridges and Wharves

Chatham, Ont.

The call for tenders for the railway deep-water extension has been cancelled.

Bobcaygeon, Ont.

The county councils of Peterborough and Victoria have decided to replace Little Bob bridge by a new concrete bridge 16 feet in width.

Collingwood, Ont.

Council is considering a \$10,000 bridge bylaw.

Edmonton, Alta.

The guarantee of \$20,000 per mile of the bonds of the Alberta & Great Waterways Railway, for the purpose of securing the construction of a line from Edmonton to the Athabasca, has been finally approved, and the province stands committed to the enterprise.

Fredericton, N.B.

Tenders are being called by the Department of Public Works until March 4th for rebuilding Lester bridge, Malone bridge, and also for building Clifton high and low water wharf, King's County. Plans, etc., at office of above and at office of Geo. B. Jones, Apohaqui, King's County. John Morrissey, Chief Commissioner.

Fort William, Ont.

Work on the construction of the C.P.R. bridge is to start as soon as the necessary order is secured from the Dominion Railway Board.

Lindsay, Ont.

The following tenders were received for the construction of an overhead bridge at 20th street: Algoma Steel Bridge Company, \$14,500; A. J. Randall, \$14,750; Jas. Priel, \$15,000. Contract not awarded.

Ottawa, Ont.

The Railway Committee of the House of Commons has finally reported the bill to incorporate the Nelson River Railway Company. A clause giving the company powers to construct tramways was struck out. Bills incorporating the Saskatchewan Central Railway and extending the time for the construction of the Prince Albert and Hudson Railway Company were also reported.

Reeve McNaught, of North Vancouver, will interview his financial agents relative to the bonds of the Burrard Inlet Tunnel & Bridge Company, to allow of proceeding as soon as possible with construction of Second Narrows bridge. Tenders will be called for in the near future and construction will be begun early this summer and hastened to completion.

Tenders for the cribbing of the B. C. Cooperage Company's new site have been submitted to the Bridge Committee from Messrs. Armstrong, Morrison & Company, Ironsides, Rannie & Campbell, Mr. P. Cotton, and Palmer Bros. & Henning, all of whom presented bids based upon details Mr. Cotton's bid totalled \$3,365.96 and Mr. Palmer's, \$3,860.25.

Prince Rupert, B.C.

A local paper is responsible for the statement that the G. T. P. has asked the Dominion government for authority to erect wireless stations across the mountains so as to connect Edmonton with Prince Rupert.

Revelstoke, B.C.

The C. P. R.'s surveying party, in charge of Mr. W. I. Bassett, has completed the location survey over the Hope mountain. At Hope the Fraser river will be bridged, and the line connected up with the main line of the company into Vancouver. Two years from now, it is said, will see the completion of the line.

Sault Ste. Marie, Ont.

Tenders are being called until March 17 by the Department of Railways and Canals for supply of timber, etc. See advertisement in this issue.

Winnipeg, Man.

The Canadian Northern will do a large amount of work next season in the filling up of their roadbed between here and Port Arthur. Orders are now out for the filling of all the bridges. There will also be a number of new bridges erected along the line.

Tenders have been called for the construction of a bridge across Long Lake by the Department of Public Works, Winnipeg. Plans, etc., at office of Maj. J. Proctor, clerk, Woodlands P. O.

Tenders are being called until March 14 for the construction of extension to planing mill at C. P. R. shops. Plans, etc., at office of Frank Lee, Division Engineer, this city.

P. E. Ryan, secretary, the Commissioners of the Transcontinental Railway, Ottawa, Ont., is calling for tenders until March 15 for the construction and erection of pump house (to be completed before July 1st) and of reservoir (to be completed before August 1st) for the locomotive shops of the Commissioners east of Winnipeg. Plans, etc., at offices of the Chief Engineer of the Commissioners, at Ottawa, and of the District Engineer, St. Boniface, Man. Tender for pumping plant will be received at the same time, etc., for the pumping plant necessary to equip the said pump house (installation on or before August 1st).

AWARDED.**St. Thomas, Ont.**

The Yarmouth council awarded the contract for the construction of Dodd's bridge on the L. & P. S. gravel road to G. A. Ponsford at \$2,336, the lowest. Other tenders were as follows: Jos. Vincent, \$3,475; C. C. Stafford, \$4,391; Spoyne & Ramey, \$2,525; Williams & Walker, 2,975. The structure will be 50 feet and of reinforced concrete.

Saskatoon, Sask.

The contract for all structural steel required for new bridge over railway tracks has been awarded to Manitoba Bridge & Iron Works, Limited, Winnipeg, Man. General contractors, Algoma Bridge Company.

Shellmouth, Man.

The Manitoba Bridge & Iron Works, Limited, Winnipeg, Man., have been awarded the contract for all iron and steel for four combination spans here and at Russell.

Winnipeg, Man.

M. Peterson, secretary, Board of Control, writes that the contract for the new superstructure for Louise bridge has been awarded to the Algoma Steel Bridge Company, Winnipeg, at \$134,450.00; also the contract for erection of pile bridge over Omand's creek has been awarded to the engineer of construction at \$3,205.72.

Public Buildings, Churches, Schools, etc.**Buckingham, Que.**

It is stated that Mr. Croisitiere has bought a site on Main street, on which he will erect a theatorium.

Berlin, Ont.

Ratepayers will vote on a \$5,000 hospital bylaw.

Brandon, Man.

It is announced that the Methodists of the east end have purchased a site for a new church near Rideau Park, and every effort will be made to have the church completed this year. The congregation of St. Matthews hope to make a beginning on the new church on Thirteenth street.

Brantford, Ont.

At a meeting of citizens a resolution was passed urging the City Council to pass a by-law for the issue of \$100,000 debentures for the Market Square for market purposes entirely. It is planned to erect a new city hall and post office combined on another street.

Canmore, Alta.

At Canmore the C. P. R. will build a \$26,000 Y. M. C. A. building.

Centreton, Ont.

Tenders will be received until March 24th for the erection of a school house on S. S. No. 11 and 12, Township of Haldimand. Plans, etc., at County Clerk's office. W. Stewart, secretary-treasurer.

Cranbrook, B.C.

The C. P. R. expect to erect this year in this place a railway Y. M. C. A. at a cost of \$26,000. C. R. Sayer, Y. M. C. A., secretary of committee in charge.

A bylaw is being framed for the sale of the city's interest in the joint municipal government building, the proceeds therefrom to be devoted to the purchase of a site for the erection of a municipal building.

Edmonton, Alta.

Edmonton carried the bylaw to donate \$70,000 towards the exhibition park, and defeated the \$33,000 bylaw for library. The present market square can be used for a future city hall, according to the plebiscite.

Estevan, Sask.

The Lundquist Bros. will erect a two-storey opera house opposite the Empire hotel. Dimensions, 27 x 120 feet. Contract for excavation has been let to Wm. Culvert. A firm of Minneapolis contractors will prepare plans. When these are completed tenders will be called for.

Tenders addressed to B. Glover, secretary, Public School Board, will be received until March 15th for the erection of public school. Plans, etc., at Builders' Exchange, Winnipeg, Man., and at offices of the architect, Wm. Zimmerman, at Moose Jaw, and this place.

Fonthill, Ont.

Tenders are being called for the erection of a school building here. See advertisement in this issue.

Hamilton, Ont.

Property east of the Caroline street school has been decided upon as a site for a new collegiate institute.

Tenders will be received until March 18th for the various trades required in the erection of a school at Jerseyville, Ont.

Ingersoll, Ont.

Tenders will be received until March 15th for the erection of a public hall at

Dickson's Corners. Plans, etc., at residence of Wm. Hutchison, Dickson's Corners. Robt. Kerr, chairman of committee.

Kentville, N.S.

The Provincial Government has purchased the sharp farm here, as the site for a Dominion fruit experimental station.

Kildonan, Man.

At a meeting of the ratepayers it was decided to secure a site south of the brick yard for a new one-room school and also for a larger school in the centre district.

London, Ont.

The Masons have bought as a site for their new Masonic Temple, the Denton property on Queen's avenue, near Dr. John D. Wilson's residence. Work will be commenced early in May. All the money required has been subscribed. Noted in issue of January 12th.

Lethbridge, Alta.

A campaign will be started about March 14th to raise \$45,000 for a new Y. M. C. A. building here. C. R. Sayer, Y. M. C. A. secretary, in charge.

Moose Jaw, Sask.

The Collegiate Board ask for plans to be submitted for the collegiate grounds. Twenty-five dollars will be paid for the plan adopted. For further information apply to J. W. Sifton, superintendent of schools.

Milton, Ont.

The public school buildings will be enlarged and remodelled. Noted in issue of February 2nd.

Montreal, Que.

Tremblay & Francoeur have been awarded the contract for the installation of plumbing and heating in the new Montreal Technical School.

Messrs. Brown & Vallance, architects, Canada Life Building, are preparing plans and specifications for an additional wing to be added to the Medical Building of McGill University. These plans will be ready in the course of two weeks.

Mr. A. F. Dunlop, architect, Lindsay Building, has completed plans for the Earl Grey School Building and will receive tenders for the construction of same until March 10th.

Tenders for the construction of the new Rosemount School will be received until Thursday, March 10th at the office of Mr. A. F. Dunlop, architect, Lindsay Building.

Longueuil, opposite Montreal, is to be the site of the military depot. Land to the extent of 180 acres has been purchased, which will provide for the necessary buildings and parade grounds.

The Nationaloscope Theatre, corner of St. Catherine and St. Andre streets, was badly damaged by fire on the 5th inst. Total estimated loss, \$20,000.

The annual report of Notre Dame hospital shows a surplus of \$7,377.81, which may be appropriated towards the continuation of the building now in progress.

The Board of Control will take up the question of building a city hall annex.

Mr. Alphonse Content, 17 Place D'Armes Hill, is preparing plans for an extensive presbytery to be erected at Coteau Station, Saint Medard, Que. Tenders will be received for the construction of same during the last week of March.

North Vancouver, B.C.

A new Anglican church to be known as the Church of St. Agnes, is to be erected. Rev. H. H. Gillies is in charge.

Peterborough, Ont.

At a meeting of the Property Committee, held last week, Ald. Duncan, chairman, was authorized to secure plans for an isolation hospital to cost not more than \$12,000. Former plans prepared called for an expenditure of about \$8,000.

Tenders addressed to E. M. Elliott, County Clerk, will be received until April 8th for the installation of a steam heating system in the Court House. See advertisement in this issue.

Revelstoke, B.C.

\$30,000 towards a new school building, having been granted by the government, the city council and school trustees are arranging to submit a bylaw to the people for the amount that has to be raised locally.

Regina, Sask.

A by-law to provide for a \$16,000 market building will be submitted to the ratepayers on the 24th of March.

The establishment of a new Methodist College here for the province has been authorized by the special committee of the Conference, of which Dr. Carman, 33 Richmond street, Toronto, Ont., is president. Rev. J. H. Oliver, and Mr. G. W. Brown, Regina, are interested. Estimate of first building, \$250,000. Plans have not been prepared yet.

Saskatoon, Sask.

The ratepayers will vote on the 9th inst. on the following bylaws: \$100,000 Hospital; \$9,000 collegiate institute; \$21,000 for completing civic hospital and buildings for fair purposes.

Sinclair, Man.

Tenders will be received until March 16th by Geo. Watson Milliken, secretary-treasurer, for the erection and completion of a two-room brick veneer building. Plans at office of W. A. Elliott, architect, Brandon, and at office of the above mentioned.

Strathcona, Alta.

The Board of Trade has been advised by the Hon. Wm. Pugsley that a new armory and post office, to cost \$200,000, will be erected this year.

St. John, N.B.

The Exhibition Association is calling for tenders until March 12th for the erection of a new building for the Dominion Fair. Plans at exhibition office, Prince William street.

Stratford, Ont.

Plans for the new registry office for North Perth are at the court house.

Sperling, Man.

Tenders addressed to Frank R. Evans, 506 Somerset Building, will be received until March 12th for all trades required in the erection and completion of a 4-room brick veneer school building here. Plans, etc., obtained from the secretary-treasurer.

Toronto, Ont.

A building permit was granted to the new Bonar Presbyterian Church on the west side of St. Clarens avenue, north of College street, cost \$38,000.

Tenders are being called by the Board of Education for the several trades required for the enlargement of Kimberley Avenue School. See advertisement in this issue.

Victoria, B.C.

There is a possibility that the ratepayers may be called upon to consider the ques-

tion of a new city hall. Mayor Mr. Morley.

The board is looking for a site for the new high school, for which funds were provided by the bylaw.

Winnipeg, Man.

The city is making an application to legislature for an amendment to the charter so that \$500,000 may be raised for hospital and morgue purposes.

An athletic association is being formed and application for charter will be made. The intention of the club is to provide a club house after the style of the Montreal A. A. A.

AWARDED.**Montreal, Que.**

Mr. Jos. Venne, architect, 5 Beaver Hall Hill, has awarded contracts as follows in connection with the alterations to the Church of St. Enfant-Jesus at Mile End: General contract, Martineau & Prenouveau; decorations, Art & Industrial Company, of Montreal; installation of chimes, J. Vennat. Estimated cost, \$20,000.

Regina, Sask.

Wilson & Wilson, of Regina, were awarded the contract for the new public school at \$68,750. The tenders were: Smith Bros., & Construction Company, \$76,549; S. Brown, Winnipeg, \$78,000; McKay Construction Company, \$79,270.

St. Boniface, Man.

The contract for fire escapes on the Convention Building has been awarded to the Manitoba Bridge & Iron Works, Limited.

Stratford, Ont.

Wilson & Wilson have been awarded the contract for the new school at \$68,750. Four other tenders were received, including one from S. Brown, Winnipeg, \$78,000.

Toronto, Ont.

The contract for constructing the new Logan Avenue School has been given to Lucas Bros. for \$25,837, while Hanna & Nelson received the plastering tender for \$3,815.

Winnipeg, Man.

The Manitoba Bridge & Iron Works, Limited, have been awarded the contract for the structural steel and iron for addition to old post office building, Main street, also for the same in the veterinary hospital.

Residences**Belleville, Ont.**

Mr. A. E. Bailey has purchased the old separate school, which he purposes changing into a semi-detached dwelling.

Fort William, Ont.

Foundation stone is being piled on the site of the five storey apartment building which John King has announced will be constructed at a cost of \$100,000 on his George street property. Final arrangements await the decision about the gas.

Hull, Que.

It is stated that Mr. S. J. Willoughby and Dr. J. E. Taggart, 61 Sparks street, Ottawa, have purchased 40 acres of the Walker farm on the Chelsea road, which will be sold as building lots.

Montreal, Que.

Plans, etc., are being prepared for three pairs of semi-detached villas to be erected in Outremont, Que. Further information will be furnished later. Mr. Jas. E. Adamson, architect.

James E. Adamson, architect, Coristine Building, is preparing plans for a first class residence to be erected in Westmount for Mr. J. H. Charlton. Further information will be given later.

Messrs. Ogilvie & Mitchell, architects, Molson Bank Building, St. Catherine street west, have prepared plans for the erection of semi-detached residence on Roslyn avenue, Westmount, for Mr. A. H. Chave. Tenders are now being received.

Messrs. MacVicar & Heriot, 104 Union avenue, have prepared plans and will receive tenders until March 14th for the erection of a residence for Mr. C. J. McCuaig.

Mr. Robt. Findlay, architect, 10 Phillips Place, has prepared plans for a residence for J. E. C. Meagher, to be erected on Pine avenue. Tenders will be received until March 12th.

J. Montgomery Rodden, architect, 8 Beaver Hall Square, has received tenders and will shortly award the contract for the erection of a residence on Columbia avenue for Mrs. Pope.

Rothsay, Ont.

The Presbyterians purpose building a new manse this summer.

St. Helens, Ont.

Tenders will be received until March 15 for the erection of a manse. Plans at office of W. L. Miller, secretary of building committee.

Sintaluta, Sask.

Premises occupied by John Dickey, John Wilson and others were destroyed by fire recently. Estimated loss, \$4,000.

Winnipeg, Man.

Excavation has been started on the 3-storey apartment block, corner of River avenue and Lewis street. Dimension 100 by 120 feet; materials, red brick with white stone facings. J. Moxam, builder; Herbert Matthews, architect.

Worswick Bros., contractors and builders, of Elmwood, have purchased a piece of property on Johnson avenue, close to Bird's Hill road, on which they intend to build several fine residences at once.

AWARDED.**Montreal, Que.**

Geo. W. T. Nicholson, Eastern Townships Bank Building, has been awarded the contract for the erection of seven houses on the Durnford Estate, corner Atwater and Tupper streets. MacVicar & Heriot, 104 Union avenue, architects.

Marchand & Haskell, architects, 164 St. James street, have awarded the general contract for the erection of a house for Mr. Urban, on St. Catherine road and Wiseman avenue, Outremont, to N. Deslauriers, contractor, Westmount.

Robert. Findlay, architect, 10 Phillips Place, awarded contracts for the erection of a residence for Mr. G. H. Bishop, as follows: Masonry and brickwork, C. E. Deakin; carpentry, D. M. Long.

Messrs. Hutchison, Wood & Miller, architects, Royal Insurance Building, have awarded the contract for the erection of a residence at Hudson Heights, Que., for Mr. J. W. Pyke, to Mr. D. M. Long.

Business Buildings and Industrial Plants**Brandon, Man.**

The ratepayers of Brandon voted on the bylaw granting certain exemptions to the Canadian Northern Railway which on its part agrees to erect this season a first-class hotel in the city.

Comber, Ont.

The Forbes hotel, and business block occupied by Jas. Jenkins, were destroyed by fire on the 5th inst. Estimated loss, \$8,000.

Calgary, Alta.

The G. F. & J. Galt Company will erect a 5-storey warehouse on Tenth avenue and Second street west to cost \$45,000.

Bert. Stringer will erect on Ninth avenue and Second street west, a warehouse to cost \$30,000.

Fort William, Ont.

It is rumored that plans are being prepared for a new C. P. R. hotel to be erected near the site of the new station.

Gananoque, Ont.

E. W. Jackson will replace the old cheese factory here by a new building.

Moncton, N.B.

The American House was badly damaged on the 26th ulto. Estimated total loss, \$20,000.

Macleod, Alta.

The Grier block was badly damaged on the 26 ulto. Estimated total damage, \$25,000.

Midland, Ont.

The Georgian Bay shoox mills are considering the erection of an additional dry kiln for the treatment of their lumber and finished products.

Montreal, Que.

Marchand & Haskell, architects, 164 St. James street, are busy preparing the initial plans and specifications for the proposed extensive workshops which the Montreal Street Railway Company contemplate erecting in the north end of the city.

C. Duford, architect, La Patrie Building, has prepared plans and specifications and is inviting tenders for the erection of four stores and four dwellings on Craig street for Messrs. Bloomfield Bros.

Tenders closed March 7th at the office of J. Montgomery Rodden, architect, 8 Beaver Hall Square, for the construction of a steel fireproofed building and stables for the Mount Royal Riding Academy.

Mr. C. A. Reeves, architect, 58 St. James street, is preparing plans for new factory and warehouse buildings, to be erected in Maisonneuve for the Tetreault Shoe Manufacturing Company. The factory building will be 500 by 50 feet and the warehouse 212 by 90 feet, both five storeys in height. The slow burning mill construction will be specified, for the construction of these buildings, and it is the intention of the company to install an up-to-date sprinkler system. The architect expects to call for tenders early in April.

T. Pringle & Sons, architects, Coristine Building, have prepared plans for the erection of a new factory building for the Holland Varnish Company.

The Montreal Steel Works, Limited, Etienne street, is preparing to erect an extensive foundry building. T. Pringle & Sons, architects, Coristine Building, are preparing plans for this new structure.

The plans for the building to be erected for the Blumenthal estate on Balmoral street, will be enlarged by the associated architects, Ogilvie & Mitchell, to include the erection of a building on an additional property which has just been purchased. Tenders recently called for the construction of this building will therefore be delayed until the completion of the new plans.

North Vancouver, B.C.

It is reported that a company of western capitalists are considering locating a plant here for the manufacture of Pullman cars. C. Wilson, of Seattle, is interested. Capital to be invested, said to be, \$1,000,000.

Parry Sound, Ont.

A site has been secured by the Union Iron Works Company, Limited, for the erection of machine shops, foundry, docks, etc. The buildings will cover 25,000 square feet, and be built of concrete. Plans are now being prepared by H. Bryan Gilbert, architect, 47 Wellington street east, Toronto, who will call for tenders in the near future.

Quebec, Que.

We are informed that the Quebec Railway, Light & Power Company, Limited, have purchased the Jacques Cartier market site containing 10,605 square feet, corner of Crown and St. Joseph streets, and as soon as plans are prepared, a six or eight-storey office building will be erected. Annual meeting on the 12th inst. at the office of Greenshields & Greenshields, Montreal, when details will be more definitely arranged.

Red Deer, Alta.

The C. P. R. will erect a new station here to cost \$20,000.

Revelstoke, B.C.

The Imperial Bank of Canada has decided to proceed at once with the erection of the new branch here.

St. Johns, Que.

John Donaghy's building at the southern end of Richlieu street, was badly damaged by fire on the 27th ulto. Estimated loss, \$3,500.

Shoal Lake, Man.

The implement warehouse of J. D. McLachlan was destroyed by fire. Loss, \$4,000.

Saskatoon, Sask.

The Bank of British North America has purchased a building site, where a large building will be erected in the spring as a branch.

Three Rivers, Que.

Several new buildings will shortly be started in the business section. Among others will be the Quebec Bank at the corner of Des Forges and Bordeau streets.

Thornbury, Ont.

Hugh Baird & Sons, formerly of Markdale, Ont., now of this town, are asking for a free site and exemption from taxation for which they propose to erect a saw mill.

Toronto, Ont.

A building permit has been granted to the Toronto Showcase Company's new two-storey factory on the east side of Carlaw avenue, near Queen street, to cost \$32,000.

Lever Bros. have obtained a building permit for a brick addition to factory on Eastern avenue and Don, \$17,000.

No. 2 machine shop of the Schofield-Holden Machine Company, Carlaw avenue, was damaged to the extent of about \$7,000 on the 7th inst.

The International Motor Car Company, 60 Jarvis street, are calling for tenders for concrete floors. See advertisement in this issue.

The Dodge Manufacturing Company, West Toronto, are considering the erection of a new warehouse for the storage of their finished products. Plans are now being drawn for the building.

The Janes Building, northeast corner of King and Yonge streets, has been purchased by Henry Osler, K.C., for clients, whose names are withheld. The tenants are entitled to a six months' notice, and surveyors have been looking over the building but no definite plans for the 16-storey structure have been made.

Wauchope, Sask.

The C. P. R. will build a new station here this spring.

Watrous, Sask.

A syndicate was formed in this town recently to build a 75-roomed hotel at Lake Manitou. The syndicate has purchased the quarter section owned by Geo. Saunders for \$20,000.

Winnipeg, Man.

A firm of British capitalists are looking for a business site here. William Bruce, of this city, is acting for them. E. E. Wire, also of Winnipeg, is now in London, Eng., making arrangements for transfer of capital.

The Manitoba Gazette announces the incorporation of the Selkirk Hotel Company, capital \$1,250,000, the objects of which are to build hotels. The directors named for the new concern are, J. W. de C. O'Grady, J. A. Anderson, financial agents; John Geddes, commission merchant, and George Summer, accountant. The charter also gives the company the power to erect a theatre.

AWARDED.**Fernie, B.C.**

The Manitoba Bridge & Iron Works, Limited, Winnipeg, have been awarded the contract for the placing of fire escapes and iron stairways in the Royal hotel.

Fort William, Ont.

The contract for the structural steel and iron and ornamental iron in the new Union Station has been awarded to the Manitoba Bridge & Iron Works, Limited, Winnipeg, Man.

Messrs. Mason & McNeil, structural iron workers, have been awarded the contract for the building of the big smoke stack on the Kakabeka Falls Brewing Company's works.

Morrisburg, Ont.

John J. Helmer, Newington, and Harry Winstanley, this place, have been awarded the contract for the erection of the tack factory.

Montreal, Que. . .

Contracts have been awarded as follows in connection with the seven storey factory, which the St. Lawrence Sugar Refining Company, Limited, is erecting in Maisonneuve: Stone and brick work, E. G. M. Cape; fireproofing, Messrs. Church & Ross.

Fort Colborne, Ont.

The Tromanhauser Construction Company, Temple Building, Toronto, have been awarded the contract for construction of the Hedley-Shaw mill here. Contract for excavation has been given to J. L. Weller, of St. Catharines.

Regina, Sask.

The contract for steel framing for R. H. Williams' five-storey departmental store has been awarded to the Manitoba Bridge & Iron Works, Limited, Winnipeg, Man.

Toronto, Ont.

The Sanitary Floor Company, of Toronto, have been awarded the contract for furnishing and laying "Sanorto" floors in the four-storey apartment house on Yorkville avenue, at \$5,450.14. Messrs. Crossley & Sons, owners; Leonard Foulds, architect.

Winnipeg, Man.

The Manitoba Bridge & Iron Works, Limited, Winnipeg, have been awarded the contract for the structural steel in connection with the new Bank of Montreal. Erroneously reported in issue of February 23 as having been given to Dominion Bridge Company, of Montreal, Que.

The Manitoba Bridge & Iron Works, Limited, this city, have been awarded the contract for complete sets of grain elevator transmission equipment for 24 elevators for the Maple Leaf Flour Mills Company.

Power Plants, Electricity and Telephones

Brandon, Man.

The Municipal Light, Heat & Power Company, head office, Hamiota, will establish warehouse and plant here in addition to those in operation in Carnduff, Sask. G. Edgar Knetchell, manager.

Bracebridge, Ont.

Alex. C. Salmon, town clerk, writes that the council did not accept any tenders for the erection of Wilson's Falls power house, but will undertake the work by day labor.

Hull, Que.

The following tenders were received for the construction of an addition to the corporation power house: Noel & Ouellette, \$19,981; E. Bisson, \$23,511.85. These tenders were found too high, and new tenders have been called on a modified form. J. F. Boulton, city clerk.

Montreal, Que.

The Bergmann Electrical Works, of Berlin, Germany, manufacturers of tungsten lamps, are considering the location of a branch industry here. For further information apply to Dr. C. Rossner, 341 Dorchester street west.

The Montreal Street Railway Company have made application to the Council for the permission to increase its trackage in this city by thirteen miles.

Nelson, B.C.

The council have decided that they will have to meter the electric light service or purchase new transformers.

Owen Sound, Ont.

The Bell Telephone Company will install a "central agency" system in the local exchange within the next year. H. R. Polson, local manager.

Prince Albert, Sask.

C. H. Mitchell, of Mitchell & Mitchell, consulting engineers, Traders' Bank Building, Toronto, Ont., has reported favorably on La Colle Falls as a site for power development. The proposed plans call for a canal a mile long and a dam across the river 750 feet in length.

Sherbrooke, Que.

The ratepayers will vote on March 25th on a bylaw regarding street railway extensions. A new company, to be known probably as the Sherbrooke Electric Railway & Power Company, Montreal, Que., have asked the right to sell power and have practically agreed to expend \$500,000 on installation of a plant.

St. Thomas, Ont.

The following were the tenders received for the full equipment for the installation of Niagara power: Canadian General Electric Company, \$19,050; Lancashire Dynamo & Motor Company, \$18,447, and the Canadian Westinghouse Company, \$18,170. Noted in last issue.

Toronto, Ont.

Included in the supplementary estimates of the Provincial Treasurer are the following items: Electric plant, Hamilton Asylum, \$12,000; electric plant, London Asylum, \$25,000; electric plant, Ontario Agricultural College, Guelph, \$15,000.

Justice Britton has quashed the bylaw authorizing Blanchard township to raise \$20,000 for the purpose of taking over debtures of the St. Marys & Western Railway.

Victoria, B.C.

Tenders have been called for the following: Copper coated carbons; high grade carbons for enclosed lamps; the installation of arc lighting system for James Bay causeway and Belleville street. Wm. W. Northcott, purchasing agent.

Welland, Ont.

George H. Pettit is solicitor for a company organized to build an electric railway from Queenston to Niagara. The length of the railway will be seven miles and will cost about \$50,000.

Weymouth Bridge, N.S.

The Campbell Lumber Company are contemplating the installation of an electric plant at the Upper Site, known as Sissiboo Falls, to generate electricity for their lower pulp mill, as well as lighting the neighboring towns. G. D. Campbell, president.

Winnipeg, Man.

The following tenders for power and testing transformers were received by the Board of Control: Canadian General Electric Company, Canada, \$138,250; Canadian Westinghouse Company, Canada, \$116,500; Siemen Bros., England, \$111,725; Ferranti, Limited, England, \$89,850; Kolben & Company, Austria, \$72,100; Brown Boveri, Switzerland, \$9,700. That of the Westinghouse Company, Canada, was recommended as having the advantage of being a similar equipment to that ordered for the generating station, which will lessen cost of inspection. Only one tender was received for the supply and erection of the oil and water system for the terminal station, that of Canadian Fairbanks Company, for \$6,482, which was recommended. In regard to the tenders for the supply and erection of light, heat and power systems for the terminal station, the engineers recommended that of Chapman & Walker, Toronto, at \$8,225. There were three Winnipeg tenders as follows: Canadian General Electric Company, \$11,200; Shipman Electric Company, \$11,715; and Reese Engineering Company, \$15,064.

M. Peterson, secretary, Board of Control, writes that the tenders for supply and installation of cooling tower, etc., have not been awarded yet.

AWARDED.**Exshaw, Alta.**

The contracts for reinforcing steel and iron stairways, etc., for transformer station for Calgary Power & Transmission Company, have been awarded to the Manitoba Bridge & Iron Works, Limited, Winnipeg, Man.

London, Ont.

The contracts for supplies for the new power station for Niagara power have been awarded as follows: Ten oil insulated water-cooled transformers, Central Electric & School Supply Company, \$12,000; one 40 k.w. automatic voltage regulator, Ferranti, Limited, \$2,350; three 20-k.w. automatic voltage regulators, Canadian General Electric Company, \$4,600; all lighting protective apparatus for both stations, Canadian General Electric Company, \$1,800; complete switchboard, instruments and wiring con-

nections between all apparatus, Canadian General Electric Company, \$16,100; complete set portable instruments as specified Ferranti, Limited, \$1,375; constant direct current arc light transformer and rectifier and sixty arc lamps with absolute cut out, Canadian General Electric Company, \$4,300; eight constant current transformers, for street series, incandescent lighting, Ferranti, Limited, \$2,425; 1,550 street fixtures, as specified, Wheeler Reflector Company, \$6,286; 2,000 series 6.6 ampere 75 or 80 watt lamps, Sunbeam Incandescent Lamp Company, \$2,500. Total, \$47,636.

Niagara Falls, Ont.

Toronto Power Company has awarded the contract for three complete sets of generating apparatus of approximately 10,000 k.w. each capacity. The electrical equipment goes to the Canadian General Electric Company, and the turbines to the I. P. Morris Company, Philadelphia, U. S.

Toronto, Ont.

The following contracts for transformers were awarded by the council: Canadian General Electric Company, \$3,800; Canadian Westinghouse Company, \$5,430; Allis-Chalmers-Bullock, Limited, \$12,670.

Winnipeg, Man.

The tender of the Jens Orten-Boving Company, of London, Eng., for the supply of seven turbine governors for the power plant was accepted at \$23,000. Two other tenders were received, as follows: Ludlow Valve Manufacturing Company, Troy, N. Y., \$12,200; Lombard Governor Company, Ashland, Mass., \$18,000. The tender of Glenfield & Kennedy, Kilmarnock, Scotland, for the supply of five foot valves for the power plant was accepted at \$2,852.

Miscellaneous**Brampton, Ont.**

The County of Peel have passed a bylaw to spend \$100,000 on road construction.

Lauphin, Man.

Tenders addressed to J. W. Johnston, town clerk, will be received until March 15 for the purchase of \$14,000 20-year local improve debentures, 5 per cent.

London, Ont.

Recent building permits include: Priddi Bros., improvements to store, \$3,700; W. Wakeling, double house on Campbell street, \$2,200; Geo. Bawden, two storey and attic on Wellington street, \$2,700; John Richards, two houses, Adelaide, \$2,400 each; R. Dickinson, dwelling, Bellevue avenue, \$2,000; Huron College, repairs, \$2,000.

Tenders will be called for immediately for 2,000 feet of hose to augment the amount at present used by the fire department.

The following is a list of estimates presented by the Board of Works for 1910: Storm sewer, \$8,000; asphalt repairs, \$3,000; bridges, \$3,000 City Hall expenses, \$1,800; city parks, \$1,000; city greenhouse, Victoria Park, \$5,000 dredging river, \$1,000 exhibition buildings, \$900; exhibition buildings, special grant, \$1,500 West London breakwater, \$1,300; militia camp, \$10; registry office expenses, \$350; sewers and culverts, \$1,500; streets and general improvements, \$3,000; new steam roller, \$3,500; street cleaning, \$14,500; storage building, \$500; town hall expenses, \$100; street signs, \$350; repairs to brick pavement Talbot street, \$2,500; lowering grade at Talbot street subway and repairing same, \$1,500; laying one new 24-inch or 30-inch siphon pipe and constructing overflow sewers at Cove road, etc., say \$16,000; Eccadilly street storm water drain, city's

(Continued on page 27)

Tenders and For Sale Department

Tenders for Concrete Floor

WANTED.—Tenders for concrete floor, about 466 square yards. THE INTERNATIONAL MOTOR CAR CO., LIMITED, 60 Jarvis street, Toronto. 10

To Heating Contractors

Sealed tenders addressed to the undersigned will be received until noon on FRIDAY, THE 8TH OF APRIL, 1910, for the installation of a Steam Heating System to heat the Court House and County Buildings in Peterborough.

Particulars for guidance of parties tendering can be had on application to the undersigned.

ED. M. ELLIOTT,
County Clerk.

Peterborough, March 5th, 1910. 12

Tenders for Building Brick School

Tenders will be received by the undersigned until twelve o'clock noon on MONDAY, MARCH 14TH, 1910, for the erection and completion of a four-roomed brick school building to be situated in the Village of Fonthill, County of Welland, Ontario.

The lowest or any tender not necessarily accepted.

GEO. A. HOWELL, Sec'y-Treasurer, Fonthill, Ont. A. E. NICHOLSON, Architect, St. Catharines, Ont. 10

Tenders For Gas Franchise

Bids, sealed and endorsed "Gas Franchise," will be received by the City Clerk of the Corporation of the City of Fort William, up to APRIL 1ST, 1910, for the letting of a Gas Franchise, including construction of Plant, Mains, etc., and operation.

Conditions, specifications and form of tender, on which bids must be submitted, can be obtained from the undersigned.

Lowest or any tender not necessarily accepted.

JOHN WILSON,
Assistant City Engineer,
Fort William, Ont.

12

CITY OF BRANTFORD

Tenders for Cement and Sewer Pipe

Sealed Tenders addressed to Ald. Joseph Minshall, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received till 12 o'clock noon on THURSDAY, MARCH 17TH, 1910, for supplies of the above material required by the City of Brantford during 1910. Specifications may be seen and instructions to bidders and forms of tender obtained on application to the City Engineer.

Each tender must be accompanied by a marked cheque, payable to the order of the City Treasurer, for the amount called for in the form of tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer,
City Hall, Brantford, March 4th, 1910. 10

City of Brantford Sewer Construction

Sealed tenders addressed to Ald. Joseph Minshall, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received till 12 o'clock noon on THURSDAY, MARCH 31st, 1910, for the furnishing and laying of about 2,180 feet of 12-inch extra strength Sewer Pipe, and 705 feet of 12-inch Cast Iron Pipe, together with 12 manholes; greatest cut 81 feet; average cut, 16½ feet.

Plans and specifications may be seen and instructions to bidders, and forms of tender obtained at the City Engineer's Office.

Each tender must be accompanied by a marked cheque for 5 per cent. of the amount of the tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.

City Hall, Brantford, March 4th, 1910. 12

Board of Education Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board, will be received until FRIDAY, 2 P.M., MARCH 11TH, 1910, for the several trades required for the ENLARGEMENT OF KIMBERLEY AVENUE SCHOOL. Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in the said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, Chairman of Committee. W. C. WILKINSON, Sec.-Treas.

Dated at Toronto, March 5, 1910, 10

Department of Railways and Canals

Sault Ste. Marie Canal

Tenders for Supplies for the year 1910

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Supplies," will be received at this office up to 16 o'clock on THURSDAY, THE 17TH MARCH, 1910, for the supply and delivery of Timber, Hardware, Electrical and various other supplies required for use on the Sault Ste. Marie Canal for the year 1910.

Specifications, forms of Tender and full information may be obtained at the office of the Superintending Engineer, Sault Ste. Marie, Ont., on and after Monday, the 28th February, 1910.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 28th February, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 11

Tenders For Gaul Heating

Tenders will be received by the undersigned up to noon on SATURDAY, MARCH THE 19TH, 1910, for the heating of the County Jail at the Town of Barrie, according to plans and specifications which may be seen on application to H. W. Beardsley, County Clerk's Office, Court House, Barrie. All tenders to be sealed and marked "Tenders for Gaul Heating" and addressed to

C. J. PICOTTE,
Chairman County Property Committee,
Box 128 Penetanguishene, Ont. 11

Tenders for Dredging

Sealed tenders addressed to Thomas Richardson, Clerk of the Township of March, South March, Ont., will be received up to 12 o'clock noon of the 16TH DAY OF MARCH, 1910, for Dredging Work on the Carp River within the Townships of March and Huntley, in the County of Carleton, to be done in accordance with the report, plans, profiles, specifications and estimates of J. H. Moore, C.E., filed with the Township of March, on the Carp River, Drainage Improvement Scheme. Tenders must be accompanied by a marked cheque for \$1,000.00, payable to the Treasurer of the Township of March. The above plans, profiles, specifications, etc., may be inspected and full particulars and form of tender obtained from J. H. Moore, C.E., Smith's Falls, Ont., or from the Township Clerk, South March, or at the office of Messrs. Beaumont & Armstrong, 25 Sparks Street, Ottawa.

The lowest or any tender received not necessarily accepted.

THOMAS RICHARDSON,
Clerk,
South March, Ont. 10

TENDERS

University of Saskatchewan

Sealed tenders, addressed to the undersigned, will be received not later than the 21ST DAY OF MARCH, 1910, for the different trades required in the erection of the College Building, Students' Residence, Power House, Live Stock Pavilion, Agricultural Engineering Building, on the University Grounds in Saskatoon.

The right to reject any or all tenders and to waive any defects or irregularities therein, is to be at the discretion of the Board of Governors.

Tenders are to be made on forms furnished by the architects.

Each tenderer is to enclose with his bid an accepted cheque for 10 per cent. of the amount of his tender, which deposit will be forfeited if the tenderer fails to execute the contract and bond when requested, and will be returned to the unsuccessful bidders when the contract is signed.

Plans and specifications may be seen at the office of the University, Saskatoon, Sask., or at the office of the Architects, David R. Brown and Hugh Vallance, Canada Life Building, Montreal, Que., and at the rooms of the Builders' Exchange, Winnipeg, Man.

WALTER C. MURRAY,
President.
Saskatoon, Sask., February 21st, 1910. 11

Plant for Sale

For Sale:—The following Second-Hand Plant, located at Durham, Ont., or portion thereof. The whole lot at a reduced price,

25 No. 8 American, square pan, wooden hub, Wheel Scrapers.

28 No. 8 K. & J., round pan, iron hub, Wheel Scrapers.

6 No. 3 Western, square pan, with doors, Wheel Scrapers.

7 No. 2, K & J, round pan, iron hub improved, Wheel Scrapers.

55 Doors and Gates, for No. 3 Wheel Scrapers.

27 Slush Scrapers.

15 Light and Heavy Plows.

Located at Three Rivers, Que.

One Large Travelling Clam Shell Derrick.

One Steam Pile Hammer (Oram Patent), with Steam Hose.

One Thomas Automobile (Model 31), 60 h.p., thoroughly overhauled and painted; location, Toronto.

THE RANDOLPH MACDONALD CO., LIMITED,
14 Crown Life Building, Toronto, Ont.

Position Vacant

WANTED.—ARCHITECTURAL DRAFTSMAN, one accustomed to general office work. State experience and salary expected. Box 940 Contract Record, Toronto.

WANTED.—MECHANICAL ENGINEER, to manage Stone Crushing Business, liberal salary to a good man. Apply Box 935 Contract Record, Toronto. 10

Miscellaneous

ALLAN W. HORWOOD, Registered Architect, has opened an office in the Bank of Ottawa Building, Bank street, Ottawa, Ont., and will be glad to receive manufacturers' catalogues. 10

AGENCIES WANTED.—Three young men going to Vancouver, B.C., to open a manufacturing agency office are open for some good lines in the Mechanical, Electrical and Construction business. Address Box 937 Contract Record, Toronto. 10

Miscellaneous

(Continued from page 25.)

portion, \$520; court house and jail, \$1,000. Total estimates 1910, \$99,530.

Montreal, Que.

At a general meeting of the Catholic architects of Montreal it was decided to collaborate in the preparation of plans for special decorations of Montreal streets in connection with the Eucharist Congress, to be held in this city about September 11th. The general scheme for this work will be prepared by Joseph Venne, architect, 5 Beaver Hall Hill, who will apportion the work amongst the different architects.

Recent building permits include: L. Fournier, 2155 St. Denis street, house containing three dwellings, \$2,000; W. Maille, 2228 St. Hubert street, house containing four dwellings, \$2,000; A. Leger, 198a Notre Dame street, house containing two dwellings, \$2,000; N. Belanger, 1457 Hotel de Ville, house containing three dwellings, \$2,500; Chas. Dagenais, 135 Dufferin street, house containing four dwellings, \$3,500; H. Plante & Company, 2881 St. Hubert street, house containing three dwellings, \$2,200; Mrs. G. Cote, 261 Amherst street, alterations to store and dwelling, \$3,000; M. McAuley, 225 St. Patrick street, factory building, \$2,000; E. Daoust, 1813 St. Denis street house containing two dwellings, \$2,000; S. Anovitz, 1239 St. Hubert street, two houses containing six dwellings, \$8,000; G. Poliquin, 1798 Park avenue, apartment house, \$10,000; A. Mainville, 833 a Albert street, house containing three dwellings, \$2,000;

J. Borderie, 3331 St. Hubert street, house containing three dwellings, \$2,000.

Victoria, B.C.

The estimates brought down foreshadow an expenditure of \$7,738,257 for the coming year. Of these, \$4,256,000 is for public works; \$250,000 for the Second Narrows bridge, \$200,000 for the new Vancouver court house, and \$100,000 for the municipality of Paint Gray.

Permits issued recently include: Messrs. Taylor Mills Company, a dry kiln and boiler house, Government street, \$3,500; J. Maynard, two dwellings, Heywood avenue, \$2,500 each; H. Calwell, stable and dwelling, Cormorant street, \$5,000; Mrs. McLellan, dwelling on Pandora avenue, \$2,600.

Vancouver, B.C.

Tenders will be invited for two motor wagons for the scavenging department to cost approximately \$11,000. W. A. Clement, city engineer.

Vancouver, B.C.

Recent building permits include: W. W. Walsh, frame apartment house, Barclay street, between Bidwell and Cardero, \$13,000; E. R. McConkey, 2042 Eighth avenue west, two houses, \$4,000; Mr. Lewis, 475 Thirteenth avenue west, \$3,000; Wicker & Ives, 1933 Fifth avenue west, \$2,000; J. D. Murray, 1763 Fifth avenue west, \$2,000; C. Gray, 937 Woodland drive, \$3,200; J. Turnbull, 36 Eleventh avenue west, \$3,000; A. Lockheart, 1581 Tenth avenue east, \$2,000.

Winnipeg Beach, Man.

Tenders addressed to N. Tossier, secretary, Department of Public Works, Ottawa, Ont., will be received until March 24th for the construction of a pile protection pier. Plans, etc., at Public Works Department and at office of A. R. Dufresne, District Engineer, Ashdown Block, Winnipeg, and on application to the local postmaster.

Winnipeg, Man.

Recent building permits include: M. Le Page, apartment block, Balmoral, between Ellice and Sargent, \$18,000; Lutheran church building, northwest corner Manitoba avenue and Brown street, \$2,400.

Ottawa, Ont.

Tenders addressed to W. W. Corry, Department of the Interior, will be received until March 15th for the supply of 150 cast iron monuments for use in marking the international boundary.

Picton, Ont.

The village of Bloomfield has carried a bylaw to raise \$3,000 to further improve the streets and walks and purchase gravel pits and road machinery.

Regina, Sask.

On March 24th bylaws will be voted on here as follows: — Albert street subway, \$41,000; sewerage and waterworks extensions, \$10,000; exhibition buildings, \$25,000; market house, \$16,000.

The following is a list of debentures purchased by Nay & James for February: Village of Fairlight, \$1,200, ten instalments, 5 1-2 per cent.; town of Davidson, Sask., \$17,000, twenty instalments, 5 1-2 per cent.; village of Semans, Sask., \$2,000, fifteen instalments, 6 per cent.; Sinclair S. D., Man., \$6,000, twenty instalments, 5 per cent.; Carmangay S. D., Alta., \$15,000, twenty instalments, 6 per cent.; Magrath S. D., Alta., \$4,000, thirty instalments, 5 1-4 per cent.; Monarch S. D., Alta., \$6,000, twenty instalments, 5 1-2 per cent. Small school issues amounting to \$15,000.

Toronto, Ont.

Included in the supplementary estimates of the provincial treasurer are the following: New wing at Osgoode Hall, \$50,000; colonization roads, \$464,000; other public works, \$37,940.

Recent building permits include: Ada E. Miller, 1 pr. brick dwellings, on N.S. Lapin, \$4,000; Dr. J. F. Gallanough, 7 att. 2 sty. brick stores & dwellings, cor. Brunswick & Bloor, \$24,000; Robt. S. Unwin, alt. to dwelling, 378 Markham, \$5,600; Mac-Millan Publishing Company, 1 sty. brick addn. to warehouse on 70 Bond street, \$5,000; R. Nancarrow, 2 1-2 sty. brick dwelling, on W. S. Medland, \$3,000; B. Sinclair, alt. to stores & dwellings, 1477-1479 Yonge street, \$3,500; H. S. Howland Sons, alt. to add. to warehouse, 136 Front St. W., \$5,000; A. H. Garrett, 3 sty. brick theatre, 2 stores & 3 dwellings, attached, 618 Bloor St. W., \$12,000; James Gibson, 3 pr. semi-det. 2 1-2 sty. brick dw., E. S. Dovercourt, \$18,000; R. A. Shields, 1 pr. semi-det. 2 sty. brick dwellings, 36-38 St. Clair, \$4,500; H. E. Thomas, 1 pr. semi-det. 2 sty. brick dwellings, W. S. St. Clarens Ave., \$4,000; H. Metcalfe, 2 det. 2 sty. brick dwellings, 498-498 St. Clarens Ave., \$4,000; J. Rydall, 3 sty. brick carriage shop, on 527 Bloor St. W., \$3,500; H. M. King, 1 pr. brick dwellings, E. S. Sunnyside, \$4,600; Jas. Hepburne, 1 pr. semi-det. 2 sty. brick dwellings, 302-304 Wallace, \$4,000; G. F. Allen, 2 sty. frame dwelling, W. S. Munro Park Ave., \$3,000; W. Howell, 1 pr. semi-det. 2 sty. brick dwellings, 2366-8 Queen E., \$4,000; Parisian Laundry, 3 sty. brick addn. to laundry, N. W. cor. King & Portland, \$11,000; L. Purdy, 2 sty. brick store and dwelling, N. E. cor. Leslie & Doel, \$3,200; E. W. Wickham, 2 sty. & attic brick dwelling, near Queen St., on W. S. Beach avenue, \$4,000; A. Henderson, 2 detached 2 sty. brick dwellings, near Bloor, on E. S. Brock, \$5,000; A. H. Wagstaff, 2 sty. brick dwelling, near Gerrard, on W. S. Greenwood, \$3,500; J. A. Love, 1 pr. semi-det. 2 sty. brick dwellings, N. S. Doel avenue, \$5,000; Toronto Show Case Company, 2 sty. brick factory, E. S. Carlaw Ave., \$32,000; Walker Parker Company, 4 sty. brick addition to factory, corner Wellington & Emily, \$7,000; J. E. Peterkin, 1 pr. semi-det. 2 sty. brick dwellings, St. Clarens avenue, \$4,000; Tompkins & Murphy, 1 pr. semi-det. 2 sty. frame dwellings, on 78-80 Kingston road, \$3,000; F. H. Swallow, 2 sty. brick store, near Summerhill, on Yonge St., \$3,000; A. A. Patterson, 2 sty. brick dwelling, on S. S. Radford, \$3,600; W. B. Begg, 2 sty. & attic brick dwelling on Lynwood avenue, \$6,500; W. Caldwell, 1 pr. semi-det. 2 sty. brick dwellings, 1064-1066 Dovercourt road, \$4,000; G. D. Lovegrove, 2 sty. & attic brick dwelling and a stable, 4 High Park avenue, \$6,000; G. E. Case, 2 det. 2 sty. & attic brick dwellings, E. S. Sunnyside, \$7,000; Batts, Limited, 2 sty. brick carpenter shop, 374 Pacific avenue, \$9,000; T. W. Robinson, 2 y-2 sty. brick dwelling, St. John & Lansdowne, \$2,600; G. McWilliams, 3 sty. & attic brick dwelling, on 118 Armstrong avenue, \$2,800; J. B. Zavitz, 2 1-2 sty. brick dwelling, S. S. West Marion street, \$2,500; R. Rolson Company, 2 1-2 sty. brick dwelling, 317 Rusholme road, \$4,000; R. S. Tickner, 1 pr. semi-det. 2 sty. brick dwellings, E. S. Dovercourt, \$4,000; Watt Milling Company, 2 sty. corrugated iron lumber shed & carpenter shop, N. W. cor. Orman & Osler, \$4,500; James Kyle, 3 det. 2 1-2 sty. brick dwellings, N. S. Galley, \$7,600; W. P. Graham, 1 pr. semi-det. 2 sty. brick dwellings, E. S. Emerson, \$4,000; Colman & Pearson, 3 att. 2 sty. & attic brick dwellings, N. W. cor. Macdonnell & Fern, \$7,500; N. Snow, 3 att. 2 sty. brick

dwellings, 40 Wallace avenue, \$6,000; A. E. Armstrong, 2 1-2 sty. brick dwelling, S. S. Farnham, \$3,500; Colman & Pearson, 1 pr. semi-det. 2 sty. brick dwellings, N. S. Fern, \$4,000; Jess Applegath, 2 sty. & attic brick dwelling, cor. Glen road & Hyland, \$20,000.

Vancouver, B.C.

A permit has been issued for the Bauer block, southeast corner of Hastings and Howie streets, \$225,000. The plans have been altered, the foundation now existing at the corner having been erected on plans for a hotel block, while the revised plans contemplate an office building. The structure will be eight storeys in height, and of reinforced concrete type of construction. Other permits were as follows:—A. M. Sharp, 1616 Alberni street, \$2,000; Mrs. G. R. Maxwell, 355 Twelfth avenue, \$4,500; G. Coulson, 524 Seventh avenue east, \$2,600; E. J. Escott, 1537 Keefer street, \$2,500; Capt. French, a six storey warehouse, Alexander street, between Carrall and Columbia, \$24,000; Mr. H. G. Elliott, apartment house on Pendrill street, between Nicola and Broughton, \$16,000; G. Stewart, 2237 Oxford street, \$2,000; W. Cook & Company, 1523 Bismarck street, \$2,000; J. Ferguson, 1136 Tenth avenue west, \$4,500; Brackman-Ker Company, C. P. R. reserve, \$3,000; W. Cooke, 1524 Bismarck street, \$2,000; Bacon & Mugford, 2249 Memlock street, \$3,000; Mark Knowlton, 829 Fourteenth avenue east, \$2,500.

AWARDED.

Collingwood, Ont.

The Collingwood Shipbuilding Company closed a contract with the Playfair Company of Midland for a ten thousand ton steel bulk freighter. The contract calls for delivery in time for the fall trade.

Kingston, Ont.

The County of Frontenac awarded the contract for cement to W. B. Dalton & Sons, of Kingston, at \$1.75 per bbl. Other tenders were: J. K. Spooner, Glenburnie, sand, at 80 cents per c. yd. on sleighs and \$1 on wagon; accepted. A. Tait, Collinsby, crushed stone, at \$1.15 per s. yd.; accepted. S. Anglin & Co., cement, at \$1.90 per bbl.; rejected. W. J. McKendy, sand, at 95 cents. per yd; rejected.

Montreal, Que.

The contract for the erection of stables on Redpath avenue for Mr. C. J. McCuaig has been awarded to D. J. Loomis. Messrs. MacVicar & Heriot, architects, 104 Union avenue.

Toronto, Ont.

McColl Brothers were awarded a contract for engine oil required by the city at 24 cents per imperial gallon, while the Ontario Soap & Oil Company received the contract for cylinder oil at 40 cents.

Winnipeg, Man.

The tender of Messrs. Mussons, Ltd. for the squeegees for street cleaning was accepted by the Board of Control.

W. O. Lee, Winnipeg, has been awarded the contract for the supply of cement at \$6,405 per No. 100 ex. sacks.

St. Mary's Hardware Company, Limited, St. Mary's, Ont., J. Walter Pearl retiring. James McFayden Lumber Company, Dryden, Ont., it is stated, has been succeeded by David Anderson.

The Annex Hardware Company of St. Louis, Que., whom we reported as having assigned in the issue of February 2nd, dissolved partnership in January last, and are still doing business under the above name and have registered accordingly.

New Companies

Kent Light, Heat & Power Company, Limited, Chatham, Ont., incorporated, capital \$300,000. Incorporators, G. H. Kilmer, J. A. McAndrew and W. H. Irving, barristers, all of Toronto, Ont.

The South Huron Telephone Company, Limited, Zurich, Ont., incorporated, capital \$25,000. Incorporators, E. Zeller, publisher, B. A. Campbell, physician, both of Zurich, and others.

The Sharp Construction Company, Limited, Montreal, Que., incorporated, capital \$50,000. Incorporators, W. R. Lerous, clerk, C. G. Mackinnon, J. T. Hackett, advocates, both of Montreal, Que.

The Montreal Electric Company, Limited, Montreal, Que., incorporated, capital \$40,000. Incorporators, W. B. Shaw, electrical engineer, E. J. Gunn, electrician, and others, all of Montreal, Que.

B. J. Coghlin Company, Limited, Montreal, Que., capital \$200,000, incorporated to carry on the business of manufacture of and dealers in iron, steel, railway and street railway supplies, etc., Incorporators, B. W. Palin Coghlin, and G. K. Coghlin, merchants, N. J. Dawes, brewer, and others, all of Montreal.

Toronto Structural Steel Company, Toronto, Ont., capital \$250,000. Incorporators, Andrew Dods and Mervil MacDonald, barrister, both of Toronto.

Woodbridge & Vaughan Telephone Company, Limited, Woodbridge, Ont., capital \$10,000. Incorporators, Peter D. McLean and Charles L. Wallace, merchants, Woodbridge.

Victor Steel & Wood Products Company, Limited, Walkerville, Ont., capital \$40,000. Incorporators, James Harmon Flinn, attorney, Ned. G. Begbie and Franklin T. Chapman, manufacturers, all of Detroit, Mich., and Edward C. Kenning, barrister, Windsor, Ont.

La Campagnie des Carrieres Fetix Labelle, Saint Francois de Salles, Que., capital, \$20,000, incorporated to carry on the business of building contractors. Incorporators, Esioff L. Patenaude, advocate, Louis J. Boileau, notary, both of Montreal, Que.

The Manitoba Gazette gives notice of a charter granted to the "Stonewood Flooring Co., Ltd., capital \$40,000. The directors are A. K. Dysart, D. N. Wemyss, and others.

Business Notes

The Western Lumber Company, Montreal, Que., have dissolved.

F. Gilbert, contractor, Westmount, Que., is stated to have assigned.

Fernel & Wilson, contractors, Montreal, Que., have dissolved.

James A. Moore, saw mill proprietor, Waterford, Que., deceased.

Lynch & Sharpe, contractors, Montreal, are stated to have assigned.

Western Lumber Company, Montreal, Leon Gagne, Jr., registered.

J. Morrison, contractor, Montreal, Que., is stated to have assigned.

Leclair & Bourque, lumber, Ely, Que., it is stated, have dissolved.

The Structural Tile Company, Montreal, Que., Jas. Stinson registered.

The Pearce Construction Company, Montreal, Que., have dissolved.

Robert Nicholson Lumber Company, Strathroy, Ont., Robert Nicholson, deceased.

Alexis Gagnon, contractor, Montreal, Que., is stated to have assigned.

Letourneau & Camire, lumber merchants, D'Israeli, Que., have dissolved.

H. G. Wyatt, Armstrong, B.C., has sold out his saw mill to T. K. Smith.

Claridge & Hillock, lumberman, South River, are stated to have assigned.

Olds Gas Power Company, Limited, Sherbrooke, Que., has been incorporated.

A. T. Short, Limited, Cobalt, Ont., lumber dealers is said to have assigned.

E. Authier & Company, contractor, Montreal, Que., is stated to have assigned.

Greenberg & Company, plumbers, Montreal, Que., Louis Greenberg registered.

Leger & Company, quarry dealers, St. Vincent de Paul, Que., have dissolved.

E. Brunet & Genest, contractors, Montreal, Que., are stated to have dissolved.

J. B. Reid & Company, contractors, Ste. Agathe, Que., Mrs. J. B. Reid registered.

J. J. Hislen, lumber merchant, Delmas, Sask., has sold to J. C. Mann & Company.

F. Nicolas & Company, electricians, Montreal, Que., Frank Nicolas registered.

Duranceau & Duranceau, bricklayer contractors, Ville Emard, Que., have registered.

H. Auclair & Company, plumbers and manufacturers, Montreal, Que., have dissolved.

Duquette & Denis, general contractors, Montreal, Que., Wilfrid Duquette and Jos. Denis registered.

Rodgers, Wray & Greenway, plumbers and tinsmiths, Grimsby, Ont., have dissolved partnership.

The Galvin-Watson Lumber Company, Limited, Wadena, Sask., it is stated, have been succeeded by C. A. Carpenter.

Canadian Sheet Steel Corporation, Limited, Morrisburg, are stated to have assigned to E. R. C. Clarkson, Toronto.

Frank Munro & Company, contractors, Montreal, Que. Michael Dohen, Leslie C. Thompson and Frank Munro have registered.

J. C. Graham Company, Limited, sash and door manufacturers, Winnipeg, Man., have increased their capital from \$50,000 to \$100,000.

Simpson Brick Company, Toronto, Ont., succeeded by Hamilton Brick Company, Limited. Business will be continued in Toronto as a branch.

The B. C. Gazette gives notice of the incorporation of the following companies:—The Elko Water, Light & Power Company, Limited, capital \$40,000; Fort George and Alberta Telephone & Electric Company, capital, \$250,000; National Paper Mills, Limited, capital \$250,000; the Portland Canal Water & Power Company, Limited, capital \$25,000; the Prince Rupert Telephone Company, Limited, capital \$25,000; International Electric Company, Limited, capital \$1,000,000; Pioneer Lumber Company, Limited, capital \$75,000; Cunningham-Sanderson, Limited, incorporated to carry on a general hardware, building or contracting business, capital \$35,000; the Hodgson Plumbing & Heating Company, capital \$25,000; Merritt Water, Light & Power Company, capital \$25,000; the Standard Hardware Company, Limited, capital \$30,000. The B. C. Gazette also gives notice of the granting of the following license:—The Canadian Heating & Ventilating Company, Limited, head office, Owen Sound, provincial office, Vancouver, capital \$200,000.

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Fair Play in the Contracting Field

One of the most potent factors in the affairs of men is the principle of fair play. Upon a strict observance of this principle depends, absolutely, the success of the individual or community. Taking it for granted that the disposition of the majority is in accord with this sentiment, and that, in business life, it is the desire of the majority to offer a fair field to all who are rightly and legitimately entitled to compete with them, one is somewhat at a loss to understand the action of such a responsible body as the Toronto city council in awarding a large contract for cast iron pipe to a local concern, in face of a tender, over \$200 lower, from a Glasgow firm. It impresses one as being a violation of the aforesaid principle, and to him who looks a little further ahead than the rest, must occur the question: "How can we hope to maintain satisfactory relations with the British manufacturer if we accord him such scurvy treatment?" It is manifestly unfair to call for bids from all quarters and then ignore those from outside sources. If Canadian firms, and Canadian firms only, are desired to figure, surely it is only common decency to advertise accordingly.

When the award in question was under consideration the argument was adduced that it would be more satisfactory to have the pipe manufactured in Toronto, under the supervision of the city, than have to put up with a "Scotch inspection." This assumes either inability on the part of the great British firms to complete an order according to given specifications or else a certain amount of incompleteness and ambiguity in the specifications themselves. Neither of which suppositions, happily, are to be taken seriously. In some instances it is perfectly apparent that the best interests of the city would not be served in the acceptance of the lowest bid, and it is possible that there may have been some good reason for the rejection of the Glasgow firm's tender; but in all such cases, if we are to maintain a reputation for acting

on the square, there must be a proper explanation made. In the award under discussion no elucidation is given, and the only conclusion to be reached by the outsider is that the city was actuated entirely by local sentiment.

As for the precedent established, it is a dangerous one and tends to monopoly. Under such conditions outside competition will cease to exist in a very few years. Is it to be expected, for instance, that the rejected firm in this case will waste time computing further tenders? The expense incurred and time involved in estimating is a vital consideration with such a concern, and they are too wide-awake to compete where failure is a foregone conclusion.

We cannot afford to cut off outside competition, and at this stage of our history, at any rate, discrimination against the British manufacturer is particularly ill-timed. We need his competition and we want him to compete with us in a fair field where no favors are given other than are compatible with reason.

Obscurity of Brick Interests

In these days of competition one cannot help wondering how it is that the brick manufacturers are contented to remain in such an obscure position as regards publicity. Surely the energetic manner in which the Canadian Cement & Concrete Association is working in the interests of the convention and exhibition at London, March 29-April 1, should provide them with food for reflection. The cement users are entitled to much credit for their enterprise. They have developed business in a manner that compels admiration and they have shown themselves to be business men as well as manufacturers. On the other hand, there has been an inclination on the part of the great bulk of the brick people to evade vigorous competition and offer a sort of passive resistance to the oncoming of their aggressive rivals.

Active competition of the kind put up by the cement people must be met with a similar policy. Where charges are laid against an article, they must be met and disproved if the article is to remain a negotiable factor in construction. We do not hold a brief for the brick manufacturer. Rather is this intended as a friendly criticism of the position in which he is contented to remain. And we do not attempt to extol the merits of brick. Indeed, so obscure have the manufacturers of the article allowed it to become, that one is tempted to ask whether it has any merits at all.

During recent years constantly increasing attention has been given to the selection of materials of construction. Availability, cost, durability, fire resisting qualities and the general properties of materials of construction are now carefully considered in the preparation of designs for the majority of structures, and to this fact, doubtless, is due partly the increased use of concrete and the decline in brick. But in all this we are influenced by the argument of those interested in concrete, and this is only natural, for it is their side of the story that we hear the most.

Permits issued at Lethbridge, Alta., during 1909 totalled \$1,268,215, an increase of no less than 247 per cent. over the total for 1908, which was \$365,495. Writing as to prospects for the current year, Mr. H. W. Meech, building inspector, says: "Prospects for the coming year could not look better. There is a good demand for all kinds of accommodation, and with a large influx of settlers expected in the spring, it is only natural to suppose that the building of 1910 will be considerably greater than that of 1909."

Interesting Methods in Foundation Work

As Employed by the Contractors at the New Windsor Street Station, Montreal—Introduction of the Chicago System

The extensive contract for the construction of foundation for the new Windsor Street Station, which is being carried out by the Bishop Construction Company, of Montreal, associated with the New York Foundation Company, embodies the use of interesting methods which have not been previously employed in Montreal.

The new Canadian Pacific Railway station will front on Windsor street, just south of the present Windsor street building, and together with the train sheds which

satisfactory way of sinking the caissons. For this work two-inch spruce sheeting, tongued and grooved to a bevel, is used, the method of procedure being to dig a circular hole, of varying diameter, depending on the stress which the pier would eventually have to carry. When a depth of six feet is reached, the sheeting is placed tightly in position and firmly fastened, about one foot from each end, with two wrought iron bands. These bands, three inches wide by half an inch thick, are in two sections and



Showing the novel Method of Procedure Adopted by the Bishop Construction Company in the Foundation Work for the New Windsor Street Station, Montreal.

will be erected, will occupy an area of approximately 65,000 square feet. The early construction was placed under way by Contractor C. E. Deakin, of Montreal. The present contractors commenced operations on the completion of the work about November 27th last. It was the wish of the railway company to finish the foundation work in time to commence the general contract of erecting the station in the spring. In furtherance of this an arc lighting system was installed on the premises and the work has been proceeded with steadily day and night throughout the winter months.

The method adopted by the contractors in sinking the open caissons for the concrete piers is, as before stated, new to Montreal; in fact, it may be said that the system is practically new to Canada. What is known as the "Chicago method" of foundation construction has been used for the most part, and this has proved a very

are firmly bolted into the required positions. With the first six feet of sheeting in place, the work of excavating another similar section is proceeded with. This process is continued until solid rock is reached. Under this method of construction the diameter of the hole remains the same at both top and bottom. On completing the caisson, the work of concreting is commenced and the iron bands are gradually removed as their usefulness gives place to the solid concrete.

In removing the earth from the pits, a series of driving engines are employed and around these are passed a system of endless cables. In turn, these cables are passed around a chieve keyed to the end of a shaft. This shaft is held in position by a tripod standing approximately twelve feet high, with legs fixed about eight feet apart on the ground. To the top of the tripod a snatch block is attached and the buckets containing the earth



General View of the Site of Operations

are hoisted by means of a rope passed over a nigger head, keyed to the constantly revolving shaft. As a rule, each driving engine is arranged to operate a row of eight tripods, and by this means an efficient method of raising the excavated earth is arranged for. These tripods are erected on platforms which cover the entire area of the hole.

Occasionally, sections of ground were found where the Chicago method could not be employed on account of the soft nature of the soil. In these places it was necessary to resort to the ordinary method of driving the sheeting into place. For the latter style of caisson, Georgia pine sheeting was used. At the lower south end, where it was found necessary to place two piers quite close together, one large square caisson, with dimensions of about 20 feet by 8 feet, was sunk.

The question of contending with the water (apparently the seepage from the mountain) which drained into the holes, proved an important factor of the work. Two sump pits were constructed when the work of construction was commenced, and it has been found necessary to keep hydraulic pumps in continual operation. For this purpose alone, about 75 horse power is required. In special cases where the infiltration of water proved a serious drawback, the steam syphon method of removing

the water was resorted to and in that manner the engineers overcame their difficulty.

In all, the Windsor Station contract included the construction of 245 piers, which have averaged a depth of 35 feet. At the present time about 230 of these piers have been finished, and the work of the foundation contractors is rapidly nearing completion. The concrete mixture used, varied with the nature of the calculated stresses upon the piers. For the train shed piers at the west end of the site, the concrete consisted of one cement, three sand and six stone, while for the more important station piers, one cement, two sand, and four stone was used.

Valuable Papers at the Good Roads' Convention

The ninth annual convention of the Ontario Good Roads Association, which was held in Toronto, March 2-4, was attended by upwards of 400 delegates. The programme of papers was a most extensive one. A selection of those of the greatest interest to our readers will be found elsewhere in this number. Particularly interesting are the comparisons of steel and concrete bridges. The respective merits of these structures were discussed very ably by Messrs. Frank Barber, C.E., County Engineer of York; A. W. Connor, C.E., Toronto, and Jas. A. Bell, St. Thomas, Ont., City and County Engineer. The cost data on road building, given by Mr. C. R. Wheelock, Orangeville, Ont., Engineer of Peel county, also furnishes information of considerable value to those connected with municipal work of this kind.

At the election of officers at the Friday session, Mr. W. H. Pugsley, of Richmond Hill, Ont., was elected president; Mr. Thos. L. Kennedy, of Cooksville, vice-president, and Col. J. E. Farewell, Whitby, Ont., secretary-treasurer. The executive was chosen as follows: Messrs. R. H. Jupp, Orillia; J. Hall, Prescott, Ont.; H. W. McKay, County Clerk, Elgin, Ont., and L. A. Hamilton, Lorne, Ont. Next year's convention will again be held in Toronto in the first week of March.

Changes from Specifications

Among the most annoying features in connection with the building industry are the changes that are so frequently demanded of a contractor in the erection of a structure. These are so wide in character, and at times so unreasonable, that there is some cause for the builder to grow impatient and become worried at the manner of the average owner. There is cause for this seemingly unreasonable action, and this can in nearly every instance be attributed to the lack of adequate knowledge that the owner possesses with regard to such matters. There are, however, some people who are not content with anything, and who can never be pleased with what they contract for, even though the plans be made after their own ideas.

This causes some difficulties at times that are not calculated to improve the disposition of the contractor, and still they must be met and acted upon in a reasonable way, because there is hardly any way to escape them. Let us take the average home builder, for instance. Many of them have at least a fair idea of what they want in the way of a house. These ideas are sometimes gleaned from printed plans, from another house they have admired, or from their own preconceived ideas of what will be both modern, convenient and still not be above the average cost for such structures. Sometimes they are deceived in the actual cost of a structure



Showing One of the Five Square Caissons Sunk for the Foundation Piers.

from an ignorance of such undertakings and a lack of definite knowledge as to the cost of either labor or materials.

One cause for this state of affairs is due to the fact that to-day we find many plans and estimated costs being published in literary magazines that are in many instances very much at variance with the actual cost of such buildings. These plans, while they are legitimate in so far as they go, do not make possible the cost in all sections of the country, and what can be had in one locality at a stipulated price for either labor or material cannot be obtained in another section. Then the market on materials is continually undergoing changes, and these have to be considered by the prospective builder, and may make a considerable difference in the ultimate cost of the structure. In many cases, to make them attractive, the price is put very low, and there is not enough allowed for either materials or labor, so that the builder will be deceived when the actual cost is shown him.

It seems to be a serious error to continue publishing plans that are impossible, from the standpoint of actual design, as some are, and from the point of economy, which is apparently the chief object of the idea. Where the plans are published in a trade magazine, a publication that goes into the hands of the trade only, there is little danger of there being any unpleasant experiences from the above sources. The average contractor can easily ascertain the accuracy of the estimated cost of such buildings, and can apply the same to the conditions that obtain in his locality. He is not infrequently benefited in this way, as the plans make possible to him some newer ideas that he has not been able to work out himself.

There are some safe rules that can be followed to advantage by every contractor and builder, and these should be noted and heeded, that he may be enabled to offset difficulties that are at times not of the most affable nature. If a prospective builder comes to you with plans for a home, particularly if they have been secured from an advertised estimate, be sure to go carefully over the items, and to make no estimate yourself until you have studied the same in every particular. There is quite likely to be a difference in your figures and those advertised, in favor of the latter, but this will forewarn the prospective customer that he has been deceived, and that it will be impossible to construct the building at the advertised price. The difference in cost can be explained and this will obviate any differences that might arise when the work has been undertaken at a stipulated price. This is a safe rule to adhere to, and one that should be noted by every contractor in advance.

Then you should have it understood that the number of changes, should there be any, aside from what are specifically stated in your contract, are to be paid for at a reasonable price.—Warfield Webb, in the "National Builder."

Concrete Highway Bridges

"Concrete Highway Bridges" was the topic of an interesting address at the recent Good Roads Convention, in Toronto, by Mr. James A. Bell, C.E., St. Thomas, Ont., City and County Engineer. At the outset, Mr. Bell made a comparison of the respective merits of steel and concrete bridges. The modern steel bridge of riveted structure, with concrete flooring, is, in Mr. Bell's opinion, the best steel bridge that can be built. Mr. Bell pointed out that an important factor to be taken into consideration is the cost of maintenance. The steel bridge requires care and attention and painting every few years, whereas this is not necessary in the case of the concrete structure. There is another point. The

steel bridge is at its strongest the day it is opened for traffic, whereas the concrete is then at its weakest and improves afterwards. Mr. Bell said that the question of reinforcement has revolutionized concrete bridge construction. Many bridges can be erected of concrete and steel and not of concrete alone. This applies particularly to beam and flat top bridges.

The necessity for perfect foundations, particularly in arch bridges, was emphasized by Mr. Bell, who pointed out that beam bridges of 40-foot span and under can be constructed at less cost than arch bridges. The same degree of care is not essential in the foundation work for the beam bridge. A slight settlement in this class of structure is not of any great consequence, but would be disastrous in the case of an arch bridge. Speaking of flat top bridges, Mr. Bell contended that properly reinforced, this class of structure can be employed up to 16-foot span.

Mr. Bell emphasized the need for proper inspection in the erection of concrete structures. Men placed in charge of this work should have an intimate knowledge of the strength of cement and of the method of working it. They should be well posted on the various materials used under their supervision and be able to read plans satisfactorily. Mr. Bell gave an instance from his own experience. Quite recently two contractors approached him and said that they would be able to submit a lower figure on a certain concrete structure if they had the assurance of a qualified man to inspect the work. Asked as to where qualified inspectors could be obtained, Mr. Bell expressed the opinion that third year science men were the most successful and desirable for the work.

Another phase of the subject discussed by Mr. Bell was the desirability of studying artistic effect. Strength and utility were certainly important features to be considered, but it was most desirable to have a "thing of beauty" as well.

In regard to the mixing of concrete, Mr. Bell pointed out how essential it is to have proper quantities and the right consistency, so as to ensure a perfect adhesion between the concrete and the steel. Where this is obtained, the concrete is practically waterproof; otherwise, the water percolates through, rusts the steel and minimizes the strength of the structure.

Mr. Archibald McGillivray has been appointed Good Roads Commissioner for the Province of Manitoba.

Mr. E. I. Sifton, city electrical engineer of London, Ont., has resigned. Mr. D. P. Roberts, assistant engineer, has been appointed temporarily to the position.

Fernie, B.C., was practically rebuilt in 1909, and extensive building operations are planned for the present year. The construction of 1,000 additional coke ovens has been mooted. One, and possibly two, of the wholesale business houses will increase their warehouse capacity. There will probably be many improvements of public works and the Dominion estimates make provision for a new armory building. A separate high school will be guaranteed next September.

The legal department of the British Columbia Electric Railway has received instructions from the management to proceed in the courts against a firm of contractors at New Westminster, who were engaged on municipal improvements and who, it is alleged, fired a blast that broke a high tension wire, damaged a transformer to the amount of \$2,000, and by so doing deprived the city of light and power for an entire day. The company states that its employees were not notified to be on hand and the proceedings will take the form of criminal as well as civil action.



General View of Works from Transmission Line, in the Winnipeg Municipal Power Development Scheme

Winnipeg's Power Development Progress

The work upon the city's power site at Point du Bois was begun under contract of Feb. 3rd, 1909, previous to which date the site only had been cleared, and 25 miles of standard gauge railway had been built to provide proper access. Fairly good progress has now been made on the canal excavation and on the construction of the concrete dams, and, since the beginning of winter, the work of closing the river by means of a rock fill has been prosecuted, and already the upper waters have been raised several feet. The natural elevation of the upper river will be raised, by the perman-



Excavation for Power House

ent works, 13 to 15 feet, giving to the total waterfall developed a head of 45 feet net, all hydraulic clauses having been considered.

The construction of the power house has been carried on since November within a huge frame shed, and the concrete foundations which have been laid to date have been placed under conditions almost ideal for this work. The contractors, who are manufacturing the equipment, are making energetic progress, and it is expected that deliveries of machinery will begin in August next.

The transmission line construction is fairly well under way. Nearly all the towers will have been delivered by the end of February. The contractors in charge of

the erection of the transmission system are prosecuting their work with diligence, and this winter are engaged upon these portion of the right-of-way which cross the swamps, and other districts inaccessible in other than winter weather.

Air Locks in Water Pipes

The effect of the sagging of a lead pipe between its supports, is that air will collect in the high parts of the bends, and will form air locks. These air locks will greatly impede the flow of water through the pipe. If the pressure is light, and the sags are many, they may stop the flow entirely. A long waste pipe suffering from these conditions might utterly prevent the passage of water and give the impression that it was choked by refuse, while, as a matter of fact, the real trouble was due wholly to the air locks which had formed.

If air has accumulated in the upper bends, the water will rise on one side of the bend and slightly compress the air which has been entrapped at different points. The air will depress the water on the other side of the bend and raise its surface at the next upper bend. The difference in level between the surfaces of the water on the opposite sides of a bend, is the measure of the resistance which the air in that bend offers to the passage of the water in a steady flow. The effects of the air accumulation are chiefly observed in low pressure systems, such as those which are supplied with water from house tanks.

The reason for this is, that the pressure due to the head between the air locks and the tank is usually too low to force the air out of the pipe. It is different when the system is under high pressure, because then the pressure is generally sufficient to force the air out of the pipes, with the water. A common cause of air lock in a building is the running of a lead hot water pipe over the floor beams for a considerable distance, the pipe not being supported uniformly throughout its entire length.



City of Winnipeg Power Development—Showing Partially Constructed River Wall

A Proposed Standard for Cast Iron Pipe

Leading City Engineers Practically Unanimous in their Approval of the Suggestion—An Opportunity for the Manufacturers to Express their Opinions

As a result of an interesting discussion at the recent annual convention of the Canadian Society of Civil Engineers, a committee of that body was appointed to frame standard specifications for cast iron water pipe and to report to the council of the institution. The question is one which is of considerable import, and with a view to stimulating further interest in the matter and to bringing the proposal more nearly to an issue we have ascertained the opinion of leading engineers, extracts from whose communications are reproduced below. The subject should provide an interesting discussion for many of our readers. We trust that some of the manufacturers will also send us an expression of their views for publication.

C. H. Rust, City Engineer, Toronto, Ont.:—

"I certainly think it would be an excellent idea, not only for the profession but also for the manufacturers, if a standard specification for cast iron pipe were prepared. The New England and American Water Works Associations have one which is generally used by engineers and municipalities in the United States."

A. F. Macallum, City Engineer, Hamilton, Ont.:—

"In this city we lay no size less than 6-inch, weighing 360 pounds per length; our 12-inch weighs 960 pounds per length, and our 18-inch 1,800 pounds per length. Within the limits of pressure that we have been working on here, we have had very few breakages using these weights, and although they are somewhat lighter than used in other cities—especially some of the western cities—yet these are, in my opinion, of weight sufficient for ordinary fire pressure. As many of the municipal engineers are members of the American Water Works Association, they would naturally adopt the specifications as gotten out by that association, and, personally, I do not see the necessity for any further specifications."

Newton J. Ker, City Engineer, Ottawa, Ont.:—

"At the recent meeting of the Canadian Society of Civil Engineers in this city, a committee composed of Owen W. Smith, Toronto; E. A. James, Toronto; T. C. Irving, Jr., Toronto; R. S. Lee, Montreal, and myself, as chairman, was appointed to report upon the standardization of the specifications for cast iron pipe and special castings. We are, at present, taking the matter up and before reporting are endeavoring to ascertain the views of the different pipe manufacturers in reference to the standardization of the specifications. Until the manufacturers' views have been received and carefully considered, the report will not be sent on to the society. I may say, however, that we are in favor of adopting the standard specifications of the American Water Works Association with some amendments."

J. Antonisen, City Engineer, Port Arthur, Ont.:—

"I am prepared to support your efforts in regard to the standardization of cast iron pipe. The New England Water Works Association adopted a standard for water pipes a couple of years ago, which is as complete as could be desired. Dr. Johnson's standard book on specifications, contains a set of specifications for cast iron pipes as used in Philadelphia, which seems to me to cover all the necessary points."

"In drawing up standard specifications for use in Canadian cities, it would be advisable, I think, to consider the standard

specifications used in Scotland, as the factories in Glasgow have a world-wide fame for the excellent quality of their pipes, and supply a large amount to Canada. Our Canadian Society of Civil Engineers, aided by representatives of Canadian foundries, would have no difficulty in deciding upon a standard, with such good models to guide them as the above mentioned."

James Hutcheon, City Engineer, Cuelph, Ont.:—

"I am in sympathy with the proposal to adopt standard designs for cast iron pipe. The adoption of a well considered series of designs will simplify the work of both the engineer and the manufacturer, and at the same time give the assurance that the materials supplied will meet the requirements for which they are intended."

"The adoption of such standards can never be made more easily than at the present time, for new difficulties and objections are sure to arise as our towns and cities increase in population. The work of standardizing should not be confined to water pipe alone, but should extend to hydrants and hose connections, so as to make these interchangeable throughout the country."

Jas. A. Bell, City Engineer, St. Thomas, Ont.:—

"I am strongly of the opinion that a standard specification for cast iron pipe would be a good thing. My experience has shown that in numerous instances pipe will not fit the specials and leave enough room for making a good joint. This is particularly the case when you are dealing with different manufacturers. There is a standard specification published by the American Water Works Association, in the proceedings of 1908, which appears to me to be very full and complete."

James C. Lindsay, City Engineer, Belleville, Ont.:—

"I consider this proposal opens up a large question. Whilst superficially a general "standardization" might appear a good thing, I can see difficulties ahead in the uniform process of manufacture."

Wm. Murdoch, City Engineer, St. John, N.B.:—

"A standardization has been reached by the New England Water Works Association and applied to that region of the United States. Although I am a member of that association, I do not concur, for the reason that different engineers have different views as to what they require. My own, for instance, are that all pipes should be cast on this continent as they are cast in Great Britain, namely, with the socket end down and a sufficient mass of metal left on the spigot end in which to accumulate all of the scoria, gases, etc., which rise to the surface of the metal after being cast; this mass to be turned off in a machine and each pipe given an exact length. This is not the case in the United States. An allowance is made for the cutting off of bad spigots and bands are permitted to be placed on the remaining spigots. Other cases are apt to occur as to thickness of metal required, etc., and in such cases the engineer would have to draw up his own specifications. For this reason I am of the opinion that every engineer should prepare his own specifications."

"I have never had any difficulty in obtaining pipe according to my specifications, but I always arrange with an inspecting firm to supervise the manufacture of the pipes and see that they are strictly according to requirements."

Comparison of Steel and Concrete Bridges

Relative Merits and Adaptability of either type — Unreliability of Cost Data — Notable Examples of Concrete Arches

BY FRANK BARBER, of Barber & Young, Bridge and Structural Engineers, Toronto

A comparison of steel and concrete as materials of construction will show that these materials are to a great extent complementary: yet the contest which has waged between the rival advocates of the two has been very bitter.

Points For and Against Structural Steel

The qualities which have helped structural steel to attain its present position as a building material for bridges are, first, great strength for a given weight and cost both in compression and tension; secondly, uniformity; thirdly, the fact that most of the work can be done in the shop, where conditions are best and where inspection is easy. Again, since comparatively little work remains to be done in the field, erection of the steel at the bridge site is a short and simple process compared to the building of a concrete bridge. Some kinds of steel bridges are erected altogether without falsework. This applies particularly to the suspension bridge and to the cantilever (except for the anchor arms) but steel arches and even simple trusses are often erected as cantilevers without centering. But even where falsework is used it is light and simple for steel, compared to that required for concrete. Moreover, if the centering settles to a slight extent it would probably be of small consequence in the case of a steel span, but it would be fatal to concrete.

But the great disadvantage that concrete suffers in comparison with steel, of having to be entirely manufactured on the ground often over a treacherous stream, has a redeeming feature, for almost the entire amount expended for the building of a concrete bridge remains in the community where it is built.

I have mentioned some of the undoubted good points of steel, but it is a remarkable fact that what has popularized steel as a material of construction probably more than anything else has been the widespread belief, first, in its great durability, and secondly in its fireproof qualities, neither of which has a basis in fact. We know now that unprotected steel columns in a building will often buckle with heat in a few minutes after a fire breaks out, and even when protected by tile experience has shown that they are not safe. However, fireproofing is more important in buildings than in highway bridges. As to the other supposed attribute, durability, twenty years ago when county commissioners built a steel bridge the belief was fairly general that it would be used by their grandchildren, whereas very many steel bridges erected 15 or 20 years ago are now showing signs of old age. In this connection it may be of interest to mention that the Government of New Brunswick, where wood is still plentiful, has recently discarded steel and reverted to wooden bridges for all spans up to 180 feet, the claim being made that covered wooden bridges will outlast steel and will cost less for maintenance.

It is a fact, however, that there are many steel bridges which were built 40 and 50 years ago which are still in good condition.

The comparatively short life of the majority of steel highway bridges in this country is due to a variety of causes. Doubtless the steel bridges of the future, partly on account of the rivalry of the more lasting concrete, will be more durable than they have been in the past. Buyers of highway bridges will take a hint from the methods followed by the

railway companies and will require strict inspection of their steel at every stage of its fabrication in the shop and erection in the field. They will learn to refuse corroded material which under present methods results from being thrown in a stock yard open to the weather, without painting or oiling. They will learn to refuse cheap oxide paints, which are very often used on highway bridges at the present time.

Some Advantages of Concrete Bridges

Concrete has none of the good qualities which I have mentioned as pertaining to steel, the chief of which were great unit strength and ease of erection, at least not to the same degree. In spite of this it has become a formidable rival of steel except for bridges of very long span. This is due to great durability more than to any other one thing. Concrete instead of deteriorating, becomes stronger with age. As you all know, examples of concrete construction remain to-day which were built 20 centuries ago. This argument is worth a host of others.

As to the structural features of concrete, it is economical for resisting compressive stresses; for instance, a concrete column can be built for about one-half the price of a structural steel column which would bear the same load. But concrete is not suited for resisting tensile stresses, that is it cannot of itself sufficiently resist forces which tend to pull it apart. It must have recourse to its hated rival, steel, to help it to bear tension. Steel thus combined with and embedded in concrete takes on the quality of permanence which it lacks in itself, for the concrete preserves the steel forever from corrosion.

Unreliability of Cost Data

It attempting to compare the costs of concrete and steel bridges, anyone but a specialist is likely to fall into errors. Some people even suppose that the cost of a bridge should vary as the span, and that a 50-foot bridge in one situation should cost much about the same as a 50-foot bridge anywhere else. But for one thing, the height of the roadway from the foundations has in general more to do with the cost than has the span. As an example, consider the following bridge: concrete abutments, wings and floor; span, 100 feet; roadway, 16 feet; heavy lattice hand guard; floor, 12 feet from the water and foundations 6 feet below it; designed for a 10-ton roller and a herd of cattle as live loads. It would cost, in general, about \$50 to increase the span one foot, and about \$150 to raise the floor one foot. But leaving out of consideration the abutments and considering the steel superstructure only, many are inclined to the opinion that a bridge with given main dimensions could be designed in only one way, and that, for instance, the bridge just referred to would contain just so many tons of steel whoever should design it. Now, I can tell you of a bridge of 90 feet span, 16 feet roadway, with a concrete floor, in which the structural steel weighs 30 tons, and of another of the same dimensions and for the same loads, which weighs scarcely more than half as much, and others of intermediate weights could easily be found. The first bridge with proper painting will last probably 50 years, the second perhaps 15 years, perhaps not 5. Again, as to the floor system, there exist different bridges all having panel lengths of 16 feet with the same spacing of joists and all supposed to carry a 10-ton roller, where the joists in one bridge are 9-inch at 21 lbs.,

* Read at the Annual Convention of the Ontario Good Roads Association.

in another are 10-inch at 25 lbs., and in a third are 12-inch at 31½ lbs.

This variation in weight is due, first, to designs being made according to different specifications. The Dominion Government specification, for instance, allows a unit tensile stress in medium steel for dead loads of 16,000 pounds, and the Ontario Government specification allows 24,000 pounds per square inch. Even when bridges are designed and detailed by the contractor according to one specification the weight will vary considerably, partly because one designer will know better than another how to take advantage of the weak points which undoubtedly exist in all specifications. Even when a specification is rigidly enforced in the design by the buyers' engineer, if the bridge is designed by the bridge company the weight may vary as much as 10 per cent., according as it is paid for by the pound or in a lump sum. When the buyer does not have his engineer enforce a specification I would not attempt to say what the variation in weight might be, but will remark that the low bid would generally mean the light bridge. Buying a bridge in this way is like buying a pig in a poke, the buyer certainly does not know what he is getting for his money. Under the above system of purchase the contracting companies themselves will admit that the buyers must trust them to give full weight, but they will argue that a company which has built many bridges in different parts of the country has a reputation to live up to which is a guarantee of good work. A very little reflection will show that this is not the case. Let us say you buy a bridge which fails in fifteen years, but which was supposed to last for fifty years. In fifteen years conditions will have changed; the bridge company will perhaps be under different management, the old councillors who bought the bridge will have been replaced. Fifteen years is too long a time for a bridge company to look ahead with much fear of having to stand the consequences of broken promises, especially when it is doing just the same as its competitors in the same line.

The obvious way to prevent this unsatisfactory state of affairs is for the purchaser to pay for the engineering labor on a bridge directly to his own man rather than indirectly in the price of the bridge to an official in the pay of the contracting company.

This little digression has been provoked by the subject of costs, and is intended to show how unreliable are cost data relative to steel bridges unless you have the weights. The weight of a steel bridge is one of the most characteristic things about it to the bridge engineer, and also, of course, to the contracting bridge company; but the optimistic buyer could seldom tell you what he is paying per pound for his steel within a considerable percentage.

The relative cost of steel and concrete bridges depends upon more things than there is time to mention, but I shall venture this general statement. The shorter the span the more likely is it that concrete will be cheaper than steel, and the longer the span, the more probable that steel will be cheaper, at least in first cost.

Choice of Type of Concrete Bridge

Where the roadway lies only a short distance above the water, arches are not suitable except for very short spans. For such situations concrete "flat tops," that is beam or girder bridges, are preferable. They are economical for spans up to 40 feet, and, under some circumstances, for spans of 50 feet. For greater spans than this, where there is not sufficient height for an arch, steel or wood has been until quite lately the only available materials. However, quite recently concrete truss bridges have been proved successful up to spans of 200 feet, and are suitable for any situation where steel trusses can be used unless the heavier and more rigid centering required would make the cost prohibitive. Where a bridge must be built on a grade, in which case teams cannot be prevented from constantly trotting over it, even with

heavy loads, there is an additional argument for concrete. Here the constant vibration soon wracks the joints of a steel bridge, but is almost non-existent in the concrete. However, where an arch is built on a grade extra care is required in the design, otherwise the extra weight of earth on one side of it would be unprovided for, and you know without my mentioning it that a load on one side of an arch has a worse effect on it than if another equal load were placed on the other side to balance it. Another kind of arch which requires extra care in designing is the skew arch. If time permitted I should tell you of the failure of a large skew arch in Australia and of the report of a commission of experts upon it. As it is, I shall content myself with saying that if any of you are thinking of building an arch on a skew, ask your designer to tell you of the report just referred to. If he can't give you an account of it, don't let him build your skew arch. Indeed, I might have covered the ground just as well and more quickly by saying that great care must be exercised in the design of all arches. One of the decided disadvantages of the concrete arch is the fact that the simplicity of its lines leads some people into thinking that the design is such a simple matter that it may be properly and safely designed by one who would not attempt the designing of a steel bridge. No greater mistake could be made. Reuter-dahl says in his work on arches: "Of all the problems of bridge design, the analysis of the arch is by far the most difficult."

Notable Examples of Concrete Arches

To show the limits so far attained, I shall refer to one or two particular examples. The largest concrete bridge in existence is the Grafton bridge in New Zealand, with a span of 320 feet clear. Second to this is the Rocky River bridge, Cleveland, span, 280 feet. This holds the record for America. The third in length is the Sitter, in Switzerland, span, 259 feet. Next to this, and the second longest in America, is the Walnut Lane bridge in Philadelphia, with a clear span of 233 feet. Altogether there are ten concrete arches with spans of over 185 feet. Besides those mentioned, an arch is now building in Spokane, Wash., which will have a span of 281 feet, and another, the Lorrimer avenue bridge, Pittsburg, 300 feet in span. An arch is projected, the Henry Hudson Memorial Arch, to cross the Spuyten Duyvil creek, New York, with a clear span of 703 feet. If this is ever built it will have more than double the span of any masonry arch now in existence. This is perhaps close to the possible limit for concrete.

The builders of these concrete bridges must have felt that they were building for posterity. They have produced bridges which are permanent improvements, which require neither painting nor repairs, which grow stronger with age, as if to meet the conditions imposed by increasing traffic, which are flood proof and frost proof, rust proof and fire proof. The massive character of the structure surely symbolizes the strength and durability of concrete, and this is not more marked than their singularly graceful lines.

On account of the greater unit strength of steel, much longer steel spans are in existence than will probably ever be possible with reinforced concrete. To show what is possible with steel, I have made a little calculation which you may perhaps find amusing. A steel cable of the best quality was manufactured, hanging with a dip of one-fifth of its span, will support its own weight with a factor of safety of three for a clear span of over five miles, and it will support four times its own weight in dead and live loads for a span of 7,000 feet. It is literally true that here steel has concrete "beat a mile."

The greatest bridge engineers, especially in this country, as yet have been designers in steel, but the time is not far distant when designers in concrete will produce structures as remarkable in every way as the masterpieces in steel.

Consideration of Steel Highway Bridges

Changes in Practice During Recent Years—The Wide Sphere of the Steel Arch—Advantages of Securing Expert Advice*

By A. W. CONNOR, C. E., of Bowman & Connor, Municipal and Structural Engineers, Toronto

The building of permanent and substantial bridges is very closely associated with the building of good roads. As the cost of bridges form a large part of the expenditure in highway improvement, it behoves those who are entrusted with this work to see that the best value is obtained for the money. Though it may appear a very simple matter to get the best value by the usual system of calling for tenders, it is really not so. Large amounts are wasted every year by neglecting simple precautions. This association is much interested in such knowledge of highway construction that will enable them to get the best and most enduring value for the outlay.

Practical and Explanatory Observations

It is not proposed to deal with the question of steel bridges in a technical way, but to give some practical observations that may be of interest to those having bridges under their control.

The early bridges in this province were built of wood, or wood and iron. They are now being replaced by more permanent structures in steel or concrete. The steel bridge is a very modern structure, both as regards its material and its design. The advance is due to greatly improved methods of manufacturing, by which a very uniform and reliable grade of structural steel is obtained. In the early 90's, steel, though at first looked upon with suspicion, began to replace iron in bridge work. In 1895, when the writer began bridge work, Carnegie's Handbook referred to iron and steel sections, but now no iron sections are rolled. The steel bridge has also been improved by a scientific study of design and working conditions, also in methods of manufacture and erection. It is not so long ago that bridges were built by guesswork, tempered with a certain amount of good judgment. Now bridge designing is a specialized branch of engineering. The up-to-date steel bridge is always built with a solid and permanent floor, and is a heavier and more rigid structure.

The writer has seen many changes in bridge practice during the last 15 years. Being the history of many bridges, it may be of interest to recall the advances made. Formerly, even moderately short spans were all pin connected structures; now all but very long bridges are rivetted. Then, wooden floors on wooden joists were largely used, now, concrete floors on steel stringers are nearly always employed. The solid floor has the advantage of permanency, larger carrying capacity, does away with vibration (such as from trotting horses), and distributes any sudden or heavy load over a greater part of the truss. The rivetted bridge is more stable than the pin connected structure, there being no loose joints or adjustable members to work loose and throw undue strains on other members. The loose joints cannot be protected from the weather as well as the rivetted; so that the latter is the more durable also. The pin connected bridge is lighter and cheaper to erect than the rivetted, but there is differences in the length of members or to ambiguity from differences in the length of members or to ambiguity from double systems of web members. The rivetted bridge consists of fewer but heavier members than the pin connected structure and is consequently more permanent and less seriously damaged by accident to one member.

Another improvement has been the substitution of rivetted stiff lateral and sway brace systems for the loose adjustable

rods previously employed. With a solid floor, however, the effect of the wind is less important in the bottom lateral system of through bridges. "Necessity is the mother of invention" is true here also, for the traffic over bridges is now much heavier than formerly. The traffic over highway bridges is likely to increase in the same way as that over railway bridges, so that there may be further advances necessary in the future.

The sphere of the steel bridge is a wide one. It is the most adaptable to all needs for first class and permanent work. It has practically driven the wood and iron structures from the market. The reinforced concrete bridge is its principal rival. For short spans the latter is often the cheaper, but for spans over 100 feet the steel bridge will generally be the cheaper. Though some long span concrete arches have been built, they are only possible under favorable conditions of the site. In such locations a steel arch might be as cheap, and also as aesthetic.

The life of the steel bridge may not be as long as the concrete structure, but, if built substantially, it may compare very favorably with the reinforced concrete structure, especially if the amount of reinforcing steel is not liberal.

Advantages of Consulting a Bridge Specialist

Every steel bridge built now is by no means as perfect as it might be. Generally, a purchaser gets a good article when he knows what value to expect and insists on getting it. Municipalities, from not knowing the values of bridges, often specify and get a poor article. Generally they take the cheapest bridge offered, regardless of its value in strength or durability. The best way to get good value is to employ a bridge specialist to draw up plans and specifications and see that every detail of the work is carried out in accordance therewith. It is a mistake for even an engineer who is not a specialist in bridge work to ask each bridge company to send in his own design, based on any of the standard specifications. There is no good highway bridge specification, as they are all out of date, being based on light wooden floors. The dead load unit stresses are too high for heavy floors, where the dead forms a large part of the total load. The defects likely to occur in a bridge thus let on competitive designs are:

1. The structure is apt to be too light to be able to resist rust very long. Every contractor has to cut down the weight to be the lowest bidder. The thinner member is also apt to be brittle, through cooling in the rolls.

2. The price is so low that every detail has to be cut down to the finest point; end struts are left out, and pointing and other work carelessly done.

3. There being no inspection, inferior metal might be used.

If a competent engineer is employed he will call for a reasonable specification and see that it is carried out. This is a protection to the municipality and to the honest and well equipped contractor. Saving decided to go to the expense of a good steel structure, it is a mistake to try and save a few dollars in cutting down the weight at the loss of hundreds in the life of the structure. There is no extra work in the additional material required for durability, so the cost is a very small percentage of the total cost of the bridge with abutments. If the contractors do not have to go to the expense of preparing designs, more of them will bid on the work and the extra competition will easily pay the engineering fees.

The engineer will also check over all the detail drawings

*Read at the Annual Convention of the Good Roads Association

of the work and see that every joint is of full strength. Even an honest contractor might make a mistake at one joint, which would impair the strength of the whole structure. The Quebec bridge disaster furnishes a very striking illustration of this. The immediate cause of the fall was the weakness of the lacing of the bottom chords. Dr. Galbraith has stated that if a man were to have struck one of those bars with a hammer he might have brought down the whole of that great, massive structure.

The engineer will examine the work during manufacture and erection and see that every detail of material and workmanship is first class and in accordance with the plans and specifications.

The most important thing in the life of a steel bridge is to see that it is kept carefully painted. If not, rust will soon reduce its strength. The surface must be clean and dry before painting. Rust will spread even under paint. All bridges should be repainted every few years.

Government Standard for County Roads

Main Requirements of the Highway Regulations—Modern Road Machinery Essential—The Most Suitable Type of Road—Bridges and Culverts*

BY W. A. McLEAN, Provincial Highways Engineer for Ontario

The Government Standard for County Roads is a subject which would tempt a very long address on road-building, but more especially it calls for an explanation of what is termed by the Highway Act, "The Regulations Respecting Highways." In order that the chief points may not be lost sight of in unnecessary detail, I desire to briefly outline the principal requirements of these regulations.

Management

First importance is attached to the systems of management. On this, the success of any county system depends. The regulations require that the management be centralized in a county road superintendent. The requirement is merely that the organization of a joint stock company be followed—viewing the property owners of the county as stockholders; the council as a board of directors; and the road superintendent, a manager carefully selected by the council because of his qualification for the position. If he is a capable man, his services through experience will grow more valuable to the county. Permanency of this kind is doubly necessary owing to the annual change in councils. The Department of Public Works cannot keep in touch with the individual members of an annually rotating council, but can assist in getting the best and most economical results through one permanent manager.

Regulations are Flexible

The regulations under which the road superintendent works signed the Toronto filtration plant, was in the city recently and inspected the plant. Mr. Hazen states that do not define one fixed standard of road to which all roads must be sandpapered. One fixed type of road is not applicable to the entire province if the best balance of economy and efficiency is to be secured. Differences of soil, road material, traffic, condition of road before improvement, drainage requirements, and other local circumstances are to be considered by your superintendent. The regulations, for the main part, state general principles; but at the same time, there is a type considered most suitable for the average main road.

Most Suitable Type

This consists of an earth turnpike 24 feet shoulder to shoulder of ditches. The camber or crown averages one inch to the foot from side to centre—12 inches in a 24-foot road. The centre is metalled with broken stone or first class gravel from 8 to 14 feet wide, and 8 inches in thickness after thorough consolidation by rolling. The road should have easy flowing grades with low spots filled and high places cut down. The open drains should have sufficient capacity and fall for storm flow; and tile underdrains should be laid as conditions require. Good drainage and grading are essential.

Old Roads

Old stone and gravel roads are to be improved by grading away the soft earth and sod shoulders; then restoring the crown by adding a covering of new stone or gravel. Grade and drain these roads if you wish, without gravelling, but never resurface with stone or gravel without grading.

Machinery

Modern road building machinery is required and of these one of the most valuable is the steam roller. To build roads in stretches of a mile or more, leaving the gravel or stone loose and without rooling, creates a serious obstruction to traffic. In some cases the speaker has seen such gravel and stone roads loose two years after building, as traffic had merely touched the edge—had not got up on the new metal. When a roller is used, less stone is wasted; coarser stone can be used, making a stronger road and decreasing the cost of crushing; the rolled road is stronger, so that the cost of future repair is less; while a rolled road, instead of an obstruction to traffic, is in perfect condition for the heaviest loads or for light driving. One or more graders are, of course, necessary, and the use of all labor saving equipment and methods is urged. A stone crushing outfit is required where a suitable local supply of field or quarry stone is available.

Bridges

Bridges and culverts are to be of a permanent type. Steel trusses on concrete substructure; or reinforced concrete throughout are the materials favored.

Patchwork is Not Accepted

Road building is to be done in stretches of reasonable length. That is, patchwork of the statute labor kind is not accepted. While the regulations are flexible it is for the purpose of obtaining better, not inferior results.

Objects of the Act

The objects of the Act are three-fold:—

- (1) To establish a businesslike system of management.
- (2) To build up a system of main roads.
- (3) To create an object lesson in management and construction.

Only one who has gone over the work, as has the speaker, can realize the great amount of success being achieved. As county after county completes and unites its work there will grow up in Ontario a system of main roads fully equal to requirements. Every county has to meet its own pioneer experiences and mistakes, but in spite of these splendid results are being produced in those counties that are operating under the Highway Improvement Act.

*Read at the Annual Convention of the Ontario Good Roads Association.

Details and Cost Data on Road Building

Plant Required, Labor Entailed and Expense Attached to Various Classes of Work — Examples from the Experience of the Writer

By C. R. WHELOCK, Orangeville, Ont., County Engineer of Peel.

The cost of roads varies widely in different localities, owing to the difference in the conditions under which they are constructed, such as nature of the soil along the proposed road, the general grade of road—level, railing or hilly—the condition of the road in respect to drainage, the cost of labor per day, the kinds of road building materials that are available and how far they are situated from the road, the amount of travel over the road, and, if bridges or culverts are to be built, the span, the nature of the foundations, the kind of bridges or culverts now in use and the condition of each.

The extent of the plant required for road making is governed by the requirements of each case. The outfit for a macadam road usually consists of scrapers, plows, road machine, steam roller and sprinkler. The average outfit of this description will cost about \$3,800. Where stone is available for crushing, a crushing plant may be added, consisting of a crusher, elevator, revolving screen and bins, at a cost of about \$1,300.

An expert road foreman and machinery engineer are necessary to get the best results and to keep the work running smoothly. Competent men are available for these positions at from \$2.50 to \$3 per day. In respect to inspection of bridge work, Mr. A. W. Campbell hit the nail on the head, in a recent address, reported in "Contract Record" of February 16th.

The cost of cement-concrete bridge work varies in proportion to the cost of the material for construction delivered at the work. For example, take two arches of similar design built in the county of Peel last year. In one case the crushed

The railing used on most of our concrete structures last year was two lines of 2-inch gas pipe with globe fittings, which makes a strong railing with a good substantial appearance at a reasonable cost. The cost of the railing painted and complete was 64 cents per foot.

The wages paid on the work were as follows:

Ordinary laborers	\$1.50 to \$1.75 per day
Road foremen	2.00 to 2.50 per day
Machinery engineers	2.50 per day
Teams	3.50 to 4.00 per day

The cost of operating road machines was from \$13.50 to \$14.50 per day. In some cases traction engines were used on these machines instead of horses, with good results. The cost of operating was less, and it is estimated that on a clay road and in hot, dry weather, nearly twice as much work can be done.

The cost of operating steam rollers was from \$3.90 to \$4.25 per day; to this may be added the cost of sprinkling, \$4 per day, making the total for rolling and sprinkling about \$8 per day.

For the roads in the south part of the county, crushed stone was brought in by rail, as satisfactory local material was not available. This added very much to the cost of these roads. In some cases the freight was double the price of the stone f.o.b. at the quarry.

The following data gives in tabulated form the details relating to the dimensions, cost, etc., of several roads built on the County of Peel Road System in 1908 and 1909:

Location	Grading		Class of Metal	Road Metal						Total Cost per Mile
	Width of Grade	Cost per Mile		Width of Metal Feet	Depth of Metal Inches	Freight on Metal	Length of Haul for Teams Miles	Cost per Mile		
Ching'sy	28 ft.	\$126	Crushed stone	9	7	\$1034	1 3-4	\$3145	\$3271.00	
Caledon	24 ft.	195	Pit Gravel	7	9	Local	1	685	\$80.00	
Toronto Tp.	24 ft.	175	Crushed stone	9	8	1005	3 1-2	3557	3730.00	
Toronto Tp.	27 ft.	145	Crushed stone and pit gravel	15	4 to 6		Stone 1/2 gravel 2	2170	2315.00	
Ching'sy	27 ft.	200	Crushed stone	8	6	876	1 1-4	2808	3008.00	
Caledon	24 ft.	272	Pit gravel	7	8	Local	1	528	\$80.00	
Toronto Tp.	22 ft.	190	Crushed stone	9	8	940	2 1-4	3214	3404.00	
Ching'sy	24 ft.	200	Crushed stone and screened gravel	8	6	Local	2 1-2	1750	1950.00	
Toronto Tp.			Gravel	8	9	Local		650	1115.00	
	26 ft.	85	Clay	9	5			480		

stone, sand and gravel cost \$2 per cubic yard delivered at the work; the cement was teamed about ten miles, and the price paid for the concrete was \$7.15 per cubic yard. In the other case, the crushed stone cost \$1.50 per cubic yard, the sand and gravel 40 cents per cubic yard, the cement was teamed one-half mile, and the price paid for the concrete was \$5.75 per cubic yard. The minimum price paid for concrete in arch bridges was \$5 and the maximum \$8 per cubic yard. The minimum paid for concrete in abutments was \$5 and the maximum \$5.75 per cubic yard. The price paid for concrete covered excavating and refilling. The price paid for reinforced concrete bridge floors was from 20 cents to 25 cents per square foot. The steel for reinforcing in arches and flat top concrete bridges cost about 2½ cents per pound.

Extract from paper read at the annual convention of the Ontario Good Roads Association.

Road No. 1—Well graded, knolls cut down and hollows raised. Metal consolidated with a steam roller. As no local material was available, crushed stone was brought in by rail. The freight on about one-half the stone was 65 cents per ton and on the remainder, which was delivered at another station, \$1 per ton. The price of the crushed stone f.o.b. at the quarry was 50 cents per ton.

Road No. 2—Well graded. The gravel was evenly spread on the road early in the summer, without being rolled, and in the fall when the gravel was partly consolidated by the travel over it, it was gone over a second time, the ruts filled and the road recrowned.

Road No. 3—Similar to No. 1, with the exception that the stone was all shipped to the same station, the freight being 65 cents per ton.

Road No. 4—This was an old stone road, wide and flat on

top, the grading consisted mainly of cutting off the shoulders, although in some places it had to be regraded and ditched. Crushed stone was placed in the centre of the road 9 feet wide, and along each side of this a strip of gravel about 3 feet in width, forming a boxing for the stone and making the total width of the metal about 15 feet. The metal was well consolidated with a steam roller.

Road No. 5—Similar to No. 1, except that the stone was all shipped to the same station and that the freight was 60

cents per ton and the stone f.o.b. at the quarry 65 cents

Road No. 6—Similar to No. 2.

Road No. 7—Similar to No. 3.

Road No. 8—Well graded, knolls cut down and hollows raised. The metal was well consolidated with a steam roller. The metal used was a coarse gravel mixed with stones, which was run through the crusher and revolving screen.

Road No. 9—This was a short piece of road built as an experiment. The soil was a very light sand.

Directions for Earthwork on Railroads

Interesting Notes on Specifications for same, which should cover every Detail of the Work—Questions of Classifications and Overhaul

At a meeting of the American Society of Engineering Contractors on Jan. 10th, 1910, Mr. Jas. H. Bason, of the Grand Trunk Pacific Railway, gave an interesting paper in connection with which he prepared the following notes on specifications for earthwork in railway construction which contain interesting observations on the questions of classification and overhaul.

Specifications In General—The two main objects of any specification are these: (1) To define the work to be done so that any competent contractor may submit an intelligent bid. (2) To establish a guide and a standard by which the contract may be interpreted with fairness to each party.

To attain the first of these desired results, if the proposed railway line is of any considerable length or is located through a country with varying physical characteristics, the company should (1) compile complete right of way maps, profiles, estimates of quantities showing as fully as possible the character of the work. (2) Divide the proposed line into sections and ask for separate bids and make separate contracts for each section. Each section should be homogeneous so that the actual cost of performing any given class of work shall be practically constant throughout the section. The item of the transportation of supplies is included. (3) Lay great stress on the necessity of each bidder making a personal inspection of the work.

To attain the second result three cardinal principles should be observed in preparing the specifications:

(1) The schedule of prices should include every item that can possibly be foreseen with a view of reducing "force account" work and "extra items" to a minimum and of preventing either party from claiming or denying without justification that any piece of work is covered by the specification.

(2) Every item in the schedule of prices should be adequately covered by a corresponding clause or section in the specifications.

(3) The specifications should be so worded as to reduce to a minimum the possibility of difference of opinion as to which clause of the specifications any given item in the schedule of prices refers.

With these principles in view, the expression "in the opinion of the engineer" or its equivalent should be excluded as far as possible. The price to be paid should be connected with the work done by language as concise and clear as possible. The contractor should have no excuse for insuring himself against loss by bidding higher prices than the actual work justifies.

Clearing and Grubbing—The usual specifications for clearing seem to be sufficient, but exception may be taken to a common clause which provides that no grubbing will be allowed on the slopes of any cutting where depth of cutting exceeds a certain number of feet. The latter clause arose from the former practice of carrying a deep cut through to

grade as the work progressed. This obviated the necessity of grubbing such cuts, as the stumps fell into the cut by gravity. With modern grading machines this practice has changed, and the contractor finds it necessary to grub out the stumps as the work progresses. The result is, if the limit above mentioned be four feet, that:

(1) The contractor is paid for grubbing where the cutting is 4 feet or less, but is obliged to do exactly the same work at the same cost without pay where the cut is over 4 feet.

(2) The difference between 4 feet and the next greater depth being infinitesimal, disputes arise as to payments.

(3) A change in grade or alignment may require a contractor at no measurable difference in cost to do unexpected grubbing without compensation or may give him compensation where the company did not expect to pay. All grubbing should be paid for.

Classification of Excavated Material—Following up the general principles enunciated above and especially that which requires that "difference of opinion" shall be eliminated, it is clear to the writer that there should be only three classes of excavated material, not including excavation under water, or excavation or removal of any artificial work such as old masonry, etc. These three classes should be: (1) Solid rock. (2) Loose rock. (3) Common excavation.

Common Excavation—In many specifications the dividing line between common excavation and loose rock is determined by the "plow test"; this test should be discarded entirely as unsatisfactory. There are thousands of acres, which may in the future be crossed by railways, where the material to be moved has not the faintest resemblance to rock and where no sane man would attempt to break ground with a plow. The plow test is impossible, and the logical result, if the specifications provide this test, is that such material must be classed as loose rock.

Many of the western roads have discarded this test and specify that "all material not classed as loose or solid rock shall be common excavation." The companies using this specification specify that loose rock shall be any rock that can be removed without blasting, although blasting may occasionally be resorted to, or any rock in detached masses varying in size between given limits, and that solid rock shall be rock in masses that cannot be removed without blasting. It will be noticed that these specifications require a definition of the word "rock."

The writer submits the following specifications for the classification of excavated material:

In these specifications the word "rock" shall be interpreted to mean any portion of the consolidated material forming the crust of the earth which has a greater volume than 1 cubic foot. Unconsolidated materials, such as sand, gravel, clay, hard pan, are not rock under these specifications.

Solid Rock—All rock in masses that cannot be removed

without drilling and blasting. All boulders or detached pieces of rock that measure 1 cubic yard or more in volume.

Loose Rock—All rock which is loose or soft enough to be removed without blasting, although blasting may, at the option of the contractor, be occasionally resorted to. Detached pieces of rock measuring in volume from 1 cubic foot to 1 cubic yard.

Common Excavation—All material not solid or loose rock.

The sizes specified for boulders and detached pieces are, of course, subject to be changed according to varying circumstances.—No tests are recommended, as the writer believes that they would serve no useful purpose and tend to cause complications.

Excavation Under Water—This classification should be applied to all channels and pits under water which cannot be drained by ditching. The price or prices paid should be per cubic yard and should cover all material and labor, including coffer dams, necessary to do the excavation required. There should be described. The price should equal the cost of the dams. In many cases special specifications would be necessary.

Overhaul—Overhaul should be paid for, a price fixed by the company, per cubic yard per hundred feet beyond the free haul, and the method by which overhaul is to be calculated should be described. The price should equal the cost of the work and is therefore a variable quantity. The limit of free haul is also variable. Both price and free haul limit should be accurately fixed for each section.

Sub-Contracts—Sub-contracts should be recognized and proper provisions made for their protection. In the face of the universal practice of letting sub-contracts it is absurd to forbid them even with the usual proviso that they may be made with the written consent of the chief engineer.

A Slide Rule for Reinforced Concrete Slabs

The latest addition to that steadily increasing family of calculating devices is a slide rule for reinforced concrete slabs. This new instrument has been invented by Arthur W. French, professor of civil engineering at the Worcester Polytechnic Institute, Worcester, Mass. In appearance the rule differs very much from the ordinary type, as it is slightly shorter and considerably wider, the exact dimensions being $4\frac{1}{4} \times 9$ inches. The principle is the same, however, although there are two sliding and three stationary scales instead of two of each, as found in the regular rule.

The top or A scale, as it may be called, represents the span in feet. The upper sliding, or B scale, is graduated in the total load per square foot, and the middle stationary scale, C, gives the bending moment in inch-pounds. The lower sliding scale, D, furnishes the depth of the slab, and the bottom scale shows the cross section of the steel required. Below this area value are lines giving the sizes and spacing of square and round reinforcing bars, and the thicknesses of expanded metal and with cloth, providing the same amount of reinforcement.

The method of using the rule is as follows: Under the span, as given on the A scale, set the proper factor on the upper edge of B for simple or continuous spans.

The total load per square foot, as marked on the lower edge of this scale, is directly over the bending moment on the C scale. An arrow on the upper edge of D is set under the bending moment value just obtained and under the lines of this scale, designating the depth of slab, the cross section of the required reinforcement is given in square inches. Carrying this value down into the tables previously mentioned gives the amount of the different reinforcing materials required to produce the given cross-sectional area.

It is stated that only formulae recognized as best by leading engineers and the technical societies are used in designing the rule, and that the results obtained are both conservative and accurate. The rule is simple to operate and is durable. The slides and lining are of mahogany and the face is of heavy paper, which is coated over the printed lines and figures.

Canadian City Engineers

Mr. William Murdoch, St. John, N.B.

Mr. William Murdoch, City Engineer of St. John, N.B., was born at Paisley, Scotland, on April 16, 1848. Six years later he was brought by his parents to St. John, and has remained there ever since. Mr. Murdoch was educated at the Grammar School at St. John and afterwards, while serving an apprenticeship in a foundry, studied his profession with Mr. Robert C. Minnette, ex-City Surveyor. On the completion of the apprenticeship, and at the age of 20 years, he obtained a position in the office of the Sewerage and Water Com-



Mr. Wm. Murdoch, City Engineer of St. John, N. B.

mission. In 1869, Mr. Murdoch was appointed Assistant Engineer. He retained this post until 1894, when, on the death of the superintendent, he was appointed to the higher position. In the year 1906, he was made executive head of the department, with the title of Director and Superintendent. Mr. Murdoch's appointment to the position of City Engineer last year put him in charge of a responsible and somewhat onerous position.

St. John has developed rapidly during the past few years and the duties of the city engineer are by no means a sinecure. They include the care of all the public works of the city, namely, ferries, harbor, streets, water and sewerage, sewage disposal, and also the many details that are inalienable from municipal service. Nevertheless, the general conditions under which Mr. Murdoch labors are most favorable. He is well connected and highly esteemed in his sphere, and having grown up in the city and with the city, is able to plan for its needs as can only one "to the manner born."

The Canadian Society of Civil Engineers has awarded the Gzowski silver medal to Professor Brown, of McGill University, Montreal.

Reinforced Concrete in Factory Building

Weight - Supporting Ability and other Advantages of this type of Construction—Comparisons of Cost Favor Concrete Structures

The value of reinforced concrete for use in the construction of factory buildings and other structures where heavy loads are to be carried by the various floors is most instructively considered in a paper by J. P. H. Perry, of the Turner Construction Company, and presented at a recent meeting in New York City. The author points out that the most frequent question asked is whether or not concrete is an experiment. In discussing this and other points he says:

Reinforced concrete is now an established structural material of recognized merit. It is not necessary to base this statement merely on the existence of some 4,000 or 5,000 reinforced concrete buildings of ages varying from 12 years down to a few weeks, for a study of the material itself is an assurance of the permanency of the structure in which it is used.

Concrete has been known from the earliest ages. In many parts of southern Europe concrete foundations, viaducts, bridges, etc., can be found, many of them 2,000 years old. Reinforced concrete is simply an improvement over this ancient concrete, because of the better quality of cement used to bind the aggregates together, and the addition of steel reinforcement. A beam in a building is subject to tension at the bottom and compression at the top. Concrete possesses great strength in compression, while in tension it is weak, but by placing bars or wire at the underside of a simple beam it becomes an economical structural member. The reinforcement takes the tensile stresses and the concrete the compression. It is possible to make the combination, because concrete and steel expand and contract in almost identically the same ratio. This combination was first made by Monier, a French flower-pot maker, in about 1860, but the commercial use of reinforced concrete does not date much back of 1897 or 1898 in this country.

The Average Reinforced Concrete Building

The average reinforced concrete building is constructed similarly as a structural steel building—a skeleton or cage construction of the columns and floors is run up first, and as soon as the forms or centering have been removed from any one storey, the building of the walls, stairs, partitions, etc., begins, and then follows the progress of the framework of the building as fast as possible. In this way an economical distribution of labor and material and very rapid construction are possible.

Backed by skill and experience a reinforced concrete building can be completed in about the same or less time than a structural steel building. While a reinforced concrete skeleton for a building cannot be erected as fast as one of steel, it can be begun and partly erected before the necessary structural steel can be detailed, rolled, fabricated and shipped from the mills, and the building finished ready for occupancy before the steel structure can catch up with it. Under present market conditions it takes from six to nine weeks to obtain steel from the mills. The necessary small size bars for reinforcing concrete can always be obtained out of stock on 24 hours' notice. An amount of cement, sand, stone and lumber sufficient to get a job started can nearly always be obtained locally. With reinforced concrete construction it is not necessary to wait before concreting the footing, and the first storey columns, to have complete detail

drawings of the building, such as is the case in structural steel work.

The Rogers & Pyatt factory at Manhattan, N.Y., is a 10-storey and basement building, roughly 60 x 70 feet in plan, of reinforced concrete throughout. After the completion of the foundations, from the day that the first concrete was put in the basement columns to the completion of the roof, but 47 working days elapsed, and the building was turned over to the owners for occupancy in three and one-half months. The Isaac Mason warehouse at Brooklyn, N.Y., is a seven-storey and basement reinforced concrete building, 40 x 80 feet in plan. It took but 48 working days to put the roof on this building after the excavation was finished, and but a few days over three months before the owner moved into the building. The Bush model factory, at South Brooklyn, N.Y., is 600 feet long, 75 feet wide, six storeys and basement in height, of reinforced concrete throughout. The roof was put on this building in 63 working days after the piles were driven.

These three records should demonstrate clearly that reinforced concrete construction does not mean slow construction.

In the case of extension No. 8 of the Bullock Electric Company, at Norwood, Ohio, reinforced concrete was adopted because of the great reduction in the time necessary to complete as compared with steel construction. This building is two storeys high, 256 x 150 feet, and was ready for the steel roof trusses in nine weeks after the contract was signed.

Weight-Supporting Ability

Reinforced concrete buildings are noted for their strength and for their ability to safely carry unexpected loads. Floors have been designed to carry as high as 5,000 pounds per square foot, and have been doing their work satisfactorily for seven years. In several buildings which have been constructed by the company with which the speaker is connected floors have been designed to carry 600 pounds superficial load per square foot, and have been subjected to 1,500 and 2,000 pounds live loads without the slightest indication of injury or increased deflection. Perhaps as remarkable an instance of the strength of reinforced concrete floors under severe load is furnished by an embossing press on the seventh floor of the Robert Gair Company's factory in Brooklyn, N.Y. The floors in this building are designed for live loads of 250 pounds per square foot. The press in question weighs 16 tons and rests on a base 3 x 6 feet; the load is therefore nearly one ton per square foot. There is no deflection noticeable under this press, and there have been no precautions taken to distribute the load.

Joseph Bancroft & Sons, Wilmington, Del., who have a reinforced concrete dyeing establishment with floors 6-inch thick, spanning between the beams 10½ feet state in a letter. "This floor was unintentionally subjected to an impact test by a piece of granite falling 32 feet and striking on one corner, making a concentrated blow over an area of 6 x 4 inches. The piece of granite was 6½ feet long, 18 inches wide, and 8 inches thick, and weighed 173 pounds per cubic foot. The floor is still in use and this accident occurred four years ago. All of our floors are subject to heavy loads and heavy

shocks, and wherever this material has been employed, it has given satisfaction."

Little Vibration

In a building where many machines are installed the matter of vibration is important. The majority of owners of concrete plants are well satisfied that they get less vibration with this kind of construction than with any other. The Robert Gair Company's large plant in Brooklyn consists of two 6-storey brick and first-class mill construction buildings, and one 6-storey and basement reinforced concrete factory. All three structures are filled with the heaviest presses, cutters, embossers, etc. The vibration in the mill construction buildings is such that a plumb-bob hung parallel to any one of the walls will sway to a considerable extent; in fact, the buildings show that it would be difficult to produce more severe vibration than they are subject to. The reinforced concrete structure directly across the street, subject to the same conditions of foundations, loads, vibration, etc., is remarkable for its rigidity. This building measures 231 x 200½ feet, and is nine storeys and basement, having 10 acres of floor space. On a typical floor are a number of very large presses; one room on the seventh floor, 231 feet long, is filled with presses which operate rapidly and have very heavy reciprocating parts, yet a coin will stand on edge anywhere on their base frames. All through this factory one may lay his hand against a column and feel scarcely a tremor.

The Ketterlinus Building, at Fourth and Arch streets, Philadelphia, Pa., is a lithographing factory 80 x 67 feet, eight storeys and basement, of reinforced concrete throughout, excepting a facing of brick with terra cotta trimming, which adjoins an older part of the plant. The old building is of steel construction fireproofed with terra cotta. In both buildings heavy machinery is running and large printing presses are at work on the third, fourth and fifth floors. A comparison of the serviceability of the two types of construction shows the advantages of reinforced concrete.

In the building of steel and terra cotta, the vibration from the machinery is noticeable as soon as one enters, while in the new wing, the concrete, because of its greater mass and inertia, absorbs the vibrations. The machinery is such that it is difficult to appreciate its vibratory tendency. As a result of the reduction in vibration in the reinforced concrete building, the noise of the machinery is greatly lessened. This is in a building of comparatively small size, but considerable height—a type more susceptible to vibration than a larger structure would be.

The Floor Question

If concrete floors in factory buildings are objected to as being either hard on the operatives or producing dust, which would seriously interfere with the manufacturing process, wooden floors can be laid on top of the concrete. This increases the cost, but not seriously. The prejudice against concrete floors is largely dying out among employees in the average plant. For perhaps ten days a mill hand will find that his feet hurt if he is working on concrete, but after that he gets used to it and learns to wear thicker-soled shoes, and his complaints are likely to be few, because he realizes that the floors are there to stay, whereas he is necessarily not permanent. The great advantage of a concrete floor over a wooden one is that it can be easily washed and is of itself more sanitary.

Concrete walls do not need waterproofing. Because of the dampness in many concrete block bungalows the impression is that reinforced concrete buildings having walls of the same material are damp. This is quite the

opposite of the facts. The company with which the speaker is connected has erected over 280 reinforced concrete structures, representing over 100 acres of floor space, and in none of these buildings is there any trouble from dampness on the walls. In several buildings brick curtain walls were put on the front and rear and concrete walls on the sides. After heavy storms the 12-inch brick walls will show moisture, whereas the concrete walls have remained impervious. In this class of construction the concrete is placed quite wet and when set thoroughly the walls are very dense and homogeneous. During the process of drying out the walls will undoubtedly be damp, but as this rarely, if ever, takes over four months, the building is dry by the time the stams, partitions, heating, lighting, plumbing, elevators and other detail fittings have been installed.

Other Advantages of Reinforced Concrete

Long spans can be constructed of reinforced beams or girders in an economical manner, when compared with structural steel beams and girders. Where light loads, such as are occasioned by roofs, have to be carried, long steel trusses will, in most cases, be better. For heavy loadings reinforced concrete has been used up to 50-foot spans in a great many instances, and there are several cases on record of concrete spans running up to 70 and 80 and to 112 feet. These are, of course, exceptional, and are merely cited to give an idea of the general adaptability of this type of construction for buildings where travelling cranes have to be used or where large assembling rooms are on the first floor, and the ceilings have to be designed to carry loads on the floor above.

One of the principal advantages offered by reinforced concrete construction of buildings is the amount of light obtainable. In the ordinary mill construction building not more than from 30 to 35 per cent. of the wall area can be used for windows. Reinforced concrete buildings generally have 50 per cent. of their walls in window area, and if necessary 80 per cent. of the walls may be windows. This is possible because of the skeleton method of construction. The light in the interior of a reinforced concrete building is increased by the white, clean interior always obtained. The concrete is left as it comes from the forms, and is given a coat of cold water paint. From the very nature of the material, the construction is sanitary. Vermin are impossible, as there are no places for them to hide. The floors and walls can be washed down at any time, as the construction is waterproof.

Fireproofing

If there is one feature of this construction which has successfully withstood criticism it is fireproofness. The insurance rates applying on reinforced concrete buildings are as low as on any type of construction. In fact, some of the mutual fire insurance companies offer to write the lowest rates on concrete industrial buildings; lower, indeed, than on any other type of construction.

Where large plants are built of brick or stone the owner or architect may hesitate about using concrete construction, as it will contrast too sharply and be out of keeping with the other buildings. In such cases a skeleton of reinforced concrete can be erected and brick curtain walls filled in or brick bearing walls used. This scheme has been used on a great number of buildings throughout the country and has been found very satisfactory.

Comparisons of Cost

In most instances the determining factor in the choice of structural material for a new building is the cost. Reinforced concrete will generally run from 5 to 15 per cent. higher in first cost than first-class mill construction and from 10 to 20 per cent. lower than steel construction

fireproofed. A large warehouse in Brooklyn was begun in May, 1908. At that time new construction work was scarce, and all contractors, both in the concrete and steel lines, figured very closely to secure the job. The successful reinforced concrete figure on this particular building was \$80,000 lower than the best bid received on the same plans executed in fireproofed structural steel. A large factory in Philadelphia was designed in steel and estimates received on the original plans. The architects considered an alternative in reinforced concrete construction and saved the owner \$60,000. A large publishing house and loft building was recently completed in Springfield, Mass., of reinforced concrete throughout, thereby saving \$40,000 over the probable cost in steel. These three instances represent, respectively, savings of 12, 25 and 10 per cent. In competition with mill construction the percentage depends almost entirely on the size of the building. For structures costing \$40,000 and less, and of the height of four storeys or less, the brick and wood construction will run about 15 per cent. less than concrete. On larger buildings, however, concrete gets closer to the cost of the mill construction. The designers of a very large hardware building in Minneapolis were surprised to find that the estimate on reinforced concrete construction was slightly under that for mill construction. A similar case occurred in Toledo, Ohio. Both of these propositions, however, exceeded \$150,000 in value.

The initial cost should not be the only consideration. There are certain fixed charges which enter into the relative values of buildings. These may be briefly summarized as follows: Insurance, maintenance, depreciation, amount of light available, freedom from vibration, not destroy the building. It is difficult to put an exact elimination of vermin and the assurance that a fire can-monetary value on these items. Each plant manager would have his own views on the subject and local conditions would alter materially any assumptions. If, however, due consideration be given to the saving which can be obtained on each of these items by using a reinforced concrete building, it will generally be found that, even though the concrete structure cost, complete, 10 per cent. more than mill construction, there will be a saving annually of from $1\frac{1}{2}$ to 2 per cent.

Wisdom of Pleasing the Owner

If the plans are changed in any material way by the builder, there is a recourse, one that can be in a measure a preventive of any great differences, when the work has been gotten under way. Many builders of homes are sceptical about how a plan will work out until they see the same in actual erection or completion, and their ideas are often totally at variance with the plans they had first conceived. It would be well to make an effort to please the home builder, when such is within reason, and this can be done, provided there is some diplomacy used as the work progresses.

It sometimes happens that the plans are so complicated, to the builder of a structure, that the same will have a very great difference in the completed building, and as the work goes forward the owner should be permitted to make inspections at intervals, so that there will be less cause for differences when the contract has been completed. There is wisdom in sometimes making an effort to please even the crank, and in order to do this there should be taken into consideration in advance of any actual work at least a general conception of what the final outcome will be, so that there can be less opportunity for the builder to make unreasonable demands for changes that are not so specified in the contract.

New Provincial Railway Engineer for Alberta

Mr. R. W. Jones has been appointed Provincial Government Railway Engineer for Alberta. Mr. Jones will have the entire supervision of the branch lines now being built under government guarantee by the C.N.R., the G.T.P. and the main line of the Alberta & Great Waterways. He has recently had the superintendence of the construction on the main line of the G.T.P., from Winnipeg to Wolf Creek. The salary attached to his new position is about \$3,500. For more than 12 years Mr. Jones was in the service of the Great Northern and took a prominent part in the building of the Transcontinental from Havre, in Montana, to Seattle. He was also in charge of the construction of the Cascade tunnel. During 1908 he superintended the double tracking of the C.P.R., from Winnipeg to Port Arthur.

Interesting to Cement Buyers

To many of our readers, especially to those whose sphere of work lies in Eastern Canada, and more particularly in Toronto, the gentleman whose portrait is



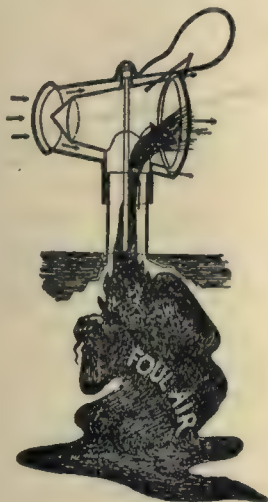
Mr. Alfred Rogers, of Toronto.

published herewith will need no introduction. Mr. Rogers is handling the output of the independent cement concerns, and having in view the results that he has accomplished in other fields of endeavor, we venture to predict that his name will soon be a familiar expression wherever cement is considered an important factor of present day development work in Canada. The office of the Alfred Rogers' concern is located at 307 Stair Building, Toronto.

We regret to report the death of Mr. Matthew Sheard, an old-time architect of Toronto. The late Mr. Sheard was born in Toronto and practised his profession there for upwards of 35 years. Among other places, he also practised in Chicago, where he took part in the rebuilding after the great fire. The deceased gentleman was a brother of Dr. Sheard, medical health officer for Toronto.

We regret to report the death of Mr. Jas. Weller, vice-president of the firm of A. Weller & Company, builders and contractors, Toronto. His death was due to typhoid fever, after an illness of but three weeks' duration. Mr. Weller was 32 years of age.

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Chas. Rogers & Sons, Limited, Toronto

A progressive Toronto concern, which for a period of more than a quarter of a century has been carrying on a successful trade in high class interior fittings and furniture, is Chas. Rogers & Sons, Limited. Some years ago this firm gave up the retail branch of its business and devoted its energies to the building up of a wholesale trade in furniture and to the extension of their business in interior fittings. Notable examples of the work executed in Toronto in recent years are to be found at the City Hall, "Telegram" office, Muller's cigar store and the College street library. To such an extent had the business expanded that the management decided last year, upon a complete reorganization and the appointment of an expert manager for the interior fittings department. A very busy year resulted, and the firm found it necessary to make an extension to their premises which affords an extra floorage for manufacturing purposes of 20,000 superficial feet. In the new premises are installed a complete plant of electrically driven wood-working machinery, devoted entirely to the manufacture of interior fittings. With such facilities, the firm has an unrivalled position to submit the right figure on all contracts pertaining to general carpentry and interior work

Average Cost of Laying Water Mains.—The following table rearranged from the report of the Engineer Department of the District of Columbia for the last fiscal year, shows the average cost per lineal foot for laying water mains of various sizes (including repairs to improved pavements) during the year ending June 30th, 1909.

Size.	3 in.	4 in.	6 in.	8 in.	12 in.
Lineal feet laid	919	1,281	586	58,200	5,135
Cost of labor per lin. ft..	\$0.377	\$0.423	\$0.485	\$0.0386	\$0.600
Materials, per lineal ft..	.401	.588	.601	.910	1.480
Repairs to pavements per lineal ft.	.441	.328	.097	.037	.167
Total	\$1.219	\$1.339	\$1.183	\$1.333	\$2.247

A Useful Book on a Useful Art

"How to write a business letter," is a matter upon which there are few people who would not be the better for a little advice. In a book with the above title, which has just been published by Gies & Company, of Buffalo, N.Y., the author, Chas. R. Wiers, of Buffalo, has set forth concisely and in an interesting manner, many of the salient points of letter writing. His ideas are those of the modern American business man, and are necessarily tinged with American ideals, but the broad principles are those upon which successful business letter writing depend. They are set forth clearly and forc-

bly so that in the greater number of instances they admit of no contention. A strong point is made of the common habit of employing useless expressions, which have received the sanction of long use, but which mean nothing and are really only an encumbrance to letter writing and reading. This class of expression will be quickly recognized from a few examples, viz., "we would say," "we beg to say," "allow us to explain," etc. These forms have arisen probably from a desire to improve the form of a sentence, or to introduce a subject gradually, but they have become meaningless, with long usage, and if one examines them critically they are worse than meaningless, as they are not sincere. Considerable stress is laid upon the necessity for brevity, courtesy, clearness, correct spelling, sincerity, etc. An excellent feature of the book is a large number of examples of letters illustrating the ideas which are dwelt upon. The book itself is to be commended for following the suggestions it contains. It is brief, concise, clear and well arranged, so that it is sure to be of value to any business man.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

289. Glass—A Newfoundland firm would like to get into communication with manufacturers of glass for filling in washboards.

292. Cement—A manufacturers' agent in Barbados who is handling several Canadian lines, desires to have correspondence with manufacturers of cement in Canada.

324. Gates, railings, etc.—A firm of architectural metal workers in the English Midlands making gates, railings, electric light fittings, etc., wishes to enter into correspondence with prospective agents or buyers in Canada.

325. Street paving process—A correspondent in London wishes to bring to the notice of interested parties in Canada a new sanitary, dustless street paving process.

Recent Canadian Patents

The following is a list of recent Canadian patents relating to contractor's appliances and building trades, and furnished by Fetherstonhaugh & Company, 5 Elgin street, Ottawa (Rus-sel S. Smart, resident):

123,689—Wm. Johnston, Wm. Hiron, Winnipeg, Man.; window sashes.

123,710—J. Cartwright, E. Wellington, B.C.; means for firing a blasting charge.

123,718—H. Conworth, Orillia, Ont.; cement brick machines.



HOISTING ENGINES

Some of the strongest friends of the M. & H. Hoists are to be found among the men who have owned and used them. For instance the following written by one of the Lumber Kings of Canada—a man who telegraphed us an unsolicited order for another Hoist not long ago.

"Answering your inquiry, I am pleased to state that the Hoists with which you supplied me some years ago have given good satisfaction and have been in pretty constant use ever since."

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Charlottetown, P.E.I.

Authority will be asked from the Legislature to issue debentures to the amount of \$15,000 for the purchase of a new pump.

Guelph, Ont.

The Public Works Committee have recommended the invitation of tenders for 1910, tar macadam paving, with concrete base, and a year's supply of sewer pipe and cement, while Engineer J. Hutcheon has advised the council to construct a tar macadam pavement on Waterloo avenue at a cost of \$27,118.

London, Ont.

Tenders will be received by O. Ellwood, secretary Water Commissioners, until March 19, for furnishing of the following supplies: Brass fittings, hydrants, valves and valve boxes, iron castings, cast iron pipe and laying, stopcock boxes, coal, lumber, oils, lead pipe, hardware, rubber boots, rubber washers, rubber valves, rubber hose, rubber packing, flax packing, cotton waste, brooms, metal polish, electric lamps, lanterns and glasses, Canadian Portland cement. John M. Moore, C.E., engineer and superintendent.

Montreal, Que.

The Board of Control are asking the City Council for \$900,000 to be spent on street repairs; \$15,000 will be required with which to engage experts in connection with water supply and filtration.

North Vancouver, B.C.

Tenders will be invited for 200,000 feet of sidewalk material required by this municipality. New specifications have been prepared, the tenders received in response to the last call not being satisfactory. Geo. Hanes, City Engineer.

New Toronto, Ont.

Tenders addressed to J. A. L. Macpherson, clerk, Islington, will be received until April 4th for the construction and completion of pipe sewers and appurtenances for a system of sewers at New Toronto. Plans, etc., at the office of the engineers, Murray & McAllister, Continental Life Building, or at the office of the above mentioned.

Regina, Sask.

On March 24th the ratepayers will vote on a by-law for the extension of the waterworks system.

Sydney, C.B.

This municipality is applying to the Legislature for authority to borrow money for waterworks extensions.

Toronto, Ont.

Tenders are being received until April 19th for the various sections of high level intercepting sewer, etc. See advertisement in this issue.

Vancouver, B.C.

Wm. McQueen, City Clerk, writes that the following tenders for galvanized iron pipe and brass were received:—Robertson-Godson Company, pipe, \$2,799.50; brass, \$3,451.02. Evans, Coleman & Evans, pipe, \$2,966.50. A. J. Forsyth, pipe, \$2,622.50. Fairbanks Company, pipe, \$2,825.70; brass, 3,787. B. C. Supply Company, brass, \$3,570.88. Crane & Company, pipe, \$2,823.50; brass, \$3,356.50. McLennan, McFeely Co., pipe, \$2,825.75; brass, \$3,524.37. Winterburn, \$2,910. Can. Brass Company, brass, 3,930. Barr & Anderson, brass, \$3,930. Successful tenderers given in last issue.

AWARDED.

Hamilton, Ont.

The Forwell Foundry Company of Berlin, Ont., have been awarded the contract for the boxings necessary in waterworks construction, \$1,143.

London, Ont.

The following contracts have been awarded in connection with equipment for Horton street pump house; turbine pumps, J. McDougall, Caledonian Iron Works Co., of Montreal, for \$5,640; motors, dynamos, etc., Lancashire Dynamo & Motom Company, Manchester, England, \$11,032; compressors and gas engines, G. H. & H. J. Daniels, Stroud, England, \$13,000; brick and stone work, B. V. Hole, \$9,000. The motor equipment will be ready for installation in June.

Stratford Ont.

The contract for broken stone for sewage plant has been awarded to Messrs. Deacon & Trow at \$1.05 per ton f.o.b. Stratford, delivery after March 15. It is estimated that between 7,500 and 8,000 tons will be needed.

Toronto, Ont.

Contracts for five sewers were awarded to the York County Paving Company, the total amount being \$4,613.

Vancouver, B.C.

Wm. McQueen, City Clerk, writes that the following contracts were awarded for pavements: Messrs. Warren Construction Company were awarded the contract for Georgia street, (bitulithic pavement); Messrs. Palmer Bros. & Henning for Beatty street (wood blocks), and Messrs. R. S. Blome Company for Howe street (granolithic). Noted previously.

Railroads, Bridges and Wharves

Brantford, Ont.

The ratepayers will vote on April 4th on debentures for new bridge over canal, \$50,000.

Tenders are being called until April 4th for supplying and erecting an 80 foot span steel bridge over Fairchild's Creek. See advertisement in this issue.

Tenders are being called until April 2nd for construction of Rispin bridge 80 feet span. Location, about one and three quar-

ter miles east of Cainsville, reached by T. H. & B. or G. T. R. Abutments to be of concrete, constructed by masonry, and will conform with masonry diagram to be furnished by the successful tenderer for the superstructure. Style, Warren truss riveted steel spans; length, 80 feet, centre to centre of bearings; width, 14 feet clear roadway; railing, latticed; floor, reinforced concrete, average thickness 6 inches. Tenders are also being called for other works. See advertisement in this issue.

Guelph, Ont.

The city engineer is calling for tenders until March 26th for the construction of a concrete arch bridge over the Speed river. For further particulars see advertisement in this issue.

Huntsville, Ont.

A deputation has left for Ottawa to seek assistance in improving wharfing facilities here. Mayor, Mr. A. E. Callahan.

Montreal, Que.

The Board of Railway Commissioners are considering an order for the construction of a bridge over the tracks of the Grand Trunk & Park & Island Railway at Rockfield, at the expense of the companies interested.

Ottawa, Ont.

The Railway Committee has passed the bill incorporating the Northern Quebec Colonization Railway. The bill granting an extension to the Kingston, Smith's Falls & Ottawa Railway was also put through along with that incorporating the Erie, London & Tilsonburg Railway.

P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, this city, is calling for tenders until April 12th for supply required for the equipment of the locomotive and other shops of the Transcontinental Railway at Springfield east of Winnipeg, Man.

St. Thomas, Ont.

Plans for the erection of the new M. C. R. roundhouse, it is understood, have been completed and, if weather permits, work will commence on the new structure the first of next month. Noted in issue of January 28th.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, City Hall, will be received until March 22nd for the construction of electrical conduit at railway crossings. Specifications at the electrical branch of the works department City Hall.

Victoria, B.C.

Tenders are invited until March 24th for the cutting and delivery of 40,000 tons. For particulars and specifications address H. E. Knobel, engineer, Empress Hotel, Victoria.

Tenders addressed to P. E. Ryan will be received until March 23rd for 24,766 tons of 80 lb. steel rails (open heart or Bessemer). Specifications on application to Gordon Grant, chief engineer this city.

AWARDED.**Calgary, Alta.**

The contract for the extension of the Tofield-Calgary line of the Grand Trunk Pacific from Camrose south to Calgary has been awarded at Winnipeg to J. D. McArthur, Limited.

Fredericton, N.B.

The following contracts were recently awarded by Hon. John Morrissey, Chief Commissioner of Public Works: Upper Mangerville low water wharf, Sunbury county, to Edward S. Banks, of Upper Burton, \$2,000; Dugway Bridge, Sunbury county, to Whitman Brewer, of St. Marys, \$300; Sheenstone Bridge, Albert county, to A. E. Smye, of Alma, \$4,600; York Mills Bridge, York county, to Frank Boone, of St. Marys, \$2,600; superstructure of Shediac Bridge, Westmorland county, to Dominion Bridge Company, Montreal, \$13,000; Johnston's Cove arch culvert, Charlotte county, to Joe McVay & Son, St. Marys, contract price about \$4,000.

St. Thomas, Ont.

The contract for the superstructure of the Port Burwell bridge was awarded to the Hamilton Bridge Company at \$4,840, and for the substructure to the Ontario Paving Company at \$2,700. The contract for the Dodd's bridge went to Scoype & Ramey at \$2,475. The closest competitors for the work were Powles & Gunning at \$2,588, and G. A. Ponsford at \$2,649.

Victoria, B.C.

The contract for the new G. T. P. wharf in this city has been awarded to C. J. Johnson & Company, Vancouver and Seattle.

Public Buildings, Churches, Schools, etc.

Arcola, Ont.

The citizens have under consideration the erection of a hospital.

Arrow Parks, B.C.

Tenders addressed to the Minister of Public Works will be received until March 31st for the erection and completion of a large one-room frame school building in the Ymir district. Plans, etc., at office of the Government offices at Nelson Revelstoke and at the office of J. N. Pennock, this place. F. C. Gamble, public works engineer, Victoria.

Brantford, Ont.

The ratepayers will vote on April 4 on debenture propositions, as follows: Public school extensions, \$30,000; new market buildings, \$100,000.

Brantford County Anti-Tuberculosis Society have had plans prepared for the erection of a consumptive hospital on Strawberry Hill, on the outskirts of the city. Ten thousand dollars have already been subscribed.

Brockville, Ont.

The council have received favorably a proposition made by local capitalists to spend \$25,000 on remodelling the opera house.

Chilliwack, B.C.

C. R. Sayer, travelling Y. M. C. A. secretary, has outlined plans for the establishment of a Y. M. C. A. here. Estimated initial cost, building and lot, \$8,000. A canvass will be made. Dr. Fraser and N. Anning are interested.

Calgary, Alta.

John L. McLaren, chairman Board of Control, is calling for tenders for painting and kalsomine work and also for the several works required in fitting up a lavatory at the City House of Refuge, for

which plans may be seen at the office of Stewart & Witton, architects, Hamilton Provident & Loan Building; also for painting and frosting at the Central Market buildings, and interior painting City Hall. S. H. Kent, city clerk.

Courtland, Ont.

Tenders addressed to D. W. White, clerk, will be received until April 2nd for the reconstruction of the old Town Hall. Plans at office of the above mentioned.

Dunedin, Ont.

Tenders addressed to Angus Campbell will be received until March 19th for the erection of a Presbyterian church. Plans at office of John Wilson, or at office of "The Star," Creemore.

Fredericton, N.B.

In the estimated expenditure brought down by the Provincial Treasurer, \$265,000 is mentioned for public works.

Forward, Sask.

A union church will shortly be built here.

Goderich, Ont.

St. Peter's Roman Catholic Church was completely gutted on the 12th inst. Estimated loss, \$15,000.

Hamilton, Ont.

Plans for the building of Nurse's Home are being called for until March 21st. Further information at office of Mr. J. H. Grayson, Main street.

Innisville, Ont.

The Anglican congregation are contemplating erecting a new church, to cost about \$5,000. Rev. Robert Farley is the rector.

Joliette, Que.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ottawa, Ont., will be received until March 22nd for amourey fittings. Plans at above Department, and on application to A. Durand, architect, Joliette, Que.

Kinistino, Sask.

The school building recently destroyed by fire will be rebuilt.

London, Ont.

The Talbot Street Baptist church are considering the erection of a new church. Mr. Walker Finch is chairman of building committee.

Moose Jaw, Sask.

The whole college will comprise three buildings, costing about \$300,000. Plans for a 3 storey brick and stone building to cost \$10,000 are being prepared.

Medicine Hat, Alta.

This municipality has decided to erect a \$10,000 isolation hospital this year. A vote will be taken next month to guarantee the bonds of the Agricultural Society for \$10,000. The money will be spent to erect additional stabling.

Montreal, Que.

A petition has been received from the town of Maisonneuve requesting the establishment of a civic public library.

Mr. Rawson Gardner, 812 New York Life Building, is the architect in charge of the erection of the Tabernacle Baptist Church, 309 Delorimier avenue. Estimated cost, \$12,000.

Mr. J. Rawson Gardiner, architect, New York Life Building, is preparing plans for a new Baptist Church to be erected on Delorimiere avenue.

It is stated that the Jesuit Congregation

of St. Mary have under consideration the extension of their church building on Bleury street. Estimated cost, \$300,000.

Mr. Dalbe Viau, architect, 76 St. Gabriel street, is preparing plans and specifications for a new school building containing sixteen class rooms for the Hochelago School Commissioners. This building will be erected on Stadacona street, between Joliette and Chambly streets. It is expected that plans will be finished in the course of two weeks.

New Westminster, B.C.

The proposition of selling the City Hall site and erecting a new civic building over the market square has been advocated by the Board of Trade and will be suggested to the city council shortly.

Niagara Falls, Ont.

Plans for the new armory have been inspected and found satisfactory. It will be 75 by 10 feet constructed of red brick and white stone. The plans call for the expenditure of \$70,000.

Prince Rupert, B.C.

The post office here will be erected shortly.

Palmerston, Ont.

Weston Presbyterians will erect a \$10,000 Sunday school during the coming summer.

Port Arthur, Ont.

Work is to start shortly on the new Y. M. C. A. building on Algoma street which is to cost \$40,000. The plans of D. W. Nichols of Winnipeg, have been accepted.

Rainy River, Ont.

A modern hospital will be erected here.

Regina, Sask.

A by-law to provide for the erection of a \$16,000 market building will be submitted to the ratepayers March 24.

St. Catharines, Ont.

Architect A. E. Nicholson was the successful competitor among the four who submitted plans for the Fonthill school. Noted in last issue.

Saskatoon, Sask.

The Trustee Board of the Natuna Methodist Church are getting plans for a church and school to cost \$60,000.

Saskatoon, Sask.

The time for receiving tenders for the University of Saskatchewan has been extended to March 29th.

The citizens have voted down the by-law to provide \$110,000 for hospital extension.

Toronto, Ont.

A communication was received at the Council from the Provincial Government stating that they would purchase the Bloor street site, and that about June 1st they will begin to build. The plans for the Northwest High School were submitted by Superintendent Bishop, and were approved.

The City Clerk was instructed to advertise for tenders for the construction of the building for the new fire alarm system. Fire Chief Thompson having reported that the matter was of great urgency, as the present system is totally inadequate to the city's needs.

The by-law to raise \$250,000 for the new Toronto General Hospital and \$271,000 for water works extensions will be submitted on April 9th.

Tenders addressed to E. S. Caswell, secretary-treasurer, public library, will be received until March 29th for the supply

of hardware for the Branch Library, corner of Gerrard street and Broadview avenue.

The permit has been granted for the new Wychwood Presbyterian Church at the corner of St. Clair avenue and Vaughan road, to cost \$25,000.

The Presbyterian Church corner of St. Clair avenue and Vaughan road, will be replaced by a new one to cost \$35,000. Rev. W. A. MacTaggart, pastor.

Vancouver, B.C.

A club to be known as the Vancouver Motor Club has been formed, of which the following Vancouver citizens are members: Messrs. B. T. Rogers, C. M. Marpole, R. H. Spencer and others. A site for a club house has been secured about 18 miles from this city. Messrs. John Waterson and Kennerley Bryan, associated architects and engineers, have designed plans.

The building inspector has been instructed to prepare plans at once for the two new fire halls in Fairview and East Mount Pleasant.

Weyburn, Sask.

F. S. St. John will erect an opera house here to seat 1,000.

Wynyard, Sask.

The Church of England will build this year. Mr. Salter, Bosworth street, is secretary.

Winnipeg, Man.

The Kildonan municipality will erect a school on Munro avenue, if the by-law is carried on March 17th.

The Salvation Army contemplate a model farm on which \$35,000 will be expended on buildings.

Albert Chamberlain, president British Welcome League, Yonge Street Arcade, Toronto, Ont., was in the city recently. The erection of a building is being considered.

Plans are now being prepared in the school board office for two technical schools which will cost approximately \$250,000. These plans will be completed as soon as possible, as it is anticipated work on the buildings will be started early this spring.

At a conference between the Schuberts, and George C. Tyler, of Liebler & Company, New York, it was decided to build twelve new theatres on the Pacific coast and adjacent territory. One of the theatres will be located at Winnipeg, and another at Vancouver and will cost about half a million each.

The building committee has recommended that tenders be called for the new school in the Rosedale district.

Tenders addressed to James Chisholm & Son, architects, 310 Enderton building, corner Portage and Hargrave, will be received until March 22nd for the erection of a brick church for the Trustee Board of Young Methodist Church.

Tenders for the erection of the Orpheum theatre on Fort street close on March 15. It is intended to begin construction as soon as the building season opens, and to rush the building to completion. Plans have been prepared by J. D. Atcheson. Probable cost, \$250,000.

The Abattoir Bill of the Government has been prepared regarding appropriation of \$50,000 to assist in the establishment of a public market and abattoir.

Tenders addressed to J. H. G. Russell, architect, Silvester-Willson Building, will be received until March 15th inst. for the work and materials required in the erection and completion of a stone and brick

church for the Fort Rouge Methodist congregation.

AWARDED.

Burk's Falls, Ont.

The Trustee Board of the Methodist Church awarded the contract for the reconstruction of church to P. W. Robinson. W. Trivett, superintendent of work.

Collingwood, Ont.

Tenders for the improvements to Central School were awarded as follows: Masonry, A. Court, \$2,800; carpentry, D. Bell, \$1,191; plastering and cement, John Lockton, \$952; painting and glazing, J. Godden, \$340; heating and plumbing, W. Parrott, \$5,563. Total, \$11,166.50.

Dauphin, Man.

We are informed that the contract for school at Gilbert Plains has been awarded to Craig Bros., of Dauphin, at \$19,350. Other tenders were as follows: A. Snyder, \$19,560; D. L. Hanks, \$21,300; Fraser & Simmons, \$20,040; I. F. Hafenbrak, \$24,000. The tenders for heating and ventilation have not yet been received.

Dundalk, Ont.

\$3,000 will be spent on a new school house.

Hamilton, Ont.

Tenders for the addition to No. 3 police station were accepted as follows: Masonry, Richard Tope, \$12,000; carpenter work, Drake & Drake, \$3,831; paint, Tamp & Son, \$600; plastering, J. Clapham & Son, \$1,098; plumbing and gas heating, Drake & Avery, \$2,921; roofing, Thos. Irwin & Son, \$425. Total, \$21,000. Those for the steel cellar aer still to be considered.

The following contracts have been awarded in connection with the erection of the Church of the Epiphany: Brick work, John Aldridge & Son, 273 Crawford street; carpentry, Thos. Painter & Son, 333 Huron street; plastering, T. Gander & Son, 38 Marian street; painting, Joseph McCausland & Sons; steel, W. H. Salter, 97 River street. Total cost, 40,000. Gordon Helliwell, Confederation Life Building, Toronto, architects.

The following tenders were accepted for the Kimberley avenue eight room addition: Masonry, G. T. Grafton, \$14,500; carpentry, Frank Armstrong, \$7,414; plastering, George White, \$2,216; painting, J. R. Robinson, \$1,120; plumbing, Keith & Fitzsimmons, \$1,500; steam heating, Keith & Fitzsimmons, \$2,650; structural steel, W. H. Salter, \$4,325; cement work, W. H. Salter, \$2,115; ventilation, Johnston Temperature Company, \$566; wiring, Hall & Dolery, \$61; tiling, A. Gardner & Company, \$2,870; steel for tiling, W. H. Salter, \$2,115. The total cost of the addition is \$36,212, as far as the tenders accepted are concerned. The estimated cost was \$35,000, and the addition results from several changes or additions to the original plans by the Board.

Moose Jaw, Sask.

The contract for alterations to the city hall has been awarded to Willoughby & Haye.

Montreal, Que.

The following is the list of tenders received by the Montreal Technical School Board for the installation of plumbing and heating system: Tremblay & Francheur, \$73,642 (accepted); T. Latourrelle, \$94,995; Garth & Company, \$74,750; Jas. Ballentyne, \$82,000; Evans & Almorale & Company, \$81,772; W. J. McGuire & Company, Limited, \$76,797.

Contracts have been let by the Building Committee of Outremont Presbyterian

Church for their new building as follows: Excavation, concrete, brick and masonry work, James Young; carpentry and joinery, Chas. Frost; roofing and damp proofing, Metal Shingle & Siding Company; plastering, Frank Charles; painting and glazing, W. E. Potter & Sons; electric wiring, McDonald & Willson; plumbing and heating, Alex. Mackay & Company. Mr. Jas. E. Adamson, architect, Coristine Building.

Mr. M. Rubenstein, electrical contractor, St. James street, has been awarded the contract for the electric wiring in the new Arthur School. A. F. Dunlop, Lindsay Building, architect.

Owen Sound, Ont.

Alex. Green and J. C. Grier have been awarded the contract for the erection of the West Methodist Church, \$24,737.

Ottawa, Ont.

John Henderson, City Clerk, sends in the following list: Tenders for changes and fittings in Howick Hall, Lansdowne Park, for purposes of Spring Horse Show. Plans and specifications prepared by Architect Noffke: (1) Smith Bros., \$1,181. (2) J. W. Featherston, \$2,527. (3) A. G. Marshall, \$2,600. No. 1 accepted.

Regina, Sask.

Wilson & Wilson were awarded contract for the new school on a bid of \$68,730. A Winnipeg bid received was next at \$78,000.

Toronto, Ont.

The contract for the roofing and sheet metal work on the Bonar church, College and Lansdowne, has been awarded to A. B. Ormsby, Limited, corner Queen and George streets.

The Minister of Public Works has awarded the contract for the whole of the new north wing to Fred Holmes & Company, 1113 Yonge street, for \$517,000. The new wing will contain the library, Department of Education, Ontario Railway Board and Hydro-Electric Commission. Work will be started on the foundation laid last fall as soon as weather permits.

Residences

Morris, Man.

James Lewis will erect a \$7,000 brick residence. Architect, H. B. Rugh.

Montreal, Que.

Lt.-Col. Burland has purchased a lot at the corner of Pine and Cedar avenues, with a frontage on Pine avenue of 225 feet and on Cedar avenue of 375 feet, with the intention, it is stated, of erecting a large residence.

Mr. C. Dufort, architect, La Patrie Building, is preparing plans for flats containing twelve dwellings to be erected for the Rodier Estate in St. Henri. These plans will be prepared in the course of two weeks.

J. Seath Smith, architect, 207 St. James street, has prepared plans for alterations of residence of Mr. F. W. Gross and has called for tenders.

Tenders are now being received by Messrs. Ross & Macfarlane, architects, 1 Belmont street, for the erection of a residence on Sydenham avenue, Westmount, for Mr. F. W. Evans.

Plans for six houses to be erected on Bloomfield avenue, Outremont, are being prepared and tenders will be called for on or before March 31st, 1910. Mr. Jas. E. Adamson, Coristine Building, architect.

Plans are being prepared and tenders will be called for on or before 24th March,

for block and flats to be erected on Edward Charles street, Park avenue, for Roland Desjardins, Esq. Mr. Jas. E. Adamson, Coristine Building, architect.

Ottawa, Ont.

J. W. H. Watts, architect, is taking prices for alterations to the residence of Mr. W. P. Davis, Wilbrod street, to cost about \$12,000.

J. W. H. Watts, architect, is preparing plans for a residence for Mr. Robt. Craig, Glen Falls, Ont., to be solid brick, and costing about \$10,000.

Recent building permits include: Wm. Bishop, brick veneer dwelling, Carling avenue, \$4,200; T. J. Somerville, brick veneer dwelling, Harvey street, \$2,000; F. L. Campbell, brick veneer dwelling, Nelson street, \$4,000; St. Germain and Fraas, brick veneer dwelling, Carling avenue, \$4,000; Jos. Alexander, brick veneer dwelling, McLeod street, \$2,500; J. R. Irvin, three brick houses, Bell street, \$6,000; W. Lamb, two brick dwellings, Frank street, \$6,400.

Smith's Falls, Ont.

R. J. Dougall has purchased lots here on which he intends to build three residences. He has also material on the ground for a house in Winchester, Ont.

Toronto, Ont.

A building permit has been granted to Archbishop McEvay for a two storey brick dwelling on Wellesley street, near Wellesley crescent, to cost \$20,000.

Winnipeg, Man.

McKim & White, the firm of New York architects, Union Bank building, have partially completed plans for a residence to be built in the south end for E. L. Taylor, K.C., \$20,000.

H. B. Rugh has completed plans for a \$6,000 brick veneer plaster stucco finish residence for A. H. Aldinger, to be erected in Crescentwood also plans for a similar residence for J. H. Tremblay, which will also cost about \$6,000.

AWARDED.

Montreal, Que.

J. Montgomery Rodden, architect, 8 Beaver Hall Square, has awarded the contract for interior mantelling and panelling in the house being erected on Roslyn avenue for Mr. Rodden, to V. E. Traversy, Papineau avenue.

The contract for electric wiring in four houses which John Stewart & Company are erecting on Roslyn avenue has been awarded to Mr. Rubenstein.

Mr. Jos. Sawyer, architect, 401 Guy street, has awarded contracts for the erection of a cottage on St. Joseph boulevard, Outremont, for Mr. A. Delorme, as follows: Masonry, Desjardins & Labelle; brick, C. Morin; plumbing, heating and roofing, T. Lessard & Fils; painting and plating, Joe Guy; electric wiring, J. A. St. Amour; tiling, Robert Ball.

Business Buildings and Industrial Plants

Brandon, Man.

It is stated that the Royal Range Company has secured temporary premises in the Atwell block on Eleventh street for their Western branch.

Chatham, Ont.

It is announced that the negotiations between local capitalists and the Anhut Mo-

tor Car Company, of Detroit, have been completed and that the present plant will be enlarged to three times its present capacity.

Cardston, Alta.

The Cardston Implement Company is erecting a two storey brick building for store and office purposes.

Edmonton, Alta.

A half million dollar packing plant is to be erected here shortly by P. Burns & Company, of Calgary.

Tenders are being called by the undersigned until March 18th for the erection of the Canada Permanent Building. Plans, etc., at Builders' Exchange, and at the office of the architect, R. W. Lines, this city.

Georgetown, Ont.

A large extension will be made to the Coating Mills. The Sykes factory will also be enlarged.

Hamilton, Ont.

It is stated that John A. Bruce Company will extend their warehouse and storehouse, and that E. T. Wright & Company will enlarge their factory.

Stewart & Witton, architects, have taken out a building permit for three 3 storey brick buildings on Macnab street, between King and Main streets, for Mr. John A. Bruce, \$43,000.

The Hamilton Bridge Company has purchased the Williamson property at the southwest corner of Bay and Barton streets, and intends to commence work at once on a fine office building, fireproof and completely modern in every particular.

Halifax, N.S.

A local report states that a representative of a large English cement manufacturing concern has been investigating the Maritime Provinces as a future field for establishing cement works, to be operated independently of the Canadian merger formed.

Lethbridge, Alta.

J. M. Reding will have a business block, 28 by 60 feet, erected, with public hall overhead.

London, Ont.

The Hobbs Manufacturing Company have a permit for a new factory on York street to cost \$10,000.

W. R. Jamieson will build a reinforced concrete building, 40 x 60. Plans, etc., at 74 King street.

Minnedosa, Man.

Tenders are being called until March 28th by the C. P. R. central division for the construction of a new station. Plans, etc., at the office of the Resident Engineer, Brandon, and the Division Engineer, Winnipeg. Frank Lee, Division Engineer.

Macleod, Alta.

C. George will put up a business block. Stone will be used from the Geuge quarries.

Melfort, Sask.

A creamery will be built at once. Ira Mousse is secretary of building committee.

Whitmore Bros. will put an extra brick storey on the laundry and dry cleaning establishment, to cost \$8,000.

Montreal, Que.

The sale of 24,000 square feet of property on St. Catherine street west, West-

mount, to Mr. Daniel Ford is recorded. It is stated that Mr. Ford will commence the erection of a large store building on this property in the spring. The frontage on St. Catherine street is 200 feet.

Mr. Theo. Daoust, architect, 103 St. Francois Xavier street, will receive tenders until March 16th for the construction of a concrete and steel restaurant building at Isle Grosse Bois, for the International Park & Amusement Company. This building will be 260 feet by 106 feet in extent.

Messrs. Finley & Spence, architect, are preparing plans for additions to the building adjoining Bennet's Theatre, St. Catherine street, for this theatre company. It is expected that the plans will be finished and tenders called for in about ten days.

Mr. L. R. Montbrian, architect, 230 St. Andre street, has prepared plans for the erection of a store building for Mr. M. Ethier at the corner of Visitation and St. Catherine streets. Tenders on this work close March 15th.

Mr. Eugene Payette, architect, 15 St. James street, is preparing plans for the erection of six additional buildings at the corner of Delorimiere avenue and Logan street, for Messrs. S. Barsalou & Company, Limited, soap manufacturers. Mill construction will be employed for the erection of these buildings and they will vary in size from 100 feet to 50 feet to 120 feet by 55 feet. It is expected that tenders will be called on this work in the course of two or three weeks.

Mr. William Harris, president of the Ritz series of hotels in Europe and America while in Montreal arranging for the building of a Ritz hotel, stated that capital had all been subscribed and that construction would start this spring. No site has been selected as yet.

Nelson, B.C.

A large business block will be erected this spring by J. E. Annable, of stone and brick, containing six storeys, and three storeys of offices and apartments.

North Battleford, Sask.

Johnson & Mair will open implement show rooms and a garage at an early date, and will erect an addition to the warehouse immediately, and later on a cement block building.

Ottawa, Ont.

Messrs. Horwood & Taylor, architects, are taking prices for extensive alterations to the Graves Bros.' store, corner Sparks and Metcalfe streets, preparatory to the premises being occupied by Messrs. Beaumont & Johnston, men's furnishing business.

Hugh Carson, Limited, whose business was destroyed by fire recently, are altering and improving the old Free Press building on Elgin street for occupancy.

The Mark-Brock Enterprises, Limited, of Montreal, are negotiating for a centrally located property for the purpose of erecting a theatre. William Jacobs, A. R. Hall, G. S. McLeish, D. S. Friedman, and L. Fitch, of Montreal, are interested.

Newmarket, Ont.

A local option hotel will be built at Newmarket to cost \$40,000.

Ottawa, Ont.

A. Rosenthal & Sons, 113 Sparks street, will erect a 7 storey 69 x 99 building on their property on the north side of Sparks street. Estimated cost, \$125,000. Work will be commenced on May 1st.

Port Colborne, Ont.

Application will be made to the Dominion Government for a lease of the vacant

land on the east side of the harbor as a site for a cork industry which is anxious to locate here.

Portage la Prairie, Man.

A. M. Williams, secretary of the Nelson Paper Company, of Minneapolis, Minn., stated that his firm has found it necessary to erect a factory in Western Canada. Winnipeg and this city are being considered. Mr. Coleman, local secretary, Board of Trade.

It is reported that the Urban Mutual Insurance Company will build in the rear of the post office on Campbell street.

Port Dalhousie, Ont.

The George Wilson Building & Contracting Company of St. Catharines will commence work on a new warehouse for the Maple Leaf Rubber Company as soon as weather permits.

Port Arthur, Ont.

Work on the Port Arthur Steel & Wagon Works will be begun as soon as the building season opens.

Regina, Sask.

W. J. Hammond, furrier, of Winnipeg, has purchased a site here for store building purposes.

Geo. R. Rastail, of the Brush & Overland Company, has decided to invest \$150,000 in a manufacturing plant at Regina.

Hang Bros. & Nelleshoe Shoe Company, of Toronto, will likely build a warehouse here.

G. S. Wood is to have a fireproof building 50 by 100 feet, costing \$25,000. Storey & Van Egmond, architects.

The Walkover & Amherst Shoe Company, and Harry Bros., of Hellenoe, contemplate the building of warehouses here, \$20,000.

A. M. Fraser contemplates erecting a sash and door factory.

Lees & Perse are having a steel and brick warehouse built here.

P. McAra and A. Mowat will have separate store buildings erected. Both will be three storeys, brick. Work to start April 1st.

Mayor R. H. Williams, Ald. Sinton, Ald. Darke, and City Solicitor H. Y. Macdonald have been in Winnipeg negotiating with the various railway companies regarding a union depot.

The following are planning to build: Regina Plumbing & Heating Company, warehouse and office, \$40,000; Farmers' Co-Operative Company, J. H. Trainer, agent, warehouse, \$15,000; Egg-O-Baking Powder Company, factory, \$5,000.

There is talk of Geo. Christie Company, Limited, of Glasgow, establishing a plant in Winnipeg.

Saskatoon, Sask.

Jas. Priel will have a two storey warehouse, 30 by 100 feet, erected shortly.

John East, of Edmonton, will erect a foundry in Saskatoon.

Lemery & Dennison will have a business block erected here. Two storeys, concrete and brick.

St. John, N.B.

Mayor Bullock has received from Ottawa the plans of the proposed sugar refinery to be built by F. O. Durant.

St. Romuald d'Etchemin, Que.

The taxpayers have voted a bonus of fifteen thousand dollars and exemption from taxes to the St. Lawrence Car Works.

St. Thomas, Ont.

The Nursery Shoe Company, of Toronto, have completed arrangements for their

locating here. Plans have not yet been made for the new building. A. E. Medcalf is interested.

Property has been purchased at the corner of Centre and Metcalfe streets, on which the foundry of C. Norseworthy Company will be extended.

Toronto, Ont.

The property at the southwest corner of Bay and Barton streets, it is announced, has been purchased by the Hamilton Bridge Works as a site for an office building.

Tenders addressed to Darling & Pearson, 2 Leader Lane, will be received until March 22nd for the various trades required in the erection of a five storey building on the corner of King and Bay streets. Plans, etc., at office of the above.

Uxbridge, Ont.

Tenders are being called until March 21st for the erection of a brick printing office and moving the present office building. Plans, etc., at office of the "Journal."

Vermilion, Alta.

Peter Wiebe, of Langham, Sask., will have a flour mill erected here. Work starts March 25.

Victoria, B.C.

A building permit has been issued for a three storey brick building with frontage of 120 feet on Government street to cost \$30,000. Architect, C. E. Watkins, 606 Fort street. Thomas Brydon, contractor.

A permit has been issued to W. K. Houston for a 2 storey warehouse on Pisgah street, south side, between Blanchard and Quadra streets, at a cost of \$7,000.

Vancouver, B.C.

The Vancouver Milling & Grain Company called for tenders last week for excavating. Further information may be had at their office, corner of Cambie and Smith streets.

A building permit has been issued to the Dominion Steam Laundry, northwest corner of Lansdowne avenue and Ontario streets. Estimated cost of block, exclusive of machinery, \$35,000.

A handsome building of reinforced concrete to be erected on Hastings street for C. Tweedale will be faced with white glazed brick and the ornamentation modelled in cement. Wm. F. Jones, architect.

A store and apartment block to cost \$52,000 is to be erected for A. E. McEvoy and E. W. McLeod. The building will be of brick, the ground floor being occupied by eleven stores, while the two upper storeys will be laid out in apartment suites.

Westmount, Que.

It is announced that Daniel Ford, contractor, has purchased land west of Greene avenue on St. Catherine bounded by Clark avenue, extending to Oliver avenue on the east, where it is stated, a large store will be built.

Winnipeg, Man.

At the corner of Bannatyne avenue and Adelaide street a five storey block, 66 by 99 feet, will be erected early this spring for the Henderson Manufacturing Company. It will be constructed of brick and stone and will be laid out for a warehouse and office building. Cost, \$35,000.

Plans for a 2 storey store and office building to be built on Hargrave street, immediately adjacent to the new Enderton block have been prepared by H. B. Rugh, architect. The block building will be erect

ed for the Winnipeg Land & Mortgage Company at a cost of approximately \$17,000.

McElroy & Hurtubise, of Montreal, are contemplating early erection of a \$40,000 tannery at St. Boniface.

Tenders are wanted, separate or bulk, for excavation and erection of stone and brick apartment block. A. C. Gardiner, 496 Main street.

A fur goods factory is to be put up on Princess street by several ex-Hudson Bay Company's men.

The Manitoba Glue Company will erect a plant. John McKay, Jas. Power and H. E. Ridgdale are interested.

The sale is reported of the southwest corner of Flora avenue and Main street by J. C. Miller, to an Eastern firm. It is said that the new owners will use the property as a site for a factory and that an extensive plant will be erected.

The Thomas Ryan Shoe Company will erect a big warehouse at Saskatoon.

Lewis & Edwards have secured a permit for the erection of a store building, corner of Rathgar and Pembina, \$7,000.

J. W. Sherwin is the financial agent for the seven storey office building to be erected on Smith street at an approximate cost of \$100,000.

Carter, Halls & Aldinger are the contractors for the \$30,000 garage which is being erected on Garry street in the rear of the Free Press building. Alloway & Champion, financial agents.

W. W. Blair, architect, is calling for tenders for the purchase and removal of the buildings on the O'Connor hotel site.

The Mullins' Tanning Company are under the necessity of again enlarging their building.

D. Bellhouse, architect, has plans completed for Dr. Martin's \$25,000 building, and tenders are wanted.

The Doty Engine Works Company, of Toronto, Ont., (F. W. Doty, of Toronto, superintendent), has obtained a site for its proposed shipyard at the foot of Water street; in connection therewith the company will operate a machine shop and boiler works for the construction of the machinery required in building steam craft.

Yorkton, Sask.

The Bank of Toronto will erect a three storey building.

AWARDED.

Calgary, Alta.

Contract was awarded to the Carter, Halls, Aldinger Company, of Winnipeg, Man., for a 6 storey business block for Leeson & Lineham. It will be of cement and concrete construction and will cost \$125,000.

Humberstone, Ont.

The contract for the construction of the Imperial Bank building has been let to P. S. Peacock, of Welland.

Montreal, Que.

Messrs. Ross & McFarlane, architects, 1 Belmont street, have awarded contracts for the remodelling and alterations to the Riordan Paper Company's property at No. 1 Beaver Hall Square, as follows: General contract, C. J. Brown; roofing, Geo. W. Reed & Company, Limited; plumbing and heating, Jas. Ballantyne; electric wiring, M. Rubenstein.

Messrs. Ryers & Anglin have been awarded the general contract for the construction of additions and alterations to

(Continued on page 28)

Tenders and For Sale Department

CITY OF STRATFORD

Tenders will be received until 5 p.m. MARCH 29TH, 1910, for approximately 57,000 square yards of Pavement. Specifications and particulars may be had on application. Lowest or any tender not necessarily accepted.

M. FERGUSON,
City Engineer.

12

To Heating Contractors

Sealed tenders addressed to the undersigned will be received until noon on FRIDAY, THE 8TH OF APRIL, 1910, for the installation of a Steam Heating System to heat the Court House and County Buildings in Peterborough.

Particulars for guidance of parties tendering can be had on application to the undersigned.

ED. M. ELLIOTT,
County Clerk.

Peterborough, March 5th, 1910. 12

Tenders For Gas Franchise

Bids, sealed and endorsed "Gas Franchise," will be received by the City Clerk of the Corporation of the City of Fort William, up to APRIL 1ST, 1910, for the letting of a Gas Franchise, including construction of Plant, Mains, etc., and operation.

Conditions, specifications and form of tender, on which bids must be submitted, can be obtained from the undersigned.

Lowest or any tender not necessarily accepted.

JOHN WILSON,
Assistant City Engineer,
Fort William, Ont.

12

TENDERS

University of Saskatchewan

Sealed tenders, addressed to the undersigned, will be received not later than the 29TH DAY OF MARCH, 1910, for the different trades required in the erection of the College Building, Students' Residence, Power House, Live Stock Pavilion, Agricultural Engineering Building, on the University Grounds in Saskatoon.

The right to reject any or all tenders and to waive any defects or irregularities therein, is to be at the discretion of the Board of Governors.

Tenders are to be made on forms furnished by the architects.

Each tenderer is to enclose with his bid an accepted cheque for 10 per cent. of the amount of his tender, which deposit will be forfeited if the tenderer fails to execute the contract and bond when requested, and will be returned to the unsuccessful bidders when the contract is signed.

Plans and specifications may be seen at the office of the University, Saskatoon, Sask., or at the office of the Architects, David R. Brown and Hugh Vallance, Canada Life Building, Montreal, Que., and at the rooms of the Builders' Exchange, Winnipeg, Man.

WALTER C. MURRAY,
President.

Saskatoon, Sask., February 21st, 1910. 11

Tenders For Gaol Heating

Tenders will be received by the undersigned until noon on SATURDAY, MARCH THE 19TH, 1910, for the heating of the County Jail at the Town of Barrie, according to plans and specifications which may be seen on application to H. W. Beardsley, County Clerk's Office, Court House, Barrie. All tenders to be sealed and marked "Tenders for Gaol Heating" and addressed to

C. J. PICOTTE,
Chairman County Property Committee,

Box 128 Penetanguishene, Ont.

Tenders for Bridge

Sealed tenders, addressed to the undersigned, will be received up till 10 o'clock a.m., on MONDAY, THE 4TH DAY OF APRIL, 1910, for supplying and erecting an 80-foot span Steel Bridge over Fairchild's Creek in the Township of Brantford.

Further particulars may be had on application to the undersigned.
The lowest or any tender not necessarily accepted.

J. A. SMITH,
Township Clerk.

Brantford, March 8th, 1910. 11

Tenders for High Level Intercepting Sewer, Toronto

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, Toronto Canada, endorsed "Tender for Section No. 1, High Level Interceptor" or "Tender for Don Syphon, High Level Interceptor," etc., as the case may be, for the construction of the several sections of High Level Interceptor mentioned below, will be received by registered post only, until noon of TUESDAY, APRIL 19TH, 1910.

The following are the sizes and approximate lengths of the various sections:

1. Section No. 8, flattened shape, 1216 linear feet, 7-foot 10-inch by 10-foot.
2. Section No. 7, circular, 3246 linear feet, 9-foot 6-inch diameter.
3. Section No. 1, circular, 2072 linear feet, 9-foot 8-inch diameter; and 1836 linear feet, 9-foot diameter.
- (Total length Section No. 1, 3408 linear feet.)
4. Section No. 2, circular, 2993 linear feet, 8-foot 9-inch diameter.
5. Don Syphon (crossing under River Don).

Specifications may be obtained from, and original drawings will be on file and can be seen at the Main Drainage Department, City Engineer's Office.

For the convenience of contractors, sets of blue prints have been prepared and will be issued to contractors upon the deposit of \$10.00, which amount will be refunded upon return of blue prints in good condition within thirty days of receiving tenders.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto, March 10th, 1910. 12

Tenders for Bridge

Sealed tenders will be received by the undersigned up to noon on SATURDAY, MARCH 26TH, 1910, for the construction of a Concrete Arch Bridge consisting of three spans of 88 feet each, over the River Speed about three miles north of this City.

Plans, specifications and form of tender may be obtained upon application to the undersigned.

The lowest or any tender not necessarily accepted.

JAMES HUTCHEON,
Engineer.

Guelph, March 14th, 1910. 12

TENDER

City of Moose Jaw, Sask.

Pavments and Sidewalks

Sealed tenders addressed to the undersigned and endorsed "Tender A," "Tender B," and "Tender C," will be received until 8.30 o'clock p.m. on MONDAY, APRIL 11TH, 1910.

Contract "A"—Furnishing material for and constructing 33,300 square yards of pavement.

Contract "B"—Furnishing material and constructing 13,500 lineal feet of combined curb and gutter.

Contract "C"—Furnishing material for and constructing 116,500 square feet of concrete sidewalk.

Plans and specifications and form of tender may be obtained at the office of Angus Smith, City Engineer, Moose Jaw, Sask.

The lowest or any tender not necessarily accepted.

(Sgd.) W. F. HEAL,
City Clerk.

Moose Jaw, Sask. March 8th, 1910. 12

Department of Railways and Canals

Sault Ste. Marie Canal

Tenders for Supplies for the year 1910

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Supplies," will be received at this office up to 16 o'clock on THURSDAY, THE 17TH MARCH, 1910, for the supply and delivery of Timber, Hardware, Electrical and various other supplies required for use on the Sault Ste. Marie Canal for the year 1910.

Specifications, forms of Tender and full information may be obtained at the office of the Superintending Engineer, Sault Ste. Marie, Ont., on and after Monday, the 28th February, 1910.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 28th February, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 11

Tenders for Concrete Work

Sealed tenders, addressed to the undersigned, and marked "Tender for Bridges," will be received up till noon, on SATURDAY, THE 2ND DAY OF APRIL, 1910, for the construction of the following works in the Township of Brantford:—

1. Concrete abutments on piles for the Rispin Bridge 80 feet span.
2. A reinforced concrete bridge, 24 feet span.
3. A reinforced concrete bridge, 16 feet span.
4. An 8-foot concrete arch.
5. A 6-foot concrete arch.

Plans and specifications may be seen at the office of the undersigned, or at the office of W. H. Fairchild, C.E., Township Engineer.

The lowest or any tender not necessarily accepted.

J. A. SMITH,
Township Clerk.

Brantford, March 8th, 1910. 11

Plant for Sale

For Sale:—The following Second-Hand Plant, located at Durham, Ont., or portion thereof. The whole lot at a reduced price,

- 25 No. 3 American, square pan, wooden hub, Wheel Scrapers.
- 28 No. 3 K. & J., round pan, iron hub, Wheel Scrapers.
- 6 No. 3 Western, square pan, with doors, Wheel Scrapers.
- 7 No. 2, K & J, round pan, iron hub improved, Wheel Scrapers.
- 55 Doors and Gates, for No. 3 Wheel Scrapers.
- 27 Slush Scrapers.
- 15 Light and Heavy Plows.

Located at Three Rivers, Que.

- One Large Travelling Clam Shell Derrick.
- One Steam Pile Hammer (Cram Patent), with Steam Hose.

One Thomas Automobile (Model 81), 60 h.p., thoroughly overhauled and painted; location, Toronto.

THE RANDOLPH MACDONALD CO., LIMITED,
14 Crown Life Building, Toronto, Ont.

City of Brantford

Sewer Construction

Sealed tenders addressed to Ald. Joseph Minshall, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received till 12 o'clock noon on THURSDAY, MARCH 31st, 1910, for the furnishing and laying of about 2,180 feet of 12-inch extra strength Sewer Pipe, and 705 feet of 12-inch Cast Iron Pipe, together with 12 manholes; greatest cut 31 feet; average cut, 16½ feet.

Plans and specifications may be seen and instructions to bidders, and forms of tender obtained at the City Engineer's Office.

Each tender must be accompanied by a marked cheque for 5 per cent. of the amount of the tender.

Copies of the plans and specifications may be seen at the office of the Contract Record, Confederation Life Building, Toronto, and at B34 Board of Trade Building, Montreal.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.

City Hall, Brantford, March 4th, 1910. 12

The B. C. Gazette gives notice of the incorporation of the following companies: Cedar Cove Sash & Door Company, Limited, capital, \$15,000; Nahmint-River Power Company, Limited, capital, \$50,000; Okanagan Lake Lumber Company, Limited, capital, \$100,000; the Morrison-Thompson Hardware Company, Limited, capital, \$25,000.

Business Buildings and Industrial Plants

(Continued from page 27.)

the Royal Trust Company's Building on St. James street. Messrs. Peden & McLaren, architects, 17 St. Alexis street. It is understood that the sub-contracts have also been arranged.

A. Mongeau has been awarded the general contract for the erection of four stores and four dwellings on Craig street, for Messrs. Bloomfield Bros.

Ottawa, Ont.

W. E. Noffke, architect, has awarded a contract to Thos. James and A. G. Marshall, for extensive alterations to the basement of Central Chambers, costing \$12,000.

Prince Albert, Sask.

The contract for the new Imperial Bank has been awarded to T. E. Baker. Cost, \$40,000. Tenders are now wanted for the heating.

Toronto, Ont.

The contract for the Terne Clad Doors for No. 4 factory of the T. Eaton Company has been awarded to A. B. Ormsby, Limited, corner Queen and George streets.

Three Rivers, Que.

The contracts for the erection of a pipe foundry and cleaning house for the Canadian Iron & Foundry Company, Limited, have been awarded as follows: Steel erection, Structural Steel Company, Limited, Longue Point, Que.; general contract, E. G. M. Cape, Montreal.

Power Plants, Electricity and Telephones

Moose Jaw, Sask.

S. P. Porter, Deputy Minister of Railways and Telephones, has announced that the Department would spend \$125,000 in the city this year. A completely new telephone system will be installed and a handsome exchange building erected, a site for which has already been purchased. The Department had also decided to complete the long distance line to Outlook this year, a distance of 125 miles, and possibly one from Moose Jaw to Swift Current.

Norwich, Ont.

This municipality proposes to take 150 horse-power at \$30 per horse-power, and Tilsonburg 500 horse-power at \$30.50 from the Hydro-Electric Commission.

Niagara Falls

The programme for the coming year for the Ontario Power Company includes the immediate installation of a second 18-foot conduit tube, and incidentally rock excavations for the third and final tube.

Ottawa, Ont.

The cost of the proposed street railway extension through Ottawa East, according to City Engineer Kor's estimate, will be \$75,000. The cost will likely be the same for either of the two routes suggested.

Parry Sound, Ont.

Council contemplate ordering extensions to electric light plant. G. Groves, superintendent.

Peterborough, Ont.

The by-law to raise \$70,000 to develop the surplus power at the new waterworks dam will be voted on by the ratepayers on Tuesday, April 19.

Prince Rupert, B.C.

The Prince Rupert Telephone Company, has entered into a contract with the Dean Electric Company, of Elyria, Ohio, for a telephone system to cost \$10,000. The system will be turned over to the city when incorporated.

Port Arthur, Ont.

The Hydro Electric have entered into a contract with the Kaministiquia Power Company to supply the City of Port Arthur with electric power up to 5,000 h.p.

Officials of the Western Dry Dock & Shipbuilding Company state that the Government having definitely promised aid to the extent of three per cent. on the investment contracts for several buildings and plans will immediately be let.

Regina, Sask.

The Legislature has been asked for authority to enable the city to construct and operate a street railway and electric power, lighting and heating plants, also for the authority to purchase a transfer railway connecting the three railways now in operation at an estimated cost of about \$10,000.

Stirling, Ont.

On March 21st the ratepayers will vote on a by-law to issue \$10,000 20-year 5 per cent. electric light debentures. G. G. Thrasher, clerk.

Toronto, Ont.

The Monarch Railway Company was refused permission to enter the city of Toronto by the Railway Committee of the Legislature.

Tenders addressed to G. R. Geary, K.C., chairman Board of Control, will be received until March 22nd for the building of two vaults and the supply, fitting and installation of office fixtures, in the offices of the Toronto Hydro-Electric System, City Hall. Specifications, etc., at the offices of the property department, City Hall.

Weymouth Bridge, N.S.

We are informed that the contract for the installation of the electric plant mentioned in our last issue has not been closed yet, further capital being required.

Winnipeg, Man.

A conduit will be constructed from the terminal station in Point Douglas to the proposed McPhillips street sub-station. Tenders for the latter will be called for as also for the conduit. The expenditure for the year's work will be divided as follows: \$50,000 for conduit, \$50,000 for the McPhillips street sub-station and \$75,000 for cables and wiring. Tenders will be called shortly. Smith, Kerry & Chase, engineers.

The following tenders were received for the erection of the terminal station in connection with the municipal power development at Point du Bois: Peter Lyall & Sons \$94,000; Thomas Kelly & Sons, \$89,531; J. McDonald Company, \$82,000.35; C. W. Sharp & Son, \$413,735.15; Carter, Halls, Aldinger, \$99,977.71; Engineer of Construction, \$88,351.19; S. Brynolfsson, \$8,832.55; John Gunn & Sons, \$99,000.47; L. H. Tremblay Company, \$86,125.46; Claydon Bros., \$78,159.51.

AWARDED.

Midland, Ont.

The Wm. Hamilton Company has been awarded the contract for five large hydraulic turbines for the power house to be built at Big Chute, on the Severn river, near the Simcoe Street Railway & Power Company.

St. Johns, Que.

M. Rubenstein, electrical contractor, Montreal, has been awarded the contract for the installation of an electric lighting system in the Government custom house at this place. The wiring will be installed in iron armor conduit and standard government fixtures are specified.

Toronto, Ont.

The contract for the supply of core cable for the electric power plant was awarded by the council to the Canadian-British Insulated, Limited, Montreal, \$48,024.50. The next lowest tender was \$48,188.85.

Miscellaneous**Bloomfield, Ont.**

A by-law has been carried by the rate-payers to issue \$3,000 road improvement debentures.

Hamilton, Ont.

W. H. Cooper has a building permit for the brick addition being built to the grey room of the International Harvester Works. The following additional permits were issued: F. S. Depew, five brick houses on Case street, between Lottridge and Emily streets, \$5,500.

Montreal, Que.

Recent building permits include: W. H. Dwyer Co., Ltd., 302 Board of Trade Building, alterations to warehouse, cost \$5,000; Jos. Pelson, 522 Chabot street, three houses containing six dwellings, cost \$3,500; Wilfrid Bessette, 97 St. James street, flats containing twelve dwellings, cost \$20,000; Beckham & Scott, Montreal, house, cost \$2,000; J. A. Nantel, 1157 St. Antoine street, house containing three dwellings, cost \$2,000; Antoine Viens, 1076 Rachel street, one dwelling, cost \$3,000; H. Deschamps, 182 St. Ferdinand street, house containing two dwellings, cost \$2,000; T. Verbanise, 1101 Huntley street, house containing four dwellings, cost \$2,300; H. Dubuc, 762 Logan street, two houses containing six dwellings, cost \$10,000; Geo. Battelade, 276 Marquette street, house containing three dwellings, cost \$3,000; Pauze & Cote, 218 Amherst street, two houses containing four dwellings, cost \$12,000; Mrs. Robt. Allan, 300 Atwater ave., house containing four dwellings, cost \$3,200; Beardmore & Co., city, warehouse, cost \$36,000; A. Comiere, 533 Laurier ave., warehouse, cost \$2,200.

Ottawa, Ont.

Tenders addressed to L. K. Jones, Secretary, Department of Railways and Canals, will be received until March 17th for the supply and delivery of timber and plank required for use on the Rideau canal for the year 1910-1911.

Oak Bay, B.C.

Tenders for sand and gravel were received from the following: Lineham Sand & Gravel Company, sand, per cubic yard, \$1.08; gravel \$1.25; filling, 88 cents in the northern or central districts; 98 cents in the southern district; \$1.08 in Victoria West or 94 cents delivered to any point within the city limits. B. C. Sand & Gravel, \$1.40; sand, \$1.20 per cubic yard. James Richards, sand \$1.20 per yard; gravel, \$1.35 per yard. John Hagerty & Company, filling, \$1.15 per yard in the southern district; \$1.10 northern district; \$1.15 in the western district. Contract not awarded.

St. Thomas, Ont.

Tenders addressed to S. O. Perry, city treasurer, will be received until March 31st for the purchase of the following de-

bentures: \$42,000 Hydro-Electric, 30-year, 4 1-2 per cent; \$5,752.08 local improvement, 20-year, 4 1-2 per cent; \$11,652.81, local improvement, 10-year, 5 per cent.

Toronto, Ont.

The Erindale Power Company sustained a loss of \$1,200 last week by an unexpected flow of ice.

Tenders addressed to C. W. Postlethwaite, harbor master, 508 Board of Trade, Toronto, will be received until March 30th for the dredging required in the harbor. Specifications at the office of the above mentioned.

Recent building permits include: G. H. Hager, 2 sty. & attic brick dwelling, Indian road, \$4,000; L. S. Haynes, 1 pr. semi-det. 2 sty. brick dwellings, near Pape, Guelph avenue, \$4,000; W. H. Plant, 2 1-2 sty. brick dwelling, near Highland, Roxboro, \$5,000; S. Thomas, 1 pr. semi-det. 2 sty. brick dwellings, near Dundas, Sheridan, \$4,000; W. E. Blake & Son, 3 sty. brick addn. to warehouse, near Queen, on Church, \$3,500; A. W. Reid, 5 det. 2 sty. brick dwellings, near Wells, on Albany, \$15,000; G. W. Dale, 1 pr. semi-det. 2 sty. brick dwellings near Hogarth, on Logan, \$4,500; W. H. Sparrow, 2 sty. brick addn. to store, 355 Yonge street, \$3,500; L. Le Grow, 1 pr. semi-det. 2 sty. brick dwellings, near Harbord, Montrose avenue, \$4,000; Watt Milling Company, alt. to planing mill, N.E. cor. Osler & Norman, \$3,000; W. Hodgkinson, 4 att. 2 sty. R. C. dw., brick fronts, near First, on Tiverton, \$7,000; J. Lavall, 6 det. 2 sty. brick dwellings, near Withrow, on Logan ave., \$12,000; H. L. Hudson, 2 1-2 sty. brick dwelling, near Indian road, on Westminster, \$3,000; J. M. Walker, 1 pr. semi-det. 2 sty. brick dwellings, cor. Fern & Sunnyside, \$4,500; K. J. Dunstan, 2 sty. & attic brick dwelling, near St. Clair, on Russell Hill road, \$8,000; S. Frame, 2 att. 2 sty. & attic brick stores & dwellings, 682-4 College street, \$6,000; T. Kernick, 2 sty. brick dwelling, on 56 Hamby ave., \$3,500; G. Wilkie, 2 sty. brick dwelling, near Heath street, on E. S. Russell Hill road, \$6,800; T. Wilkins, 2 sty. & attic brick dwelling, near Sherbourne on Elm ave., \$9,500; W. Weller, 3 sty. brick store & dwelling, near Delaware, on Bloor W., \$3,500; P. M. Cooper, 2 sty. & attic brick dwelling, on 22 Beatty avenue, \$3,500; W. G. MacKendrick, 2 sty. brick dwelling, near Rosedale Ravine Drive, on Roxborough street E., \$6,500; G. W. Watson, 2 sty. & attic brick dwellings, on 2 Fern avenue, \$3,500; C. E. Walton, 2 det. 2 1-2 sty. brick dwellings, on 993-995 Gerrard St. E., \$3,600; Fisher Bros., 2 sty. & attic brick dwelling, on Sunnyside ave., \$3,000; H. Wright, 2 pr. 2 1-2 sty. brick dwellings near Roncesvalles, on S. S. Marmaduke, \$10,000.

Vancouver, B.C.

Tenders addressed to Wm. McQueen, city clerk, will be received until April 21st for the following automobile fire apparatus: 2 hose wagons, 2 chemical and 1 aerial ladder. Specifications, etc., at fire department.

Tenders will be received by Wm. McQueen, city clerk, until March 22nd, for two motor wagons and one sprinkling attachment for the garbage collection. Information from City Engineer.

A permit has been issued to Mason & McLeod, corner of Thurlow and Pendrill streets, apartment house, \$80,000. Other permits include:—Mr. George King, covering a three storey block at 223 Harris street, \$25,000; H. McLennan, 1530 Barnard street, \$2,300; J. Crowe, warehouse, Front street, \$8,000; L. S. Burton, 1935 Tenth avenue west, \$3,000; ee, Lee Wo

Co., Pender street east, \$19,000; G. R. Baird, 2196 Second avenue west \$12,500; M. Godson, 36 Hastings west, \$3,000; M. Noble, 3005 Heather street, \$6,000; Mr. C. J. Church for a frame apartment house at 2036 York street, \$18,000; H. Hoffmeister, covering a two storey warehouse at 1290 Howe street, \$9,000; J. Brown, 1190 Eleventh avenue west, \$8,500; A. M. Coleman, Tenth avenue, \$3,000; R. J. Coleman, Dock street, four houses, \$6,000.

Winnipeg, Man.

The following building permits have been issued: A. J. Greeves, apartment block, east side Sherbrooke, between Buell and Preston, cost \$15,000; J. Dixon, house, west side Arlington, between Livinia and St. Paul, cost \$3,000; J. F. Parker, house, west side Lipton, between Portage and Livinia, cost \$5,000; Aberdeen, between Powers and Andrews, H. Giesby, stable, \$6,000; McDermott, between King and Princess, J. C. Wilson, steel water tower, \$2,500; Alexander, between Main and King, Real Estate & Investment Co., stores, \$8,500; Vaudruil, between Bird's Hill and railway track, J. Gimpel, dwelling, \$2,000; Rathgar, between Pembina street, northwest corner Lewis and Edwards, dwelling, \$7,000; Jarvis, southwest corner of Salter, Chechik, Gold and Kernechan, cold storage, \$20,000; Rosedale, between Nassau and John, Henderson Bros., dwelling, \$1,800; McAdam, corner of Main, E. E. E. Bray, dwelling, \$2,000; Polson, between McGregor and Power, R. A. Scott, dwelling, \$12,500; Mulvey, south side Helen and Ainsly, J. Johnson, six dwellings, each \$2,800; Paulin-Chambers, addition to factory, north side Ross between Princess and Paulin, \$30,000.

AWARDED.**Dundas, Ont.**

The American Road Machine Company, of Canada, Limited, Goderich, have been awarded the contract from Messrs. Doolittle & Wilcox, to furnish all the screens to be used in connection with a large crusher with capacity in the neighborhood of 6,000 tons per day.

Kingston, Ont.

The City Council has awarded to the Waterous Engine Company, of Brantford, Ont., the contract for steam engine of 600 gallons capacity for \$5,000.

Port Arthur, Ont.

The Canadian Stewart Company has secured a contract for building a big dry dock. Estimated expenditure, \$1,000,000.

New Companies

J. W. Kilgour & Bros., Limited, Beauharnois, Que., capital \$300,000, incorporated to carry on a lumber and timber business. Incorporators, John Wilson Kilgour, and James Wilson, both of Beauharnois, Que.

United Manufacturing Company, Montreal, Que., incorporated to carry on the business of manufacturers of electricity for light, heat and motive power, etc., capital, \$45,000. Incorporators, E. E. Vipond and H. S. Vipond, advocates, both of Montreal, Que.

National Bag & Paper Company, Limited, Ottawa, Ont., incorporated, capital, \$200,000. Incorporators, W. Anderson, J. F. Booth, lumberman; W. H. Dwyer, merchant, all of Ottawa.

Quebec, New Brunswick Pulp, Lumber & Lands Company, Saint Antoine Abbe, Que., incorporated, capital, \$20,000. Incorporators, Francois Toupin, contractor; Rev. J. Brady, priest, both of Montreal, Que.

Contract Record

ESTABLISHED 1886

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No. 11

The Outlook for Business

It seems to be the consensus of opinion that the coming season will be a banner one for contractors. Last year at this time the prospects were considered pretty good, and ultimate developments proved that they were so, but a much better forecast is warranted for the coming season. There is promise of activity in every branch of building and engineering work. There are a great many important projects which have not yet been given out but which are progressing rapidly through the preliminary stage with every prospect of completion as planned. Again, many projects, plans for which were held over during the time of depression are materializing, and this speaks well for a boom in the contracting line.

In the country sections, as well as in the cities, the volume of building planned shows up remarkably well. Here, educational institutions and churches are likely to form a good percentage of the season's totals, while in the towns and cities perhaps the greatest activity will be experienced in business buildings and factories. Recent reports from many sources favoring a substantial increase in these structures both in number and value.

In some quarters, as is always the case at this time of the year, there is some anxiety as to how the labor question is going to work out. It is almost certain that there will be demands for increased scales of wages, but there is an old saw about not attempting to cross a bridge before you come to it, and it is rather early in the season to be making predictions as to labor. If any trouble is developed it will probably come from a scar-

city of help in the building field. In the west, especially, there is likely to be a premium on skilled mechanics. According to a recent report from Brandon, for instance, there are less than 25 bricklayers available in that city, with an increasing demand and no near prospect of improvement. Under such conditions it is only to be expected that higher wages will be demanded. Anticipating trouble from any source, however, has a depressing effect upon the trade, and at this time, in particular, every influence should be uplifting. If prospective work is discouraged through the uncertainties which may exist as to its progress should it be started, the outcome is almost certain to be that some work will be deferred and other work not taken up this season at all.

Naturally, the supply men are expecting a busy season. In view of recent developments it is only reasonable to expect a further increased consumption in cement as the ways of using it continue to grow. Present indications favor an increased sale for brick and terra cotta work and it seems likely that the coming season will witness an improvement in common brick, while the demand for construction work in the various phases is well maintained.

With a busy season in prospect the well organized contractor will have all his equipment in readiness by this time. In the heavier lines of contracting this is particularly necessary. Much money has been sacrificed in this quarter owing to carelessness in this regard. Repairs made on the scene of operations are never of such a satisfactory nature as those undertaken during the winter months, which provide the proper opportunity for overhauling old working equipment.

Unfair to the Contractor

One not infrequently hears complaints from contractors as to the unassailable position in which the engineer is placed by contract provisos. A recent kick of this nature is registered in a despatch from London, Eng., which runs as follows:

"George Sutton, managing director of the W. T. Henley Telegraph Works, at the annual meeting, said that the only fly in the ointment in regard to Canada is that a great deal of business is lost to British manufacturers because they are unable to accept the conditions which are creeping into municipal contracts.

"He said he had particular objection to conditions of contracts fixed by Canada. One of them was a clause in which they would put the company's reputation as contractors, and their contract money, entirely at the disposal of the engineer who was supervising the contract."

"If a man can preach a better sermon, write a better book, or make a better mousetrap than his neighbor, though he build his house in the woods, the world will make a beaten path to his door."—Emerson.

New Methods in Reinforced Concrete Work

Detailing a System of Construction for Light Floor Loads —Interesting Practical Data and Comparative Costs—

BY EMILE G. FERROT

While there has been no doubt of the economy and practicability of reinforced concrete for massive construction and where heavy loads are carried, the advisability of its use for light floor loads, especially if the spans are long, has been questioned even by those who favor its use in other instances. The dead weight of the material itself has often operated against its use, especially where the carrying capacity of the soil required the unit pressure to be kept to the minimum, or from other like causes.

We all agree that clear spans of 40 or 50 ft. in buildings are not usual and are generally avoided on account of their increased cost; hence a description of such a span, with its cost as compared with steel girder construction for the same span, is of interest.

While the author does not wish to take any credit

over same, and 12x12 in. plaster block centers between each joist, thus making a flat ceiling between girders. The joists are reinforced with one 11-16 in. square twisted bars and eight ¼ in. stirrups. In the top of every third joist were placed two ¾ in. square twisted bars over the girders to act as tie. These rods were only 5 ft. long, but two were used in each case, lapped in the center so as to project beyond the T-head into the joists. The slab is reinforced with ¼ in. rods run in both directions, 12 in. on centers or thereabouts.

The girders supporting the auditorium floor, on account of the higher ceiling, are 43 ins. deep, with T-head, 4 ft. 9 ins. wide. The reinforcement in the bottom consists of eighteen 1½ in. square twisted bars, bent the same as shown for first floor.

Each floor is designed for a live load of 120 lbs. sq.

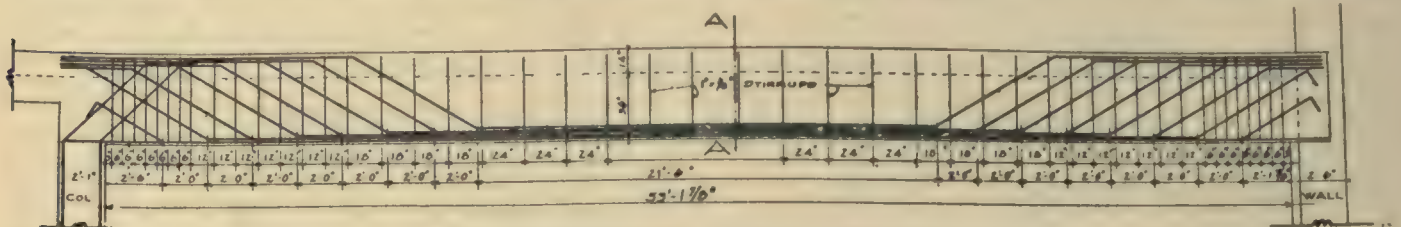


Fig. 1—Longitudinal Section of Long Span Girder

for originality in the design of this floor, as the same general scheme has been used many times before for shorter spans, it is because of the unusual length of the span that its details become an important factor in the design.

The spans in question form the floors over the swimming pool and gymnasium of the Turngemeinde Club House, Philadelphia, and are 53 ft. 17/8 ins. clear span. There are two floors with these spans, of an area of about 4,700 sq. ft. each, having five girders on the first floor and six on the second floor, spaced 13 ft. 9 in. centers. Those of the first floor are only 36 ins. deep

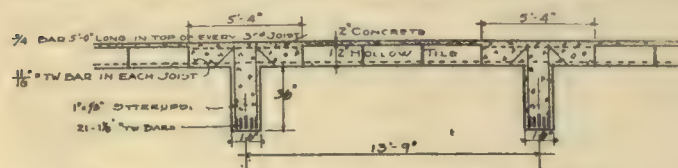


Fig. 2—Transverse Section of Long Span Girder

below the joist, on account of head room. The top portion or T-head is 5 ft. 4 ins. wide and 14 ins. thick. These girders are reinforced with twenty-one 1½ in. square twisted bars, bent as shown by Fig. 1. The stirrups are 1x1/8 in. flat iron, bent and spaced as shown by Fig. 2. Great care was taken to place the bars accurately in position, and the bottom bars were supported in the bottom of the molds on cast cement chairs, while the spacing of the bars and stirrup was maintained by iron rods and the wiring of one bar to the other.

The floor panels between the girders consist of 5x12 in. concrete joists, with a 2-in. reinforced concrete slab

ft., as the top floor is an auditorium and the floor below a gymnasium.

There seemed to be some doubt amongst the members of the building committee as to the advisability of constructing such a long span of reinforced concrete, and one of the committee went so far as to offer to increase his subscription to the building fund by a very large amount, in order to pay for steel girders, but the amount offered was insufficient to pay the extra cost, so the girders were built as originally designed, of reinforced concrete. In order to obtain the actual difference in cost, we designed the girders of Bethlehem steel girder sections, reinforced with top and bottom cover plates and fireproofed. The size of the steel girders was 30 ins. deep, 200 lbs. per foot, with two cover plates on each flange, one 5/8x15 ins. and one 1/2x15 ins. We obtained bids from the building contractor for the difference in cost of these girders, we having likewise made an estimate of the difference in cost. The contractor's price for them was \$6,500 additional to his contract price, although our estimate of the difference was somewhat less, being \$4,664, based on prices obtained from outside sources. Taking our figures as a base, as there are 5,400 sq. ft. in the two floors, the difference in cost for the structural steel, fireproofed, is 50 cents a square foot more than the reinforced concrete, with no increased advantage.

The weight of the structural steel for a girder as compared to the weight of reinforcing steel is as follows: Total weight of steel girders, with strap iron reinforcement for fireproofing and bearing plate, about 17,000 lbs. Total weight of reinforcing steel in one reinforced concrete girder, 36 ins. deep, 5,500 lbs.

This shows that it takes about one-third the amount

* Read at the annual convention of the National Association of Cement Users February, 1910.

of steel for reinforced concrete as compared with structural steel for girders and beams. The amount of saving in concrete would be the overhanging portions of the T-head, which amounts to $2\frac{1}{4}$ cu. yd. per beam, when the extra thickness of concrete on the girders is taken into account due to the wide flanges on the steel girders; likewise there would be additional plaster blocks necessary to take the place of the T-head omitted, the cost of which would have to be deducted from the saving effected by omitting the T-head.

The sub-contractor for the reinforced concrete work gave the cost of the plaster blocks delivered at the job, as 14 cts. per sq. ft., and setting of same, including the nailing on of a fine wire screen at each end to prevent

Canadian Society of Civil Engineers

At a general meeting of the Canadian Society of Civil Engineers, held in Montreal last week, the Gzowski silver medal was awarded to Professor Brown, McGill University, Montreal, for his paper on "Reinforced Concrete Beams," read last season. The presentation was made by the chairman, Mr. W. F. Tye, vice-president of the society.

This ceremony ended, an address on "The Conservation Problem in Canada" was given by Mr. C. R. Coutlee, of Ottawa, engineer in charge of the Ottawa storage system. In dealing with this, and the water supply of the country, Mr. Coutlee pointed out the enormous cost

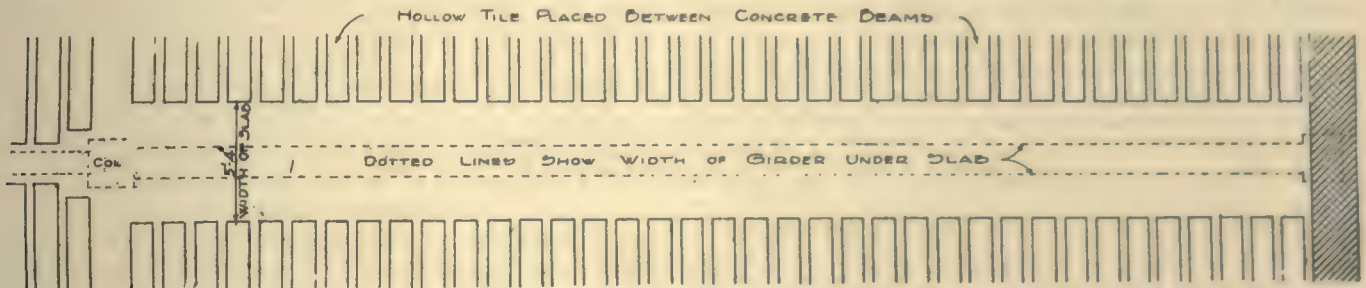


Fig. 3—Plan of Long Span Floor Construction

the concrete running into the hollow part of the block, as 3 cents per square foot additional.

The plaster block weighs 25 lbs. per sq. ft., as compared with 40 lbs. per sq. ft. for terra cotta tile, which costs the same price as the plaster block, but which are not as easily handled, being only 12 ins. long, whereas the plaster blocks are 3 feet long and can be sawed to fit any position.

The walls of plaster blocks are about $1\frac{1}{2}$ ins. thick.

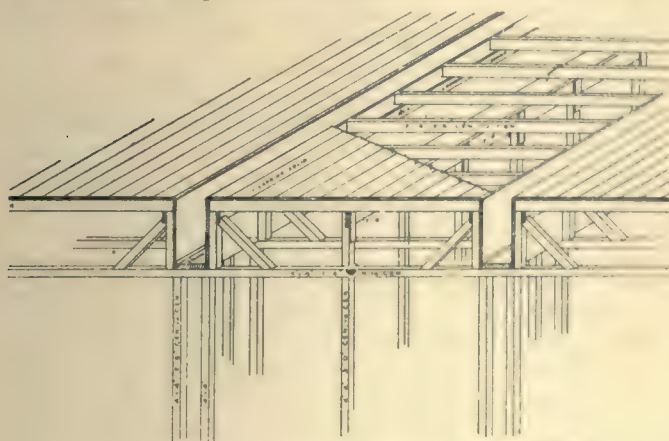


Fig. 4—Form for Constructing Long Span Girder

and there are two cells in each block, separated by a vertical wall in the middle which strengthens the block, so that traffic can take place over them and during the time of pouring the concrete.

Immediately before pouring the concrete, it is necessary to thoroughly soak with water the plaster blocks, as they absorb a considerable quantity of water from the concrete if not thoroughly wetted; in fact, the parts of the floor where the blocks occur and where they do not, are clearly marked during the earlier stages of the setting of the concrete by the difference in its color, the concrete which does not come in contact with the plaster requiring more time to set.

For moderate spans, the use of concrete joists with either the plaster block or tile filler are desirable, where a flat ceiling is sought and the load light.

of the canal system to Canada, and the great expense of canal transportation as compared with railways, showing that instead of being 30 cents per ton mile it really amounted to \$3.30 per ton mile when the cost of construction and maintenance was considered.

From this Mr. Coutlee proceeded to a description of the immense works now under way by the Government for the conservation of the head waters of the Ottawa river, so as to regulate its flow and give a full supply of water for power purposes all the year round. The Ottawa river, he pointed out, drained a territory of 55,000 square miles, equal to all England and Wales, and during half a century its flow had averaged 55,000 cubic feet a second, varying from 10,000 feet at low water to 150,000 and even more during flood time. The result of these great variations was that while at times there was more water than power plants could handle, during much of the year there was not enough.

In order to overcome this the Government had decided to construct great reservoirs in the wild northern country, in whose lakes the supply of water for the river was collected. To this end immense dams were being constructed, which would raise the level of Lakes Temiskaming, Kipawa and other lakes twenty feet, giving a storage of 300 square miles twenty feet thick. This could be controlled so as to equalize the flow of the river and double its horsepower at low water, raising it at the Chaudiere Falls from 25,000 to 50,000 horsepower. This work, which would only cost \$500,000, would ultimately render available some 200,000 horsepower, which could be sold to companies, and doubtless would in time find a market, when methods were devised to economically carry current more than 150 miles.

A joint meeting of all the carpenters' unions of Toronto has been called by the Amalgamated Society of Carpenters and Joiners and the Brotherhood of Carpenters, to take place on March 19th, to consider the question of accepting or rejecting the offer of the Master Builders to raise the wages of carpenters from 33 to 35 cents per hour.

Street Improvement in Towns and Villages

Classification, Drainage and Design of Streets—The Choice of a Higher Grade Paving Material—Management and Cost

BY W. A. McLEAN, PROVINCIAL ENGINEER OF HIGHWAYS FOR ONTARIO.

Of all works of improvement, the streets of cities and towns call for most general attention. There is no work which, for the expenditure, will make better returns in advanced property values. The public streets constitute a system of parkways which every town possesses. There is absolutely no excuse for the state of disorder in which they are so often left.

Street improvement does not necessarily imply their complete construction with expensive roadways and pavements. The smallest village can have its streets graded, drained and kept clean and neat at so low a cost that neglect is inexcusable, except on the ground that the means of so doing are not generally known and understood. There are two phases of street work—the one implying little more than neatness, the result of good grading and draining with subsequent care; the other reaching into the construction of pavements of a more or less expensive type.

The complexity of municipal services is nearly as great for a town as for a city. The city requires large works, but there is proportionately a greater amount to spend upon them. Towns require waterworks, sewers, sewage disposal, well-designed streets, but they have to be obtained for a less expenditure—and the greater economy very often demands proportionately greater skill. The planning of a town in all these respects should, as far as practicable, be undertaken as one work—not a series of disconnected sections. Just as a house is now planned with water service, waste-pipes, sewer connections and electric wiring, considered in connection with foundations, walls and partitions, so the more nearly a town's services can be dovetailed into the one system, will there be less future expense when these are installed. The tearing up of pavements to lay sewers, water and gas mains is one of the chief results of unsystematic methods.

Classification of Streets.

Streets of a small town naturally fall into several classes as regards paving. There is the immediate business section, with roadway from sidewalk to sidewalk, where the best pavement the town can afford should be laid. For this we may have a well-built broken stone roadway; or preferably may look to the higher class of pavement, such as vitrified brick, asphalt block or concrete. For main thoroughfares, entering a town with farm traffic, a well-built macadam roadway is a standard. Other streets, of still less importance, should at least be graded and drained, looking to an ultimate coating with gravel or broken stone.

Drainage of Streets

Before considering further the details of street design it should be emphasized that good drainage is essential for any class of improved street. Good drainage is the first principle of road building of any kind. A clear understanding of drainage and its influence on roads and pavements is essential to a skilful handling of this work. For this reason the improvement of streets can hardly be considered apart from sewers. To pave streets and then to tear them up, to lay sewers, is wasteful in method; but sewers are necessary for the

efficient handling of storm water. The town with a good system of sewers has taken a valuable step towards modern street improvement as a means of outlets for drainage. Drainage should provide both for surface and subsoil water. That is, there should be gutters or open drains, with outlets, to carry away storm-water and drainage from the roofs of houses; but further, by means of porous tile drains, the waterline should be kept at least two feet below the grade of the roadway. If a village or street does not require an effective sewer system, the porous tile drains may be employed both for storm and subsoil drainage.

Design of Streets.

By means of underground drainage, the streets or towns may depart from the general plan of country roads, in which large open drains and a high grade are so often necessary to provide a bed of dry soil under the metal surface. This is the distinguishing feature of town streets, that by a complete system of sewers and underdrains, the grade may be lowered, and shallow gutters take the place of open drains.

In the design of a town street in the business section the roadway should be paved from sidewalk to sidewalk. The usual width of streets in Ontario is 66 feet. This provides for a roadway 40 or 42 feet wide, and walks on each side twelve or thirteen feet in width. This is the plan of Yonge Street, Toronto, and is generally followed throughout the province.

For residential streets—or any street not in the business section—a design which meets with a great deal of favor consists of a roadway 24 feet wide, bordered on each side by a 6-inch concrete curb. Between the curb and the walk is a strip of sod about 6 feet wide; then the sidewalk 5 feet wide; then the remainder of the allowance (9 feet 6 inches on a 66-foot street) is sodded and in appearance added to the depth of the lawn. When streets have been graded and boulevarded in this way, the usual effect is to cause the owners of private property to remove fences, improve their lawns, plant flowers, and get busy with the paint pot. Many residence streets in towns and cities are only 18 or 20 feet from curb to curb, and traffic is not inconvenienced. With a narrow roadway the cost of construction is less, maintenance is less, and the appearance of a street is improved by the wide boulevards.

Every care should be taken to get the grade of a street right. This is the distinguishing point between a town street and a country road. The crown of the roadway should be no higher than is necessary—usually no higher, preferably lower, than the sidewalk of the curb. To anyone driving along a street of the high country road type, the houses look low and "squatty," and the appearance of the street is in every way inferior.

The building of a town street then involves considerable excavation, which can usually be placed in the boulevard or in adjacent low-lying lots. The shorter the haul the less the expense. Having graded the street, the earth roadbed should be tile drained—thoroughly rolled, and it is then ready for the pavement.

For a macadam road, crushed stone of the best kind obtainable in the locality will ordinarily be used. Field stone or quarry limestone are most common in Western Ontario, while in the east, granite, gneiss and trap may be had. Crushed and screened gravel may be used. Natural pit gravel may be laid for a foundation, and over this may be spread a wearing surface of crushed stone. Or a foundation of large flake stone, laid by hand and rolled, gives good service. The depth of consolidated material should be, on town streets, eight to ten inches, on residence streets it may be spread to a uniform depth curb to curb, or may decrease in thickness toward the curb, according to the requirements of traffic. Whatever material is used, it should be thoroughly consolidated by rolling. A roller is an absolute necessity in making an economical and durable roadway for either town or country traffic.

Higher Class of Pavements.

Coming to the higher grade of pavement for a central business section, the small town is debarred from the use of sheet asphalt owing to the expensive plant needed for construction and repair. Choice will necessarily be made between vitrified brick, asphalt blocks, westrumite, concrete, or a high class macadam. Apart from macadam, the pavements are practically the same up to the surface covering. That is, they all require the same concrete foundation, 5 or 6 inches in thickness, and the same concrete curb and gutters. In order of first cost, prices have ranged, with concrete as cheapest; then westrumite, vitrified brick and asphalt block. No one of these pavements can be said to be superior to the other in every respect. Whatever pavement is selected, the chief point is to see that only first class material is accepted, that the concrete foundation is good, and that workmanship in laying is what it should be.

Samples of concrete pavement may be seen in Windsor, Chatham, and to some extent in Toronto. Asphalt block may be examined in Windsor, Seaforth, Stratford, St. Catharines, Guelph or Toronto; and vitrified brick is largely used in Toronto, and may be seen in St. Thomas, Guelph, Chatham or Petrolia. Westrumite is a comparatively new asphaltic pavement in Canada and may be seen in Brantford or Guelph. Bitulithic is a pavement with a refined tar base, and is used in a number of cities, Toronto, Chatham, London and elsewhere, but like sheet asphalt requires an expensive plant and skilled labor to construct and repair, so that it is not adapted to small towns. Good samples of ordinary macadam may be seen in Toronto, Galt, St. Thomas, Kingston, Belleville, Ottawa, and other towns and cities. No attempt is made in any case to give a complete list of the places in which any of these pavements are used. Councils having matters of street improvement before them should visit a number of these places in order that different methods and materials may be compared and the most suitable adopted.

Curbing and Gutters.

Concrete curbing is growing in popularity as a means of narrowing roadways and protecting the boulevards. It may be used on an earth roadway or any class of street. Combined with a concrete gutter, they are a necessity on any of the higher class of pavements. The cost of curbing, as with everything else, varies, but is usually about 25 or 30 cents per lineal foot, with 40 or 50 cents per lineal foot for concrete curb and gutter.

Management and Cost.

No hard and fast price can be stated for any class of roadway or pavement. Local conditions as to labor and

material are the ruling factors. The system of management in any case may double the cost or reduce it materially.

To get results that will be satisfactory, every town undertaking street improvement should employ an engineer. If there is not a local man, then one who has made a success of this work in his own town. It is the work of the engineer to map out the drainage, give grades, prepare specifications, and in general give such expert attention as will produce uniform results. The patch work that so many towns in Ontario have been carrying on to save an engineer's fee is simply deplorable. To save \$15 or \$50 councils are easily losing from ten to one hundred times these amounts in results. Every town and village should at least have a definite plan of improvement mapped out under an engineer's advice so that each succeeding council can work on a uniform system from year to year, such as will in a term of years accumulate into a complete improvement of the town.

Method and Cost of Road Surfacing With 2 in. Concrete Cubes

During the past year a new type of road surfacing was employed in the construction of a section of state-highway in Monroe county, New York. This surfacing consisted of 2-in. concrete cubes made from Portland cement and gravel or shale and moulded in machines specially built for the purpose. The idea of using these cubes was evolved by Mr. J. Y. McClintock, county engineer of Monroe county, and the New York State Highway Commission authorized the expenditure of \$2,250 for the purpose of making a preliminary demonstration. At the recent annual convention of the National Association of Cement Users, Mr. George C. Wright, consulting engineer, Rochester, N.Y., described the methods employed in constructing and laying these cubes, his information in the main being taken from a report of Mr. McClintock to the State Highway Commission.

The cubes were placed in a section of the Ridge Road northeast of the city of Rochester, N.Y. On this section the original trap rock surface 2 in. thick was completely off at the centre and nearly so at the side of the 16 ft. macadam roadway, leaving exposed a good solid lower course of rather large size broken Medina sand stone resting on good gravelly foundation.

The existing surface was somewhat rough and knobby, and over this was spread as thin a layer as possible of screened gravel, which was rolled down with a 12-ton roller, so that in spots it was 2 in. thick and in other spaces the over knobs it was no measurable thickness. The resulting surface had a crown of about 4 in. in 16 ft. width.

On this bed so prepared was placed directly a wearing coat of 2-inch cubes for a width of 15 ft., being laid close together by hand, the edges being held up temporarily by 2-in. planks laid lengthwise with the road. On the cubes was spread a small amount of fine, somewhat loamy, gravel, which was broomed in, after which the heavy roller was slowly passed over the whole of the surface, forcing the cubes to take a full bearing on the supporting gravel. The edges and roller wheel was supported by the planks, when the side-planks were pulled up and moved ahead and coarse gravel $\frac{3}{4}$ -in. to 1 $\frac{1}{2}$ -in. was placed along the sides next to the cubes on the shoulder for a width of about 2 ft. Outside of this a finer gravel spread, feathered off to a width of

about 3 ft.; more of the fine loamy gravel was spread on the top and broomed and flushed in until the space between the cubes was thoroughly filled. The gravel on the shoulders was wet and the whole surface thoroughly rolled with the heavy roller.

A stretch of road 1,800 ft. long was surfaced with cubes. On 1,600 ft. Portland cement gravel concrete cubes were used, and on 200 ft. vitrified shale cubes 2¼-ins. in size were used. For a length of 100 ft. a concrete sunken curb 6 ins. by 9 ins. in dimension was used in place of the gravel shoulders. On a 100 ft. length the joints between the cubes were filled with Portland cement grout instead of the fine loamy gravel. For 60 ft. on which the joints were filled with the fine gravel, light asphaltic road oil was sprinkled over.

A machine for making cubes which is an adaptation of the ordinary cement brick machine was furnished. This machine made 68 cubes at one operation, resting on a wooden tray, and the tray was carefully placed on a drying rack without disturbing the freshly made cubes. The cubes remained in racks 24 hours and were then dumped in a pile. This pile was thoroughly sprinkled twice each day.

The number of cubes made was about 7,000 upon the first day, but within a few days the same gang was able to make with ease 26,000 of the cubes. Various sizes of screens were tried from ½ in. to 2 in., but it was found that the ½-in. screen gave a product that could best be handled in the machine. Experience showed that the concrete had to be rather dry in order to avoid settling and bulging of the cubes before the concrete set. The amount of cement used averaged 2 2-10 bbls. to a cubic yard of concrete. The area covered with cement cubes was 2,652 sq. yds., upon which was laid all of the 730,000 cubes manufactured, except about 5,000 kept for repairs. The cost of cement cubes laid was as follows:

	Per sq. yd.
Cement, 0.088 barrels	\$0.121
Cost of factory	0.107
Labor of manufacture	0.161
Gravel, 50c per cu. yd.	0.024
Carting	0.027
Laying	0.072

Total cost per sq. yd. laid.....\$0.512

There was placed on shoulders 219 cu. yds. of gravel covering 1,800 sq. yds., costing \$2.12 per cubic yard rolled in place, or 26 cents per square yard.

In considering these figures as the basis for estimating cost it is obvious that there might be reductions made in cost of cement by using a reduced quantity, and in reduced cost of carting, the cost of the factory might be disturbed over many more square yards, and the cost of labor reduced by use of concrete mixer and other labor-saving devices. The cost of gravel in pit is usually nearer 10 cents per cu. yd. than 50 cents, which was paid here. The cost of laying was very much reduced as the men became experienced, and this could be still further reduced by paying for it on the basis of piece work.

At Prince Arthur, Sask., the building permits issued during 1909 represented a total value of \$200,000, compared with \$350,000 for 1908. As to prospects for the current year, Mr. F. A. Crighton, city clerk, writes: "Prospects are exceptionally bright. It is expected that the building of 1910 will exceed that of any other year in the history of the city."

Notable Cement Convention

Canadian Cement and Concrete Association
Working Hard in the Interests of Great
Meeting at London, Ont., March 29-April 1.

Widespread interest is being taken in the approaching convention and exhibition of the Canadian Cement and Concrete Association, which is to be held at London, Ont., March 29 to April 1. Among the many interesting subjects to be discussed at the convention is the formulating of standard specifications for cement and concrete work, with special reference to their adaptation to Canadian business and climatic conditions. The special committee of the executive, consisting of Messrs. Gustave Kahn, Professor Gillespie and R. E. G. Hagarty, will submit their report in this connection.

While the official programme of papers to be read has not yet been issued, contributions will probably be submitted in part as follows:

Opening Address—Professor Peter Gillespie, President Canadian Cement and Concrete Association.

"Concrete in Europe," Mr. Richard L. Humphrey, Director of United States Structural Materials Testing Laboratories, Philadelphia.

"Concrete Construction," Mr. Cecil B. Smith, of Messrs. Smith, Kerry & Chace, consulting engineers, Toronto.

"The Use of Cement in Architecture," Mr. F. S. Baker, President Royal Architectural Institute of Canada.

"The Engineer and the Finished Work," Mr. A. W. Campbell, Deputy Minister of Public Works, Ottawa.

Professor W. H. Day, Ontario Agricultural College, Guelph, Ont., subject probably "Cement Tiles."

Mr. Ernest Wilby, architect, Detroit, Mich., subject undecided.

"Municipal Concrete Bridges," Mr. A. W. Connor, of Messrs. Bowman & Connor, consulting engineers, Toronto.

Mr. Percy H. Wilson, Philadelphia, Pa., subject undecided.

"The Commercial Aspect of Reinforced Concrete in Canada," Mr. Gustave Kahn, of the Trussed Concrete Steel Co., Toronto.

"An Analysis of Concrete Bridge Failures," Mr. C. R. Young, of Messrs. Barber & Young, consulting engineers, Toronto.

"Inexpensive Homes of Concrete," Mr. M. D. Morrill, architect, Washington, D.C.

"Concrete from the Contractor's Standpoint," Mr. D. C. Raymond, Vice-President Bishop Construction Co., Montreal and Toronto.

"Highway Bridge Construction," Mr. Charles Talbot, London, Ont.

Mr. A. G. Larson, Owen Sound, subject undecided, probably chemical.

"The Uses of Concrete on the Farm," Mr. Philip Wormeley, United States Department of Agriculture, Washington, D.C.

"Concrete Pavements," Mr. James Pearson, contractor, Toronto.

"Concrete Sidewalks," Mr. C. W. Boynton, Chief Inspecting Engineer, Universal Portland Cement Company.

"Waterproofing," Mr. R. A. Plumb, Detroit, Mich.

Exhibition of Cement Products, Etc.

The exhibition of cement products will be formally opened by His Worship the Mayor. This feature of the convention promises to be a great success. Space has already been allotted to a large number of the leading Canadian and United States concerns, and the Princess Rink, the use of which has been donated to the association by the city council of London, Ont., will contain many interesting exhibits illustrating processes of manufacture, products and machinery.

Mr. R. E. Hagarty, 662 Euclid Avenue, Toronto, the secretary of the association, will be pleased to furnish any further details to interested parties.

Cost Keeping on Railroad Construction

Advantages of Estimating by the aid of Systematically Prepared Records —A General Outline of Satisfactory Record and Cost Systems

BY B. M. LAUCHEAD *

The method of keeping costs of railroad construction work by an engineering contracting firm is one of the most important features of the contracting business. I say "engineering contracting firm" because I believe that future successful contracting business is going to be carried on by contractors that are thoroughly trained engineers. The contractor that submits a bid for a few meagre calculations and then finally throws such calculations in the waste basket and makes a bid almost purely from guess work is destined to be sidetracked by the engineering contractor, who has made estimates of his work from systematically prepared records of cost keeping of actual work performed.

It is customary among some contractors, after having made a rough calculation of the cost of a certain piece of work, to look over their bid and say, "Well, I know this piece or section of work will be let for such and such a figure," and finally ignore all their calculations and resort to guess work. They are not willing to submit their bid as figured, for the simple reason that they know at the start their data, if any at all, are not reliable, and such being the case, a guess is better than risking their calculations on poor records of previous work. Not only is it necessary for the contractor to be able to bid successfully on contract work, but he should have such engineering training as will enable him correctly to calculate the contents of all kinds of excavation. He should be able to calculate the contents of all masonry structures, not roughly, but accurately, so that when the finals are returned he will know whether the engineer in charge of his work has submitted estimates that are correct.

Contractors Should Check the Engineer's Work.

The contractor should have records of all cross sections and should go over his work before the grading is begun and carefully examine the ground to see if the engineer has cross sectioned his work properly; that is, taken sections where they are needed and a sufficient number of them. It often happens that the engineer in charge of a piece of construction work is so busy, especially at the beginning of the work, that he does not have time to give his attention to the cross sectioning, but has to leave it to others who in some instances are really incompetent to do the work. The engineer never has time to examine the cross sections on the ground to see if they have been properly taken, and without such an examination neither he nor the contractor is aware of the fact that certain sections that affect very materially the contents of the excavations have been improperly taken, partly through ignorance and partly through carelessness.

The successful contractor should have as complete a record of all notes pertaining to the work as does the engineer in charge of the work. Taking a piece of railroad construction work or any construction work, let us see what notes on cost keeping and engineering records the contractor should keep, from beginning to end of his contract. One part of the contractor's of-

fice should be used for keeping and filing of all engineering records and cost data.

Let us take first the method of keeping the engineering records, as they are just as essential as the cost keeping and should be kept together. The first thing the contractor should do in carrying out his contract is to form an acquaintance with the engineer in direct charge of his work. He should tell the engineer of his plans in regard to cost keeping, stating that it will be necessary for him (the contractor) to have a copy of all cross sections, level and alignment notes. It is not likely that the engineer can furnish all the cross section notes at once, but they can be gotten as fast as the engineer takes them in the field. Let me say as a side remark that no honest engineer should hesitate to give the contractor a copy of his notes, for he should be only too glad to have a competent contractor check all his work. It should not take the engineer long to judge whether the contractor really is competent to handle engineering records and is really in earnest about his cost keeping. The engineer and contractor should at all times be on the best of terms, for an exchange of notes is of the greatest value to both.

The cross section notes should be copied by the contractor from the engineer's record in a regular book made for the purpose. A good form is published by Keuffel & Esser and numbered in their catalogue 380. If the engineer is slow in giving the cross section notes it is well for the contractor to copy the notes in a transit book, K. & E. No. 360, as fast as he can get them, and later copy all the notes consecutively in cross section book, K. & E., No. 380. These notes should be plotted on cross section paper and carefully used each month to work up monthly estimates. A planimeter is a very handy instrument and should be used by all contractors.

Before any grading work is started and in fact as fast as the engineer sets the slope stakes, good heavy stakes about 3 ft. long should be driven 1 ft. deep at each slope stake and the station number and cutting marked on same. The importance of this is obvious.

The contractor should plot a profile on heavy profile paper—plate B, 4x30—full width, so as to enable him to keep a careful record of each month's work, using a color for each month. The quantities of each month's work, both grading and masonry, should be printed on the profile in same color to show actual figures. This progress profile should never leave the office. The contractor should also plot a profile in profile book (a good form is published by the Engineering News Publishing Co.).

This profile book should be an exact copy of the office profile, although on a much smaller scale, and should be carried in the pocket at all times for reference. These profiles should contain all alignment and level notes, property lines, road and channel charges, masonry structures, clearing, etc. The contractor should have a private note book, preferably a field book, and in it keep a daily record of the progress of the work, giving the actual condition of each piece of work. He should have an office copy of all notes, such as cross

* Read at the January meeting of the American Society of Engineering Contractors.

sections, road and channel changes, masonry structures, clearing, etc. He should have a tape, hand level and level rod, and it would be well for him to have a transit and level combined.

Method of Cost Keeping.

Having given a general outline of the method of keeping the engineering records, we will now look to the method of cost keeping. The contractor's time-keeper should keep his daily time book in such shape as will enable him to transfer his notes to a special book, which also contains the monthly estimate, as taken by the contractor himself. The monthly estimate as given by the engineer in charge should not be used by the contractor in calculating his unit costs of the work, as very often they are too approximate and not reliable enough for a close approximate of the actual cost of the work.

The cost keeping record book should be so constructed as to enable the contractor to charge all labor against the quantities of estimate, with suitable columns for prorating fixed charges and expenses, of the entire contract against each particular piece of work.

After the contract is complete and the final estimate has been received and accepted by the contractor, he should prepare a final cost keeping record book, making all chargings of the different pieces of work against the final quantities as given in final estimate.

The object of the monthly cost records is to show the contractor the progress he is making and what this progress is costing him. His daily record book or diary gives him the conditions under which the different pieces of work were done and the two together are invaluable to him not only for his present but also for future work. The final cost keeping record book will principally be used in figuring on new contracts.

Road Building in Wentworth County, Ont.

How the Good Roads Scheme is Working Out—Interesting Facts and Figures Relating to Road Machinery Employed*

BY JAMES L. TAYLOR, Superintendent

I have had many enquiries from the representatives of different Counties in our Province as to the working of the Good Roads System in the County of Wentworth and the cost of the work of crushing stone and rolling, etc.

As the County of Wentworth has practically completed its system of good roads; no doubt there are some who would like to know just how the scheme has worked out. The few words that I have to say will be along the line of the cost of the work in general as a County system, and the cost to the individual ratepayers on each one thousand dollar assessment.

As an example, I will first take the work of 1909, as a whole, and show the cost of crushing the stone and putting it on the road, and also the cost of rolling on the road after being placed in position.

The County of Wentworth owns two road rollers, but we should have had more road rollers in order to do the work properly and get the best results for the money expended.

It is established beyond doubt that the road roller is the life of any macadam road. When the County of Wentworth first started on the good road work, we only had one road roller, and I found it impossible to roll properly all the stone that was being crushed and laid on the roads. Some of this work was thoroughly rolled, and some not more than half-rolled, and some did not get any rolling. The work that was thoroughly rolled stood the action of the hoof and wheel and is in good condition to-day. It also held its shape and form, while the portion that was only half rolled showed signs of weakness and lost its form and shape. Ruts were a prominent feature in the road, holding the water and assisting to wear the road out.

Last year I made an extra effort to get our rolling all thoroughly done with two road rollers, by running night work as much as possible. The Waterous roller last year ran for 202 days of ten hours each, and 76 nights of twelve hours each, and cost \$189 for repairs. (This is practically all the cost for repairs this roller has incurred since it was bought, and it has run for five seasons; it was purchased in 1905).

The J. I. Case roller was in operation 129 days of ten hours each and eighteen nights of twelve hours each, and cost for

repairs \$197. (This roller has been in operation four seasons and was purchased in 1906).

The County of Wentworth owns and operates four stone-crushers, two of the Sawyer-Massey make, and two of the Climax crushers.

1st. Climax crusher, No. 2, worked 134 days and crushed 1880 cords, an average of 14.029 cords per day; 2nd. Climax crusher No. 2, worked 127 days, and crushed 1705 cords, an average of 13.425 cords per day; 1st. Sawyer-Massey crusher worked 132 days and crushed 1386 cords, an average of 10.500 cords per day; 2nd Sawyer-Massey crusher, worked 126 days and crushed 1362 cords, an average of 10.80 cords per day; making a total of 519 days to crush 6,333 cords, or 12,009 cords, the average amount crushed by each crusher per day. The average amount of the stone crushed by the four crushers combined for the season was 48 cords per day.

The cost of quarrying, crushing and delivering the stone on the road for the year 1909, was \$4.96 per cord, made up as per the following example.

The total amount expended on roads for wages and teams as per foreman's time books for the year ending December 31st, 1909, was \$33,941.18, made up as follows:

Amount expended for winter work, repairs to machinery, culverts and grading, etc.	\$ 1,468.32
Amount for new culverts	1,211.14
Rolling expenses for the year, including engineer and team	2,054.00
Amount expended for quarrying, crushing, spreading and drawing 6,333 cords	29,207.72

Total expenditure. 33,941.18

\$29,207.72, divided by 6,333 cords of stone, equals	\$4.61 per cord
Add for coal	.18 " "
" " "	.17 " "
" " " dynamite	.17 " "

Total cost for crushed stone 4.96 " "
Add for rolling 43 " "

Total average cost per cord for 1909 .. 5.39 " "

*Extracted from paper read at the recent convention of the Ontario Good Roads Association.

Preparation and Use of Road Metal*

BY A. RANKIN, Collin's Bay, Ont.

We will not deal with the cost of the material on the road as it depends so much on the size of the plant, class of stone, and the length of haul, and for this reason it is not fair to compare the cost of road construction in one section with that of another section, even in the same township. The cost of laying the metal on the road should be reduced to a minimum, which can only be done when all the teams are working to full capacity with the least handling of material that is possible.

The preparation of the material may be divided under two heads: The preparation of the material to be placed on the road, and the preparation of the road to receive the material.

Whether the source of the metal be a quarry or field stone, sufficient coarse material should be piled convenient to site for crusher, and arrangements made for keeping a surplus of coarse material on hand as well as supplying the crusher, and a bin of sufficient capacity to provide against a temporary shut-down of the crusher for minor repairs or adjustment. The time and labor saved in loading from the bin compared with loading from a pile will far more than pay for the sinking fund and interest on the cost of the bin.

The metal should be screened on coming from the crusher, first separating out the dust and chips up to $\frac{1}{2}$ inch, then sorting out the 1 inch, $2\frac{1}{4}$ inch and tailings. Where new construction work is being done, the proportion of tailings and $2\frac{1}{4}$ inch should be much greater than where repair or re-construction work is being done; also very hard or tough metal will stand to be more finely broken than the softer metals.

In preparing the road surface to receive the metal, the surplus dust or fine material on the surface, as well as the false berm at the edge of the ditch, which has been formed by the growth of grass and collection of dust, should be removed, as it holds the water and softens the roadway. To do this the use of a scarifier is used to advantage to loosen up the material so that the grader can do with one cut what it would take three or four cuts to accomplish with unloosened material.

It is not advisable to place the metal on a smooth hard-surface of a macadam roadway. It takes more material than is necessary to form a good wearing surface, as a thin layer of metal will not bond on the smooth surface. The old surface should be roughened to give a bond between the old and new metal. To accomplish this the scarifier drawn by a traction engine is the most economical method. The traction engine should also be used for hauling the grader.

After the material has been loosened, it should be trimmed with the grader, and the broken stone spread, and levelled and rolled with the steam roller. By the use of the steam roller, a thinner coat of metal can be put on and bound into the loosened macadam below, and a good road formed at once, instead of allowing the traffic to kick the loose stone about and take a long time to make a passable road.

Pumping Concrete

Many attempts have been made to pump concrete, generally resulting in costly failure. With ordinary concrete it is safe to say that pumping is practically impossible. Engineering-Contracting, answering an inquiry on this subject, describes a trial made by one of its editors. It was found that by using stone no larger than $\frac{3}{4}$ in. in any dimension and making a rather wet mixture a certain degree of success could be obtained after 30 minutes' continuous mixing. The long mixing made a concrete in which there was little tendency on the part of the aggregates to separate, but it took a very long time to set. With the long mixed material a centrifugal pump was the only pump that could be used and a great deal of concrete was wasted. It was necessary at intervals to pump water alone until the pump

and pipes were clean, wasting the concrete that was in them at the time the water was introduced. Certain types of pumps are used to inject thin cement and sand grout into crevices, but grout is not concrete.

Oddfellows' Hall, New Westminster

The accompanying illustration is that of the Oddfellows' Hall, New Westminster, B.C., which is built of concrete blocks. The structure was erected during the present year, Smith & Buckland, contractors, of New Westminster, having the entire contract. The blocks are all rock-faced. London concrete block machines were used.

The concrete blocks are made of a proportion of five parts of gravel to one part of cement, and are faced with a mixture of two parts sand to one part of cement. They are of a good uniform color, and the entire structure has an appearance of neatness and durability.

A feature of note is the neat appearance of the window-heads in this structure, which are made from cement, and capped with a return mould. Window-heads of this type cost only about one-half that of brick



Oddfellows' Hall, New Westminster, B.C.

arches. They will carry as much weight as stone or any other building material.

Window-heads and sills of this type should always be reinforced with $\frac{1}{4}$ -inch iron bars, which will give them sufficient tensile strength to meet all ordinary requirements. Concrete blocks make one of the best materials for buildings of this type.

At the annual meeting of the Association of Dominion Land Surveyors at Ottawa, Ont., the following officers were elected: Dr. W. F. King, of Ottawa, Honorary President; Mr. Thos. Fawcett, of Niagara Falls, President; Mr. P. R. A. Belanger, of Ottawa, Vice-President; Mr. A. W. Ashton, of Ottawa, Secretary-Treasurer; Executive, Messrs. J. D. Craig of Ottawa, C. F. Aylesworth, of Madoc, Ont., and F. T. Nash, of Ottawa.

At the annual meeting of the Engineering Society of the University of Toronto, held last week, the following officers were elected for the ensuing year: President, A. D. Campbell; first vice-president, R. L. Dobbin; vice-president for civil engineering and architecture section, W. H. Murphy; mechanical and electrical section, F. H. Downing; mining and chemical section, E. Freeland; treasurer, W. A. Gordon; corresponding secretary, A. H. Munro; recording secretary, E. J. Ritchie; curator, E. V. Chambers.

* Extract from paper read at the recent Convention of the Ontario Good Roads Association.

Incompleteness of Plumbing Specifications

Meagre Details Prepared by Average Architect Claimed to Prevent Close Figuring — Practical Suggestions as to what Proper Plans Should Show

BY O. B. CRAIG*

There is nothing entering into the construction of the modern building which is more intimately associated with the health and comfort of its inmates than the plumbing. Under this general term is included the drainage from and water supply to the fixtures, the proper arrangement of all traps and vent lines, the heating of the water and the apparatus therefor, the proper installation of all plumbing fixtures, and such mechanical appliances as house and fire pumps, suction and supply tanks, etc.

The plumbing system for a building may be very aptly compared with the circulation and intestinal systems of the human body. The water supply lines are the arteries which carry the life giving fluid to the remotest corners of the structure; the sewers the intestinal canal through which the waste matter is discharged. The proper action of the one is just as important to the building and its inmates as is the function of the other to the human body.

Architects' Plans Lack Information.

Notwithstanding the important bearing of the plumber's work it is, as a rule, given very little study by the average architect in the preparation of his plans and specifications. He will elaborate most exhaustively on his construction and materials which go to make up the superstructure, making numerous full size detail drawings of doors, windows, interior and exterior trimmings and decorations, but when it comes to the plumbing, the most important of all from the standpoint of health and convenience, he is woefully lax in his instructions to the plumbing contractor. And it is greatly to the credit of the much maligned plumbing trade that such good work is produced with such meagre assistance as the plumber gets from his plans and specifications.

The architect in drawing up his contracts usually stipulates that the plumbing must conform to the drawings and specifications, which would necessarily imply that the drawings and specifications contained all the information that might be necessary for the plumbing contractor to not only give an intelligent figure on the work required, but also to carry out his contract in a manner to insure the very best results obtainable. But let us turn to those same drawings and specifications, and what do we find? The average building plans show us a toilet room located here, a sink there, lavatories scattered promiscuously, with a few lines on the basement plan to indicate the general direction of the sewer, but nothing more. It is up to the plumber to figure, if he can, how he is to reach the various fixtures with his lines; where to locate his water heater, pumps, tanks, etc.; where to install his risers and vent lines, and how he is to keep out of the way of the steel contractor, the heating contractor, the electrician, the sheet metal contractor, and, in fact, every other artisan on the job; for it seems to be the generally accepted rule that the plumber must give way to all of these more favored trades and crowd his work into impossible out of the

way places, working under handicaps which would hardly be tolerated in other lines of building construction.

On the drawings he finds not a line to indicate where his water lines are to go or the size thereof; and as for locating his basement machinery, let him get along with whatever space the other contractors have no use for. The incomplete nature of the drawings is oftentimes to some extent recompensed by a carefully detailed specification, but, unfortunately, the specification is generally indefinite and inadequate, abounding in such terms as "pipes of ample size," "valves satisfactory to architect," "water heater of sufficient capacity," etc., thereby placing upon the plumber almost the entire responsibility for the designing and proper working of the system, and woe betide him should his judgment be at fault.

Meagre Details Prevent Close Figuring

A case in point came to the writer's notice not long since. A large building involving more than the usual amount of plumbing was designed, and plans were submitted to some half dozen plumbing contractors with request for bids on the work. Beyond showing the location of the various toilet rooms and the fixtures therein, there was not a line in the drawings to guide the bidder, and, as for specifications, there were absolutely none, each bidder being requested to submit his own specification with his bid. Each of the bidders, after spending a great deal more time in figuring the job than would otherwise have been necessary, submitted his proposition, but all to no purpose, as such a wide variation of ideas was found and such a lack of uniformity in the cost of the work that the designers were compelled to readvertise for bids on a uniform and carefully drawn plumbing plan and specification.

What Plumbing Plans Should Show.

The plumbing for a building should be so indicated in the drawings and described in the specifications as to cover everything required, and so clear and concise as to be readily understood by the average plumbing contractor. The positions of all mechanical appliances in connection with the plumbing should be clearly shown upon whatever floor plan such appliance may be located. All runs of piping through basement, together with the size of same, should be concisely indicated in the basement drawing. House traps, bell traps, area drains, sump pits, conductor lines, etc., should be located beyond dispute. Branches to risers, with size plainly indicated, together with location of such risers, should be shown, and valves and stop cocks should be plainly indicated.

In addition to the plumbing lines shown on the plans there should be prepared a riser diagram showing the serving of each and every fixture on each floor of the building. This riser diagram should show clearly all water lines, waste lines, soil lines, vent lines, fire lines, etc., at each and every floor throughout the building giving the relative position and arrangement of the waste and vent lines for each fixture, with the sizes of

* Read at the Annual Meeting of the American Society of Inspectors of Plumbing and Sanitary Engineers.

all lines plainly designated. Pipes of the various characters can be indicated by different kinds of broken or dotted lines, with a properly arranged index on the drawing, showing the kind of service each line performs.

Where there are groups of fixtures, and where it is desirable to show connections to pumps, house tanks, filters, etc., it is advisable to prepare, on a larger scale than is ordinarily used, a detailed drawing showing the exact arrangement of all piping, together with all fittings, joints, valves, traps, etc.; but where the plumbing is ordinary straight and simple work such detailed drawing may be omitted.

Information Specifications Should Give.

The specifications should indicate in the clearest possible manner the quality of the materials to be used and the method of installation. The location, size, depth and general direction of the street sewer, if there be any, should be clearly described, and if there be no street sewer, the final disposition of the sewage should be given in detail.

The location and size of the city water main from which the water supply is to be taken should be plainly stated along with the water pressure at source of supply. This information can be obtained in any well regulated municipality, where it is always kept on file. The specification should list accurately the number of each style of fixtures to be located on each floor of the building and should give such an accurate and detailed description of such fixtures and the trimmings as to leave no room for doubt as to what is desired.

Noises in Pipes

Summing up many contributions to Domestic Engineering from practical men in the trade concerning the causes of noises in pipes and how to overcome this difficulty, the following resume covers the matter in a nutshell:

Cause: High pressure of water. Remedy: Substitute tank pressure; partial remedy, casing in the pipes and packing in tightly either mineral wool or asbestos fibre. Another remedy is to put in a pressure regulator near the cellar wall where the water supply enters the building and still another is to put discs at each one of the cocks on the premises. It is claimed that these prevent water hammer and splash as well as noise. Another remedy is the use of air chambers on the hot and cold supply to the fixtures.

Cause: Partial stoppage in the service pipe by an obstruction such as galvanizing partly filling the pipe and causing vibration when water is passing through with great velocity. Remedy: Take out pipe from main to the point where first branch is taken off and replace with a good smooth-bore pipe.

Cause: Too great vibration caused by velocity of the water. Remedy: A bit of rubber packing used between joists or studding or between pipe and hangers. The water pipe should not be allowed to rest against soil or heating pipes, as they will carry the sound.

Cause: Loose packing on faucets. Remedy: Do not use rubber packing; use fibre or hard leather.

Cause: Corporation stop at main too small or choked with sediment. Remedy: Examine it and repair defects.

Cause: Service pipe too small, ends not reamed out. Each successive end with burr telephones the noise ahead. Remedy: Self-evident.

Cause: Air-chambers become water-logged and each stroke of the faucet can be heard distinctly. Remedy: Draw off the water from the building.

Loose washers in fixture faucet may be the cause of the noise.

If noise has developed recently the cause has recently developed also and is probably a loose part in a faucet or valve. Pipes fastened to wood should have some non-conducting material between.

Risers not well anchored with non-conducting material between them and wood would cause vibration of the entire pipe.

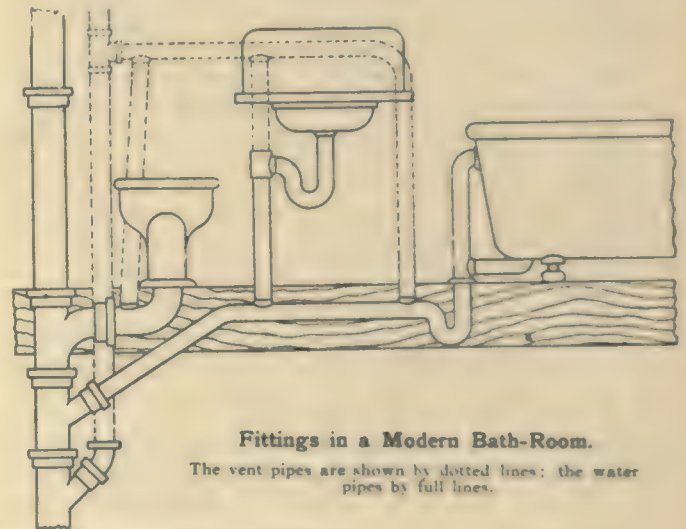
Stopcock may be partly closed. After opening it wide there may be no noise.

Supply pipe may be too small so that when a number of faucets are opened the water must necessarily travel through the small pipe at a high velocity.

If when the stopcock is shut off the noise ceases, look for a leak between the stopcock and the main.

A Modern Bath-Room

With modern fixtures and modern methods the bathroom of to-day may become, with a comparatively small cost, a thing of great beauty. No one attempts to make a comparison of the old-time sheathed-in bath-room work with that of the present day so far as beauty and artistic effect are concerned. When the fixtures were sheathed in, neither light nor air could circulate about



Fittings in a Modern Bath-Room.

The vent pipes are shown by dotted lines; the water pipes by full lines.

them, with the result that there was constantly a musty, if not foul, odor present. The bath-room of to-day can be made as clean and wholesome as the parlor.

Many factors have taken part in the advancement of sanitary construction, and the many improvements that have been made are not to be credited to any one, but to many and varied influences. In the first place, people have been educated to demand and expect the best possible living conditions, and the result is that the standard is constantly being raised. Municipal plumbing ordinances are constantly being revised or added to in the effort to provide the most perfect sanitary conditions. Competition is another factor which has brought results. Also, the plumber, whose duty it is to execute the work of construction, has been most influential in bringing about improved conditions. It is he who is better able than others to observe the good points of different methods and devices as well as their deficiencies, and to him is due the credit of many improvements in the construction of the plumbing system.

The accompanying sketch shows the method of draining and venting a modern bath-room according to the latest regulations. This method will work equally well in a one or a ten-story building.

Trade News from Montreal

Opening of Spring has Bouyant Effect on Building Operations—Good Season Anticipated in this Section—Supply Men Cheerful

Office of the Contract Record,
March 14th, 1910.

The excellent spring weather conditions prevailing in the Montreal district are having a decidedly buoyant effect upon building operations in general. Contractors are awake to the fact that an extra early start will be made this year in building construction, and are laying their plans accordingly. Architects have advanced their prospective plans far enough in many cases to ask tenders for construction, and, from this time on, we may expect to hear regularly and frequently from the designers' offices.

Gradual Improvement in Supply Business.

The supply business is also showing a tendency to shake off its winter lethargy. Dealers in cement report that this article is beginning to move more freely. It is now quoted at \$1.90 per barrel, f.o.b. Montreal. This is not the increase which appeared on the surface, but includes the cost of package; every barrel contains four bags, which are returnable at ten cents each, the actual wholesale price being \$1.50 per barrel. Firebrick in the various grades is reported inactive, with no price changes of note. In another month the brick yards will be open, and then a rush for this line of supplies may be expected. Crushed stone is not in much demand just now, since very little foundation work is being proceeded with as yet. The poor roads in and about the city have been responsible to a great extent for the somewhat quiet conditions of the supply trade.

February Building Statistics.

February building figures are rather disappointing in view of the excellent showing made during the month of January. In all, 107 permits were issued from the Building Inspector's office, 72 of these being for new buildings. In point of numbers this showing is slightly behind the same period in 1909, when 83 permits for new construction and 37 for alterations were issued.

Comparing, however, the values of permits issued during these two periods we find that in 1909 the total registered value of permits reached \$235,330. In February, 1910, this value reached \$264,030, so that on the whole the increase in the building figures is very creditable.

Inspection of City Contracts.

The Board of Control promise to inaugurate a better system of checking civic contracts. A large amount of money will be expended this season for walks and pavements, and it is the intention of the Board to see that contracts are rigidly adhered to. To carry this into effect it is anticipated that an extra staff of inspectors will be employed to check the work of contractors and to see that the proper proportions of cement is used in all cases.

Another innovation which the Board have under consideration is the posting of copies of all civic plans and specifications in the Montreal Builders' Exchange. This move would be a welcome one, and would probably result in a more general interest being awakened in this work on the part of Montreal contractors.

The promoters of the proposed subway for Montreal are apparently working energetically in the prepara-

tion of the necessary preliminary details for this extensive project. It is stated that the route of the new subway will connect the eastern and western ends of the city, and at the same time a cross line will be built from the riverfront northward. There is a persistent rumor that the Canadian Northern Railway Company will be prepared to give the scheme every support, since it would allow them an excellent entrance way to the centre of the city. The organization of a syndicate to carry out this work is said to have been completed. It involves English, American and Canadian capital to the extent of \$20,000,000. Montreal financiers said to be interested in the project are Messrs. Rudolph Forget, M.P., H. S. Holt and W. G. Ross.

Items of Interest.

Considerable activity in building circles is promised with the opening of spring. The district along the shore of Lake St. Louis, from Lachine to Ste. Anne de Bellevue, is growing in popularity as a summer resort, and several contracts are being made for the erection of summer cottages of the bungalow type.

A Public Utilities Commission for the Province of Quebec was recently inaugurated. The first members of the new commission are Col. Hibbard, of Montreal, chairman; Sir J. George Garneau, Quebec, and Mr. Charles Laberge, Professor in the Polytechnical School, Montreal.

Our Winnipeg Letter

Office of the "Contract Record,"
Winnipeg, March 12, 1910.

The season is opening up rapidly, and at some points of the West building construction is already in active operation. There is some talk of a shortage of labor during the coming season, but there are many who fear more trouble from a shortage of supplies than from the other source. When the price of lumber and building material came down a little and the building campaign was being carried on, it was the home builders in this city, augmented by the agricultural districts, that responded most and did the greater part of the building. This work naturally did not call for so much structural steel and brick and lumber. The agricultural districts built partly because they were prospering. The building in the suburbs of the cities was encouraged by the cheapness of lumber and building material and by the desire on the part of many to have their money invested securely in a home. The agitation for building, however, did not encourage people to invest extensively in buildings until the close of the last building season, despite the cheapness of material and the plentiful supply of labor.

To-day there are all kinds of building projects under consideration in every town and city throughout the West. In Winnipeg, especially, there are an immense number of important buildings talked of for 1910. According to the files of the Winnipeg Development and Industrial Bureau, inquiries are more numerous than ever before. Especially active in this way are manufacturers of the United States and Great Britain. One of the most likely firms in this connection are George Christie, Limited, Glasgow, who are looking for a Canadian outlet for their woven wire goods. Another firm which is negotiating for the establishment of a large factory in Winnipeg is one of the largest strawboard

and paper manufacturers in the world. We learn that a representative is expected from two of England's largest gas and oil engine makers, that several big British concerns engaged in automobile and traction manufacture have been making enquiries, and that, following upon the Canadian cement merger, inquiries have been received from reliable cement manufacturers of London and Newcastle-on-Tyne. The industrial future of Winnipeg is assured.

The building season here has already opened. Work has commenced in connection with the new Bank of Montreal building, to be erected at the corner of Main Street and Portage Avenue. The contract amounts to about 1¼ million dollars, but is not looked upon as one of great magnitude. The contractors for the new structure are Norcraft Bros., while the sub-contractor for excavation and demolition is D. D. McOuatt. The work of tearing down the only Canada Permanent block is also under way.

Labor and Other Predictions

It is not probable that there will be any dearth of skilled labor this year, but developments in this field will, of course, depend largely upon what transpires in Eastern Canada, and the United States. It is possible that there may be some difficulty in obtaining sufficient help in railroad construction. A prominent labor agent informs us that he already has work in sight for nearly 30,000 unskilled laborers. "Last year," he says, "was a very active one, and this year promises to be more so. I foresee considerable difficulties in getting enough men to fill the various jobs, especially on railroad construction. Hitherto the contractors have relied largely upon Poles and Italians, but there will not be so many of these available this season. Last year they saved so much money that they were able to make a record rush to Europe at the end of the season. It is not to be expected that half of these will return, and we are wondering where the men will be found." Prominent contractors in the building line, however, are unanimous in the assertion that here will not be any shortage of labor in their department. A large influx of mechanics is expected from the United States, while there is every possibility of a healthy immigration from the British Isles.

C. W. Sharp, of the contracting firm of Sharp & Sons, anticipates little trouble in the building trade during the coming season. Interviewed recently, he said, "This is going to be a banner year in every respect. It will be greater far than 1906, which was the greatest year in Winnipeg's history up to date. The contractor may experience a little shortage in some material, but not in any of the leading lines. Personally, I have been delayed on the Great West Life building owing to the difficulty in getting marble from the Kootenay."

Frank E. Halls, of the Carter-Halls-Aldinger Company, is very optimistic. He says: "I do not think the estimate of 15 millions for Winnipeg building is any too big a computation. We shall be able to handle satisfactorily all the contracts put into our hands—provided we get them early enough. The trouble with Winnipeg people is that they consider too long and then expect the building to be up the next minute. There will be lots of work for everybody and at the worst, a little shortage of labor towards the close of the season."

Mr. E. A. James, editor of the "Canadian Engineer," has been appointed town engineer of North Toronto.

Weight of Building Materials

The following convenient table of the approximate weight per cubic foot of various building materials is furnished by a leading architect and consulting engineer:

Metals.	Weight.
Bronze	552
Copper	550
Iron, cast	450
Iron, wrought	480
Lead	712
Steel, structural	490
Timber.	
Cedar	23
Chestnut	41
Cypress	29
Fir	32
Hemlock	25
Oak, white	50
Pine, white	24
Pine, yellow	35
Spruce	25
Masonry.	
Asphalt	130
Blue stone	160
Brick in lime	120
Brick in cement	130
Cement, Portland	90
Concrete	140
Gneiss	160
Granite	165
Gravel	120
Limestone	170
Marble	165
Sandstone	145
Slate	170
Terra cotta	110
Tile	115

The incorporation is announced of the Dominion Cement Company, Limited, of Montreal. The capital stock is \$5,000,000.

The revision of the salary list for the city of Montreal has resulted in a wholesale cutting of the wages of civic employees. It is interesting to note, however, that Mr. J. R. Barlow, City Surveyor, and Mr. Stuart Howard, of the Sewers Department, were recommended for substantial increases, which have since been sustained by the City Council.

In the House of Assembly at Halifax, N.S., last week there was introduced a Government measure providing for compensation by employers in cases where workmen lose their lives by accident or are partially or totally incapacitated for work. In case of death the amount payable where a workman has been employed for three years shall be one thousand dollars, or a sum equal to his earnings of three years, whichever is larger, but not to be more than two thousand dollars. Where total or partial incapacity for work is caused through accident, he shall during incapacity be paid weekly 50 per cent. of his earnings in the previous twelve months, but the amount shall not be in excess of five dollars per week. The act provides for arbitration for carrying out its provisions.

Ontario Land Surveyors' Annual Convention

The annual meeting of the Ontario Land Surveyors' Association was held at 96 King Street West, Toronto, March 8-10. Among the many interesting papers read at this meeting was one entitled "The Principles of Road Supervision," by Mr. W. O. McLean, Toronto, Provincial Engineer of Highways. Mr. McLean stated that the roads of Ontario were built equally as well as those of England, but that the great difference was in the manner of improving them. He criticized the fact that any sort of an engineer could set himself up as an expert in road building. Another interesting paper, which it is hoped to publish in a later issue, was that entitled "A Concrete Box Sewer," submitted by Mr. Owen McKay, Walkerville, Ont.

In "The Autobiography of an Old Surveyor," Mr. Chas. Unwin, of Toronto, related his personal experiences in a most interesting paper. Mr. Unwin has lived under eighteen mayors in the city of Toronto and under four English sovereigns. He can remember the time when wild pigeon shooting was a favorite pastime in the district now known as the Allan Gardens, Toronto, and when the population of the city was considerably less than 20,000.

Mr. H. W. Selby, of Toronto, was elected President for the ensuing year, Mr. J. F. Whitson, of Toronto, Vice-President, Capt. Killaly Gamble, Secretary-Treasurer, and Messrs. E. T. Wilkie, of Carleton Place, and H. L. Sston, of Toronto, auditors. The following nominations were also made for Council; Messrs. C. H. Fullerton of New Liskeard, P. S. Gibson of Willowdale, E. T. Wilkie of Carleton Place, C. J. Murphy of Toronto, J. M. Watson of Orillia, and James Hutcheson of Toronto.

Armored Concrete*

Concrete pavements, properly laid, during the past twenty years show one defect, that is, in the joints. Among the first laid in the country were those laid in Bellefontaine, Ohio, about seventeen years ago. After seventeen years of service these pavements are still in good condition, excepting wear at joints. Other well-constructed pavements in different cities show the same defect, or weakness. This is about the only valid objection to concrete pavements, and it is overcome by the "Armored Expansion Joint." This device was originated and used in 1909 by R. D. Baker, of Detroit, Mich. The armor consists of a steel plate at the edge of expansion joints wherever necessary to provide for expansion and contraction. Where such a joint is to be made each edge is protected first by a steel plate 3-16 in. wide. Between the two edges thus protected is placed a board. When the board is removed the cavity left by its removal is filled in with proper paving pitch or other suitable material. Some of the pavements thus constructed in Detroit have been subject to severe tests in the way of heavy traffic, and seem perfectly satisfactory. The added cost is little compared to the lasting improvement in wear.

Apropos of the Toronto pipe contract, Mr. Richard Grigg, of Montreal, Dominion Trade Commissioner, in a recent communication to City Engineer Rust says: "Any buyer who invites bids merely for the purpose of making a price for another firm will soon find that first-class concerns will refrain from the expense and trouble of submitting tenders at all."

* Contributed by David Todd, Walkerville, Ont.

Personal News and Notes

Mr. L. M. Jones, late of Toronto, has entered upon his duties as assistant city engineer at Port Arthur, Ont.

Mr. R. S. Lee, consulting engineer, Montreal, has obtained the degree of Mem. Inst. C.E. (England).

R. E. Speakman, city engineer of Brandon, Man., has been appointed city engineer of Victoria, B.C., at a salary of \$3,500 a year.

With a view to assisting architectural draughtsmen, the Manitoba Association of Architects has instituted a class in architectural design at Winnipeg.

Ottawa building permits for February, 1910, were valued at \$97,200, compared with \$66,940 for February of last year.

Building permits at Victoria B.C., last month represented a total value of \$140,960, an advance of \$27,280 on February, 1909.

Mr. B. S. Mackenzie, of the Quebec Bridge Co., Montreal, has been appointed assistant engineer on the G. T. P., with headquarters at Winnipeg.

Mr. N. D. Wilson, A.M., Con. Soc. C.E., has opened a temporary office at 41 Murray Street, Toronto, where he will engage in a municipal and general engineering practice.

The total amount represented by building permits issued at Vancouver, B.C., last month was \$880,795. The February, 1909, total was \$409,655. For the two months of the respective years the totals were \$1,512,106 and \$77,285.

Building permits issued at Winnipeg, Man., during February, 1910, represented a value of \$318,600, compared with \$158,500 for February, 1909. The total for the first two months of the year was \$502,000. This is the first time in the history of the city that the figure for this period has exceeded the half million mark.

Building permits issued at Toronto during February, 1910, amounted to \$860,440 compared with \$853,035 for the corresponding month of the previous year. The totals for the first two months of 1909 and 1910 were respectively \$1,233,060 and \$1,542,528.

A meeting of the Central Railway and Engineering Club was held at the Prince George Hotel on Tuesday, March 15th, when Mr. M. J. Quinn, manager of the National Equipment Co., Toronto, read an interesting article on "Sewage Disposal and Water Supply."

Mr. J. A. Orbits, Assistant Engineer of Public Works, Mount Clemens, Mich., was a recent visitor at the office of Mr. A. F. Macallum, City Engineer of Hamilton, Ont. He stated that his city had been universally metered for water, and that the consumption had decreased remarkably as a result.

Mr. J. E. Griffith, C.E., formerly government agent at Golden, B.C., has been appointed assistant to Mr. F. C. Gamble, Provincial Engineer, B. C. Department of Public Works. Mr. Griffith returned recently from the Argentine Republic, where he was engaged on railway work.

Building permits issued in Toronto last month represented a total of \$860,440, an increase of \$7,405 over the total for the corresponding month of last year. The total for the year to date stands at over a million and a half dollars, an increase of \$300,000 over the first two months of 1909.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Atwood, Ont.

Tenders addressed to Geo. Lochhead, clerk of Elma, will be received until April 2nd for the construction of a drain in the township of Elma. Plans, etc., at office of the above.

Brandon, Man.

Tenders are being called until April 1st for waterworks supplies, etc. R. E. Speakman, city engineer. For further information see advertisement in this issue.

Chatham, Ont.

The following tenders were received for installation of a pump: McKeough & Trotter, \$1,260; McKeough & Trotter, \$1,388; Smart-Turner Company, \$1,295; Canada Foundry Company, \$1,390; John McDougall Caledonian Iron Works Company, \$2,507; Park Bros., \$1,402.50; Canadian Buffalo Forge Company, freight and duty extra, \$833.50; Gardener Governor Company, duty extra, \$1,100.

Cumberland, B.C.

M. Manson, M.P.P., is authority for the statement that the Government is preparing plans for the entire sewerage system.

Calgary, Alta.

The following complete list of tenders for cast iron pipes has been submitted by H. E. Gillis, city clerk:—National Iron Works, Toronto, 10 inch, \$46.50 per ton, lake and rail. Jack & Company, Glasgow, 4 inch, \$48.37; 6 inch, \$46.10; 9 inch, \$45.20; 16 inch, \$44.75; specials, \$71.20, f.o.b. Calgary. Canadian Equipment Company, Calgary, 4 inch, \$49; 6 inch, \$47.50; 8 inch, \$47; 10 inch, \$46.50; 16 inch, \$45.50, f.o.b. Calgary. Evans, Coleman & Evans, Vancouver, 4 inch, \$45.90; 6 inch, \$44.29; 8 inch, \$44.10; 10 inch, \$43.75; 16 inch, \$44.64; special, \$78, f.o.b. Calgary. Stavely Coal & Iron Company, 4 inch, \$46.40; 6 inch, \$45.80; 8 inch, \$45.25; 10 inch, \$44.40; 16 inch, \$44.10; special, \$72.50, f.o.b. Calgary. Gartshore, Thomson Pipe Company, Hamilton, 8 inch, \$46.50 per ton; specials, \$57, f.o.b. Calgary. Canadian Iron Corporation Company, Montreal, 4 inch, \$46.50; 6 inch, \$45.40; 8 inch, \$45; 10 inch, \$45; 16 inch, \$44.50; special, \$67, f.o.b. Calgary. McFarlane, Strang Company, Glasgow, 6 inch, \$26.64; 8 inch, \$26.28; 10 inch, \$25.80; 12 inch, \$25.56; 16 inch, \$25.92, f.o.b. Montreal. Canadian General Electric Company, Calgary, 4 inch, \$47.10; 6 inch, \$47.20; 8 inch, \$46.70; 10 inch, \$46.70; 16 inch, \$46.20; specials, \$64, f.o.b. Calgary. Total, 1,752 tons. Amount involved, \$77,374.

Fort Erie, Ont.

The by-law to authorize the issue of debentures to the amount of \$50,000 for the purpose of constructing a system of waterworks was carried.

Tenders addressed to B. F. Matthews, town clerk, will be received until March 30th for furnishing the materials for and constructing a system of waterworks for this village. Plans, etc., at office of the

aforesaid, or at the office of the engineers, Witmer & Brown, Fort Erie.

Guelph, Ont.

Tenders will be received by the City Clerk until April 2nd for the construction of approximately 15,000 square yards of pavement, etc. James Hutcheon, city engineer. For further information see advertisement in this issue.

Kingston, Ont.

Tenders have been taken for materials and labor necessary for laying a steel intake pipe. A. K. Kirkpatrick, engineer, Rockwood Hospital.

The Waterworks Committee will recommend that tenders for supplies be awarded as follows. Selby & Youlden, hydrants, etc.; Francis Tracy, steel drills, picks, etc.; Chadwick Bros., service cocks; Canada Foundry Company, valve, etc.; Gartshore, Thompson Pipe & Foundry Company, cast iron piping; Queen City Oil Company, oil; Simmons Bros., block tin, waste, etc.; W. B. Dalton & Sons, fire clay, shovels, etc.; McKelvey & Birch, lead piping, galvanized piping, fittings, etc.

Lockeport, N.S.

The ratepayers have authorized the council to borrow \$3,000 for the providing of a free water supply.

London, Ont.

Tenders will be received until March 24th for the following supplies: Cement sidewalks, cement curb and gutter, lumber, hardware, iron castings, gravel, broken stone, corner irons, delivering broken stone, sewer pipe and cement, concrete pipe. A. O. Graydon, city engineer.

Moose Jaw, Sask.

Tenders addressed to W. F. Heal, city clerk, will be received until April 11th for furnishing materials for and constructing pavement, combined curb and gutter and \$116,500 feet of concrete sidewalk. Angus Smith, engineer.

Montreal, Que.

The Board of Control have asked for an appropriation for \$10,000 to cover the cost of preparing plans and of preliminary work in connection with the establishment of a city filtration plant.

The Board of Control have under consideration the purchase of the property and plant of the Montreal Water & Power Company.

The Board of Control will be asked to extend the waterworks mains during the coming season to include all the suburbs annexed by the city within the past few years, and which are at present without a city supply.

Mr. William Lyall has outlined a scheme to the Board of Control which involves the construction of three and one half miles of boulevard, stretching from the eastern to the western parts of the city. The estimated cost of this project is placed at one million dollars.

Mimico, Ont.

Tenders addressed to Chester Ferrier, superintendent, Victoria Industrial School,

will be received until April 4th for the construction and completion of a pipe sewer to connect with the New Toronto sewer system. Plans, etc., at office of the above or at the office of J. O. L. Macpherson, engineer-in-charge, Islington.

Nassagaweya, Ont.

The ratepayers will vote on a \$10,000 drainage by-law.

North Battleford, Sask.

Tenders are being called by this municipality for pipes, hydrants, etc., in connection with the waterworks system. For further information see advertisement in this issue.

Ottawa, Ont.

The following tenders for pipe, etc., have been recommended by the Board of Control:—Vitrified clay pipe, T. S. Kirby & Company, 72 per cent. off list prices; stone sets, T. S. Kirby & Company, \$65 and \$75 per 1,000; stone sets, Dupuis & Fleming, \$12,510; cement, H. Dupuis & Company, 45 1-2 cents cwt.; sand, L. Cousineau, 87 cents per cubic yard. The tenders recommended for acceptance by the waterworks committee are:—Hydrants and valves, Thos. Lawson & Sons, \$2,902.50; castings, Thos. Lawson & Sons, \$3.25 per cwt.; brass goods, James Robertson Company, Limited, \$1,672.10; lead pipe, McKinley & Northwood, \$1,527.60; iron pipe, Alex. Fleck, \$8,901.50; oils and grease, Canadian Oil Company, \$117. The case where the lowest tender was not accepted was that of John Coates, agent, but the committee gave the Fleck firm the preference because the pipe would be manufactured in Canada.

Quebec, Que.

This municipality is calling for tenders for annual supply of iron castings, brass castings, lead pipe and pipe lead, cement brick and drain pipes. Jer. Gallagher, waterworks engineer.

Regina, Sask.

The engineers engaged to prepare plans for the sewerage scheme to cost \$350,000 will shortly report. Mayor, R. H. Williams.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until April 5th for the supply of 1,000 feet of rivetted steel pipe, seventy-two inches in diameter, and also 20 flexible joints. Specifications at office of City Engineer, and at B. 33 Board of Trade Building, Montreal.

Victoria, B.C.

G. H. Bryson, acting engineer, in his report on the reservoir advises that he is called for repairs, which will cost about \$30,000.

Vancouver, B.C.

Tenders will shortly be invited for approximately eighty tons of castings required by the waterworks department. S. Madison, superintendent.

Westmount, Que.

By-laws authorizing a loan of \$550,000 for municipal improvements, including roadways, sewers, etc., have passed the first reading in the council.

Wetaskiwin, Alta.

The by-law to raise \$40,000 to complete the waterworks and sewers installation has been carried.

Waterloo, Ont.

The council has authorized the issue of debentures to raise the sum of \$6,000 for improvements to waterworks.

Weyburn, Sask.

Tenders are being called under April 27th for pipelaying, pump house, etc., in connection with the waterworks system. For further information see advertisement in this issue.

Weston, Ont.

Tenders are being called by this municipality for pump house, mechanical water filters and electrically operated pumping machinery. For further information see advertisement in this issue.

AWARDED.**Chatham, Ont.**

Park Brothers have been awarded the contract for waterworks supplies.

Calgary, Alta.

H. E. Gillis, city clerk, sends us the following list of accepted tenders for supplies for 1910; Canadian Brass Company, Galt, Ont., brass work for house services, lump sum, 2,357, f.o.b. Calgary. J. Robertson Company, Winnipeg, pipe lead, \$5.50 per 100 lbs., f.o.b. Calgary; pig lead, \$4.62 per 100 lbs., f.o.b. Calgary. Gurney Standard Metal Company, Calgary, Oakum, \$3.75 per 100 lbs., f.o.b. Calgary. Crane & Ordway, galvanized iron pipe, bulk sum, \$3,175, f.o.b. Calgary. Calgary Ironworks, Calgary, valve boxes, \$4 per 100 lbs. Canadian Foundry Company, Toronto, crane posts, \$54.10; specials, \$3.20 per 100 lbs. Bissett & Loucks, Winnipeg, valves, \$2,989.30 lump sum, f.o.b. Calgary. Calgary Iron Works, Calgary, hydrants, \$50, all sizes, without crane attachment; made to sample. Union Iron Works, Calgary, hydrants, 8 feet, \$49.50; 8 feet 6 inches, \$50; 9 feet, \$51.50 without crane attachment; with crane attachment, \$5 extra; made to sample. Evans, Coleman, Evans, Vancouver, cast iron pipe.

Hull, Que.

Of the tenders for the new pumphouse, the lowest, Bisson & Sons, for \$15,301, was accepted. Two others were received; one for \$17,500 and one for \$15,800.

London, Ont.

The following list of accepted tenders for supplies has been sent:—Brass work, London Brass Works Company, list, \$905.75. Lead pipe, the Cowan Hardware Company, at \$4.85. Stop cock boxes, the London Foundry Company, 1-2 inch at \$1.35. Iron body street valves, the London Foundry Company, \$6.75; \$10.0; \$18; 10 inch, \$27.50. Iron castings, the Vulcan Company, at \$2.65 per 100 lbs. Street hydrants, the Vulcan Company, 3-way, at \$35.50. Hardware, the McLean Hardware Company. Miscellaneous supplies, the McLean Hardware Company. Portland Cement, W. Heaman & Son, at \$1.59 bbl. Brass polish, A. McCormick & Son. Coal, the Lake Erie Coal Company, soft, \$4. Oils (engine), Queen City Oil Company. Oil (cylinder, coal and grease), Canadian Oil Company. Lumber, the Dymont Baker Lumber Company. Pipe laying and iron pipe, Fred T. Harding. Bookbinding, H. P. Bock. Print-

ing (general), Dawson Bros. Printing annual reports, Allinson & Hieghway.

Victoria, B.C.

The committee recommended that the contract for paving blocks be awarded to the Michigan Puget Sound Lumber Company, the lowest tendered. G. H. Bryson, acting city engineer.

Railroads, Bridges and Wharves**Brookville, Ont.**

Ratepayers have authorized an expenditure of \$16,000 for the rebuilding of certain bridges in the municipality. Barber & Young, consulting engineers.

Calgary, Alta.

The C. P. R. management are calling for tenders until March 31st for construction of concrete work for various pieces of work in this division. Plans, etc., at office of assistant chief engineer, Winnipeg; division engineer, N. E. Brooks, Calgary; and resident engineers at Moose Jaw, Medicine Hat, and Cranbrook.

Fredericton, N.B.

Premier Hazen introduced in the Legislature a bill to aid in the construction of a railway down the St. John river valley to St. John.

Gravenhurst, Ont.

It is stated that Mr. W. F. Wasley is in Boston arranging for the building of a marine railway.

Minotnas, Man.

Tenders are being called by E. Wiermeyer, secretary-treasurer of this municipality, until March 30th for a ninety foot steel Pratt truss bridge. Plans to be seen at Department of Public Works, Winnipeg, or at the municipal offices.

Montreal, Que.

Plans concerning the disposal of the six million dollar Government loan to the Montreal Harbor Commissioners are expected to be made public within the course of two weeks.

New Westminster, B.C.

It is probable that the city will construct a new wharf at the foot of McInnis street. The engineer has drawn up plans providing for a warehouse 143 by 53 feet, where building material may be stored.

Port Arthur, Ont.

The Great Northern line from Orville, Wash., to Penticton, B.C., has been located. Forty miles of road may be built this year.

St. Thomas, Ont.

Tenders addressed to T. H. Holmes, Colvinville, Ont., will be received until April 6th for the building of concrete abutments, etc., to bridge over Sydenham river, etc. For further particulars see advertisement in this issue.

Toronto, Ont.

The Temiskaming & Northern Ontario Railway Commission are calling for tenders until April 6th for works required in connection with construction of bridges. For further particulars see advertisement in this issue.

Vancouver, B.C.

C. A. Hannington, who is in charge of the Canadian Northern survey in Northern British Columbia, has succeeded in locating a line from the entire distance between Tete Jaune Cache and the Yellow Head

Pass at the summit of the Rockies. He is now on the way out and is engaged revising a portion of last summer's survey near Cranberry Lake, in the summit between the North Thompson and Fraser rivers. The Canadian Northern now has a line located from New Westminster to Yellow Head Pass, 450 miles.

Winnipeg, Man.

Tenders are being called until March 28th for the construction of new freight car shops, six stall addition to Ignace engine house and several standard section houses and station buildings on the Central Division, C. P. R. Plans, etc., at office of the Division Engineer, Frank Lee, Winnipeg.

AWARDED.**Vancouver, B.C.**

The contract for the construction of the Grand Trunk Pacific wharf at Vancouver has been awarded to C. J. Johnson & Company, Vancouver and Seattle.

J. N. Stewart & Son are reported to have secured contracts from the Vancouver, Victoria & Eastern Railway Company for construction of two sections of its line aggregating 18 and 51 miles of track.

Winnipeg, Man.

The recommendation of the city engineer to purchase railroad asphalt plant, capacity 1,800 square yards per day, from F. D. Cummer & Son, at \$16,500 was accepted. Other tenderers were: Alloway & Champion, six tenders on various types of plants, Bitulithic & Contracting Company, and H. P. Pennock & Company. Prices ranged from \$15,700 to \$23,100. Lowest tender was for a plant with capacity of only 1,000 yards daily.

Public Buildings, Churches, Schools, etc.**Assiniboia, Man.**

On the 2nd April the ratepayers will vote on a by-law to raise \$40,000 for school purposes. Frank Ness, St. Charles, clerk.

Battleford, Sask.

Tenders will be received until 31st March for the construction of buildings on the Indian Reserves: Thunderchild's Reserve, Battleford Agency, Moosomin's Reserve, Battleford Agency, Ready's Reserve, Duck Lake Agency. Plans may be seen at the following offices: Indian Agents at Battleford and Duck Lake, and for the offices of Dominion Lands at Prince Albert and Battleford, and on application to J. D. Maclean, Secretary Department of Indian Affairs, Ottawa, Ont.

Boissevain, Man.

The by-law to raise \$12,000 for town hall, etc., was carried by the ratepayers.

Brantford, Ont.

The Separate School Board is calling for tenders for the erection of a new school here to cost about \$18,000.

Carleton Place, Ont.

A joint stock company will be formed to build a rink of steel structure at an estimated cost of about \$15,000.

Cote St. Paul, Que.

The erection of a new town hall for this municipality has been approved by the ratepayers. Estimated expenditure, \$36,000.

Flesherton, Ont.

A continuation high school will be erected in the township of Artemesia for which debentures of \$13,000 have been authorized.

Halifax, N.S.

Messrs. Harris & Horton, Keith building, are calling for tenders until April 6th for the construction and completion of a Young Men's Christian Association building to be erected here. Plans, etc., at office above. O. E. Smith, convener, building committee.

Hamilton, Ont.

The First Methodist Church are considering the erection of a new church to seat about 1,800 people.

Tenders addressed to J. W. Jardine, county clerk, will be received until March 23rd for the various trades, including tiling, plumbing and heating, fittings, etc., in the erection of registry office. Plans, etc., at the office of the architect, Mr. Stewart McPhie, 701 Bank of Hamilton Building.

Hanover, Ont.

The town council are having plans prepared for a public library and town hall. John Taylor, clerk.

Kildonan, Man.

The money by-law for issuing debentures for \$11,000 for a new school was decisively defeated.

Kilowna, B.C.

It is reported that bids will be received until March 26 for the erection of the proposed church of St. Michael and All Angels. W. A. Peters, architects, Kelowna.

Kingston, Ont.

The plans for the new metallurgy building for the School of Mining, Queen's University, have been approved. The cost, \$40,000, is covered by a gift.

It is estimated that the remodelling of the north wing of the municipal buildings and the installation of steam heating will cost \$14,000. Wm. Neelands, architect, Ald. Graham, chairman, Property Committee.

Lachine, Que.

The city council are endeavoring to complete arrangements for the purchase of property on Eighteenth and Nineteenth avenues for the erection of an extensive combination city hall, fire and police station.

Leamington, Ont.

Tenders addressed to N. Tessier, secretary, Department of Public Works, Ottawa, will be received until April 4th for post office, customs and inland revenue fittings for this place. Plans, etc., on application to Mr. S. O. Roach, clerk of works, Leamington; T. A. Hastings, clerk of works, postal station F., Toronto, Ont., and at the above Department.

Lethbridge, Alta.

The congregation of St. Augustine will erect a new church. Estimated expenditure, \$100,000.

London, Ont.

Plans for the new Masonic Temple are to be in by the 1st of April, when tenders will likely be called.

Talbot Street Baptist Church are considering advisability of selling the present church site, and the purchase of a new one.

Montreal, Que.

The Board of Protestant School Commissioners have purchased extensive building lots in Nun's Park, Point St. Charles, Que. These will be held for future school sites.

Eric Mann, architect, 30 St. John street, is preparing plans for additions and alterations to the Victoria Presbyterian Church building at Point St. Charles.

The Federal Government have under consideration the erection of a new Catholic school building at this place, estimated cost, \$10,000.

It is expected that the work of completing the new Catholic Church in Verdun will be commenced in the spring. Estimated cost, \$100,000.

Nelson, B.C.

At the annual meeting of the Kootenay Lake Hospital Association the proposition for a modern hospital building was favorably considered. President Hamilton Byers; secretary, G. Johnstone.

Ottawa, Ont.

Tenders will be called shortly for the erection of the new departmental building on Sussex street.

Councillor W. R. Cummings, Reeve of Eastview, is authority for the statement that Carleton county will build the tuberculosis hospital, which was to have been built by the two counties, Renfrew and Carleton. Estimated cost, \$30,000.

Prince Albert, Sask.

At a special meeting of the council, it was decided to make extensive alterations and improvements in the city hall, the cost of which will be about \$7,000.

The Board of Trade has received a letter from the International Theatre Company, of Winnipeg, asking if suitable properties for a theatre can be secured here.

Rodney, Ont.

The council passed a \$2,500 new town hall by-law.

Simcoe, Ont.

The new Lynwood skating rink was destroyed by fire on the 17th inst. Estimated loss, \$12,000.

Southampton, Ont.

The by-law to expend \$12,000 in the building of a new Town Hall here was carried.

St. John, N.B.

The committee appointed to investigate the need of a new school has recommended that a new building be erected in the vicinity of the Newman Street School. Mr. Bullock, chairman.

Tapscott, B.C.

Tenders addressed to the Minister of Public Works will be received until March 29th for the erection of a large one-room frame school building. Plans, etc., at office of the secretary of the school board, Kault, B.C., and at the Department of Public Works, Victoria, B.C.

Toronto, Ont.

Tenders for the construction of a school at Balmy Beach will be invited shortly. James Simpson, chairman, Board of Education.

Improvements and extensions to cost \$15,000 will be made to the Rosedale stand and club house by the Toronto Lacrosse & Athletic Association. Geo. W. Gouninlock, Temple Building, architect.

Chief Justice Meredith has issued an order directing the county of Wentworth to proceed forthwith to erect and establish a House of Refuge. The order is stayed for three months to enable the council to come to a satisfactory arrangement with the Government, if possible, by other means.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until March 29th for mason work required in connection with the erection of an addition to the House of Industry on Elm street. Plans, etc., at office of the City Architect, City Hall.

Vancouver, B.C.

Plans have been prepared by Architect Leach for the new offices of the board on the corner of Hamilton and Dunsmuir streets.

The Socialists have decided to buy a site and erect an auditorium in which they can hold their meetings. Nearly \$20,000 has already been subscribed.

Victoria, B.C.

C. E. Watkins, architect, 606 Fort street, will prepare plans for the new high school to be erected, for which the ratepayers voted \$150,000.

Welland, Ont.

The tenders for Welland Presbyterian church will have to be reconsidered, as a change had been made in the plans, which had become known to some and not to others. New tenders will be called. Estimated cost of improvement, \$10,000.

Winnipeg, Man.

Central Congregational Church has purchased a \$100,000 site at the corner of Kennedy and Ellice streets, and will build an edifice to accommodate 4,000.

It is stated that tenders will be called at once for the erection of the Lord Roberts school on Hereford avenue. Estimated expenditure, \$80,000.

AWARDED.**Fonthill, Ont.**

We are informed that P. S. Peacock, of Welland, has been awarded the contract of the masonry, plastering, carpentry, painting and glazing and metal work for the erection of Fonthill public school.

Montreal, Que.

The Board of Control have awarded the contract as follows for alterations to the council room. Painting, D. H. Scott, \$475; brass railings, Garth & Company, \$264.

The general contract for the construction of a new school building for the Board of Trustees, Rosemount, has been awarded to L. Beaudry. Mr. A. F. Dunlop, architect, Lindsay Building.

Mr. Jos. Sawyer, architect, 491 Guy street, has awarded the contract for the wiring and fixtures for the Plessis street school for the Catholic School Commissioners, to the N. Simoneau Electric Company, 583 Notre Dame street west, Montreal.

Portage la Prairie, Man.

The contract has been awarded for the erection of a new grand stand to cost \$43,500 to D. Winton of this city, and the structure is to be completed by May 15.

Sudbury, Ont.

The Thornton-Smith Company, 11 King street west, Toronto, has been awarded the contract for the decoration of the fine new Presbyterian church.

Sydney, N.S.

The following tenders for the construction of the new fire station were received: Brick construction. (1) Rhodes, Curry & Company, Amherst, N.S., \$12,400; (2) Chappell Bros. & Company, Limited, \$14,755; (3) F. L. Dixon, \$14,200; (4) A. Gullies, \$14,500. Reinforced concrete. (1) \$13,300 (2) \$15,560; (3) \$12,800; (4) \$14,150. Monolithic blocks. (1) \$12,500; (2) \$14,150; (3) \$13,250; (4) \$13,600. Rhodes, Curry & Company were awarded the contract for brick construction.

Toronto, Ont.

The following contracts for the isolation hospital were recommended: Mason work, \$30,796, Orr Bros; and carpenter work, \$18,673, M. Hutchinson.

Montreal, Que.

The Montreal Underground and Elevated Railway Company are applying to the Quebec Legislature for a charter of incorporation. The concern is capitalized at \$20,000,000.

A petition has been introduced at the Quebec Legislature for the incorporation of the Soulanges Power Company, with a capitalization of \$1,000,000. The company propose to develop and sell electrical power in the Counties of Soulanges, Jacques-Cartier, Laval and Hochelaga and in the City of Montreal. They also ask for permission to erect necessary transmission lines.

Winnipeg, Man.

The council awarded the contract for the equipment of the terminal station to the Canadian Westinghouse Company, \$116,500, and to Claydon Bros., the contract for the erection of terminal station, \$78,159.51. Noted in issues of March 16th and 9th.

Residences**Hamilton, Ont.**

The following building permits have been issued: Charles Widdup, six brick houses on Stirton avenue, between King and Wilson streets, \$6,000; Thomas Stephenson, brick house on Charlton avenue and Kent streets, \$2,000; Robins, Limited, five frame houses in Kenilworth, \$3,400.

Montreal, Que.

Mr. Dalbe Viau, architect, 76 St. Gabriel street, is preparing plans for two stores and two dwellings to be erected at La Tuque, Que., for Mr. George Boussly.

North Bay, Ont.

Plans have been prepared for His Lordship Bishop Scollard, by H. W. Angus, architect, for a residence adjoining the Church of St. Mary's-on-the-Lake, and facing McIntyre street west. Estimated cost, \$25,000.

Outremont, Que.

Recent building permits include the following: P. O. Cassaret, 140 Bloomfield street, dwelling, Bloomfield street, \$4,000; J. Z. Gauthier, 504 Sherbrooke street east, residence on Bloomfield street, \$5,500; F. Gabiere, 938a Drolet street, residence on Bloomfield street, cost \$5,000; J. L. Tremblay, 2432 Park avenue, twelve flats to be erected on Hutchison street, \$12,800; J. D. Langevine, 2366 Park avenue, flats on Fairmount avenue, cost \$10,000; David Abel, 137 Knox street, Montreal, residence on Rockland avenue, cost \$5,000. Building inspector, H. C. Reid.

Winnipeg, Man.

The apartment block to be erected between Ellen and Dagmar streets will be of pressed brick and cut stone construction, four storeys high. Contracts have been awarded for the excavation. W. W. Blair, Northern Bank Building, architect. Noted in issue of February 2nd.

AWARDED.**Montreal, Que.**

Messrs. Ogilvy & Mitchell, architects, 127 Stanley street, have awarded the general contract for the erection of a residence corner of Sherbrooke street and Elm avenue for Mr. John Ogilvy, to Messrs. Bernard & Fils, contractors.

Waterloo, Ont.

Mr. Gledhill has let the contract for the construction of five houses to Messrs. Hurst & White. S. H. Lambert will supply the material.

Business Buildings and Industrial Plants**Brandon, Man.**

The International Harvester Company has applied for suitable track frontage for their proposed \$75,000 warehouse.

Burgessville, Ont.

The store owned by W. Kirkpatrick was destroyed by fire on the 19th inst. Total estimated loss, \$6,000.

Collingwood, Ont.

The store of David C. Fields was damaged by fire on the 15th inst. Estimated total loss, \$9,000.

Messrs. C. Stephens Company, Limited, will erect a large building, 35 x 80 feet, two storeys high with basement. Plans have been prepared by Mr. John Wilson.

Dartmouth, N.S.

The Christie Fish Company have submitted a proposition to the Board of Trade for the establishment of a cold storage plant here. President of Board of Trade, C. E. Creighton.

Elk Lake, Ont.

Buildings to the value of \$50,000 were destroyed by fire on the 15th inst.

Hanover, Ont.

The Knechtel Furniture Company, Limited, called for tenders on the 18th inst. for their 5 storey reinforced concrete building.

Kenora, Ont.

The Royal Canadian Four Mills Company, recently organized, will erect a large plant.

The Tourist Hotel Company, Limited, have appointed a committee to make arrangements to commence work on the completion of the new building at once.

Kingston, Ont.

The N. C. Polson Company are having plans prepared for a concrete factory and warehouse building, 100 feet by 60 feet.

Lachine, Que.

At a recent meeting of the City council a deputation was appointed to interview the management of the Grand Trunk Railway Company to urge the advisability of erecting a station building in the centre of the municipality, to be known as the "Lachine Station."

London, Ont.

White & Sons have a building permit for a cement plant to cost \$40,000, and an office to cost \$10,000.

Montreal, Que.

Tenders for the construction of the new Windsor street station viaducts will be received up to Saturday, March 26th. W. S. Painter, architect, Windsor street station.

The Salada Tea Company, head office, 32 Yonge street, have purchased the cut stone building, corner St. Paul and St. Sulpice streets on which they will make alterations and probably additions.

Plans are being prepared for extensive alterations to the Alliance National Building, corner of Labelle Lane and Viger street. Mr. Dalbe Viau, architect, 78 St. Gabriel street.

Geo. W. Reed & Company, Limited, have secured additional property on St. Antoine street, adjoining their present factory, and will erect a three storey office building on this site. The structure will have an ornamental metal finish and will be fireproofed throughout. The company also intend to erect an addition to their

present factory, 125 feet by 50 feet in extent. Messrs. Hutchison, Wood & Miller, architects, Royal Insurance Building, are preparing the plans.

The Montreal City and District Savings Bank have completed the purchase of a tenement house, corner Park avenue and Laurier avenue, in the Annex, which will be remodelled for banking purposes. Mr. A. H. Lapierre, architect, 21 Street Railway Building, is at present preparing plans for the extension and alterations.

Morrisburg, Ont.

Permission has been granted to the assignee of the Canadian Sheet Steel Corporation to make alterations in the power plant in accordance with the plans submitted by Henry Holgate, consulting engineer, Montreal, thus permitting the company to erect another mill.

McAdam Junction, N.B.

The C. P. R. will commence work immediately upon a large addition to the station here.

Nelson, B.C.

Kootenay Jam Company, which erected a factory last summer, intends to put a new storey on the building.

Newmarket, Ont.

The by-law in favor of granting five thousand dollars to the Office Specialty Manufacturing Company was carried. This company purpose erecting an \$80,000 addition to the present factory this summer.

New Westminster, B.C.

The National Paper Mills Company, a Vancouver and Victoria concern, is negotiating for a site near the Fraser Mills, where it is proposed to establish an industry.

North Vancouver, B.C.

Burns & Walkem, it is stated, have purchased the property between St. Andrews and St. Patrick running through to Second street, on which a tourist hotel will be erected.

Outlook, Sask.

The buildings occupied by G. W. Drug-gist, Fraser Bros.' hardware and others were destroyed by fire on the 20th inst. Estimated total loss, \$80,000.

Port Arthur, Ont.

The Port Arthur Independent Order of Foresters is planning to erect a 5 storey brick business block on St. Paul and Van Norman streets.

Mayor Matthews is authority for the statement that the new shipbuilding yards will be established here by the Western Shipbuilding & Dry Dock Company, branch of the American Shipbuilding & Dry Dock Company. Estimated expenditure \$1,600,000.

Shoal Lake, Man.

The Farmers' Trading Company's building was destroyed by fire recently. Estimated loss, \$9,000.

St. John, N.B.

The proposition to give a free site and special tax and water rate concessions to Frederick C. Durant, of Philadelphia, representing the Atlantic Sugar Refinery Company, Limited, has been formally ratified. Mr. Durant guarantees to erect a sugar refinery in St. John to cost \$2,000,000. Noted in previous issues.

H. L. McGowan is authority for the statement that work on the David Craig Company's plant (mentioned previously) will be started early in May.

Toronto, Ont.

The foundry of the Don Iron Works Company, Ashbridge's Marsh, was destroyed by fire on the 19th inst.

The premises of William Coulter & Son, 155 George street, were damaged to the extent of about \$5,000.

The T. Eaton Company have taken out a building permit for their 5 storey brick and steel store at 6-8 Queen street west, \$57,000.

Rumor credits the C. P. R. with being the purchaser of the two blocks of real estate at the corner of Yonge and Carlton streets. Nothing definite is yet known as to plans.

Truro, N.S.

At the annual meeting of Stanfields, Limited, it was decided to erect another large building this year. Mr. Dougall Henderson has plans prepared for a building, 53 x 163 feet, to cost \$50,000. Work will be commenced shortly.

Vancouver, B.C.

A Vancouver syndicate, headed by F. L. Buckley, has purchased 1,300 feet of water frontage on Lulu Island, and announce their intention of putting a lumber mill on the property this spring.

Thomas Hooper, architect, 739 Hastings street, has plans prepared for a 12 storey building, 104 x 120 feet, for the Dominion Stock & Bond Corporation of Vancouver, capital \$2,000,000. Estimated expenditure, \$600,000. President, Hon. Price Ellison, Minister of Lands; managing director, George H. Salmon.

Victoria, B.C.

The Union Bank of Canada has opened up a branch in this city, occupying temporary quarters at present. Ultimately a business site will be secured and a fine building erected.

Waterloo, Ont.

The premises of Valentine & Martin, shoe manufacturers, were destroyed by fire on the 18th inst. Total estimated loss, \$30,000.

Welland, Ont.

The Welland Glass Manufacturing Company have two sites under option, on one of which it is announced four steel buildings will be built at a cost of \$75,000. E. A. Fultz, Cleveland, Ohio, Willis L. Adams, electrical engineer, Niagara Falls, N.Y., and G. C. Brown, this place, are directors.

Weyburn, Sask.

Cameron & Heap, wholesale grocers, of Fort William, Kenora and Regina, have acquired the property southeast of the C. P. R. station, on which they will immediately erect a large distributing warehouse. R. M. Alexander, local manager.

Winnipeg, Man.

S. Hinacel will erect a cold storage plant on Higgins avenue. Approximate cost, \$80,000.

The lumber yard of the Graham Sash & Door Company with a small warehouse were damaged on the 13th inst. by fire to the extent of about \$30,000.

Tenders are being called by the Vulcan Iron Works until March 31st for the erection of a brick and stone blacksmith shop. Plans, etc., at Builders' Exchange.

It is the intention of the Manitoba Cold Storage Company to add three more storeys to their present building to cost \$40,000. The new machinery will cost \$40,000. S. H. MacColl, manager.

The Provincial Legislature will be asked to authorize the issue of provincial bonds

to the extent of two million dollars for the establishment of a system of elevators. The Legislature will also be asked for a grant of fifty thousand dollars for preliminary operating expenses.

AWARDED.**Comox, B.C.**

W. K. Gilley has been awarded the contract for the supplying of the pile foundation for the three and one-half miles of railway being constructed by the Fraser River Lumber Company. Estimated quantity required, about 3,000,000.

Edmonton, Alta.

The contract for the new Molsons Bank building to be erected on Jasper avenue has been awarded to J. Dunlop at a figure close to the fifty thousand dollar mark. The building will be a three storey structure, fireproof, of concrete and stone. H. A. Magoon, architect.

Fort William, Ont.

The contract for the construction of the brick block being erected for Mr. P. J. Rochon, corner of Myles and North streets, has been awarded to A. P. Rochon.

Hamilton, Ont.

The contracts for the erection of the steel building for the Sawyer-Massey Company have been awarded as follows:—Structural steel, Hamilton Bridge Works; mason work, George C. Mills; roofing, Thos. Irwin & Son.

Montreal, Que.

The W. W. Scott Company, Limited, have been awarded the contract for installation of fixtures and fittings for the Cafe Bouillon in the new Banque Nationale. Alphonse Piche, architect, 52 Victoria Square.

Messrs. Simpson & Peel, contractors, have been awarded the contract for the construction of offices on the eighth floor of the Mark Fisher Building. Alphonse Piche, architect, 52 Victoria Square.

Mr. Alphonse Venne, architect, 15 St. Lawrence boulevard, has awarded the contract for the erection of flats containing twelve apartments and three stores for Mr. Wilfrid Besette, to be erected corner Esplanade and Bernard streets, to Arsene Frenette, general contractor, 212 Fabre street.

Mr. Dalbe Viau, architect, 76 St. Gabriel street, is preparing plans and specifications for six dwellings on Esplanade avenue and six dwellings on St. Urbain street for Messrs. Dobrofsky & Rosenburg.

Plans are being prepared for the erection of six dwellings on Cadieux street near Prince Arthur street for Mr. Dobrofsky. Mr. Dalbe Viau, architect, 76 St. Gabriel street.

Orillia, Ont.

The contract for the Long Manufacturing Company's plant has been awarded to Clarke & Monds, 36 Toronto street; work to be completed on the 15th of July. Foundations were laid in the fall.

Power Plants, Electricity and Telephones**Brandon, Man.**

City is applying to Provincial Government for power to purchase a transfer railway, connecting the three railways now operated in the city, and to hand over the same to a company to operate. Mayor Adolph.

Calgary, Alta.

J. A. McCullough has made a proposition to the city council respecting the con-

struction of an electric railway from Calgary to Chestermere Lake. No decision has been reached.

Works Board have recommended that 200 meters of various sizes be contracted for with the Canadian General Electric Company, Toronto, for the coming year; also that 200 five ampere meters or equivalent be contracted for with the Northwest Electric Company, and necessary polyphase meters.

Guelph, Ont.

The Ontario Government have granted permission to the People's Railway for the proposed extensions to Wellesley and New Dundee and construction work will commence early this spring. A. N. Warfield, chief engineer.

Hull, Que.

New tenders are invited for the construction of power house extensions to cost (approximately) \$20,000. R. W. Farley, city engineer.

Kingston, Ont.

Camden township is to have a telephone service, a company have been formed and the capital fixed at \$10,000. Dr. M. I. Bowman, president, and J. K. Fraser, secretary. Work will begin immediately.

Montreal, Que.

The Board of Control are negotiating with the Montreal Light, Heat & Power Company, who are endeavoring to secure a contract for the city street lighting.

The Bell Telephone Company will install conduit systems on several of the city streets during the coming year.

The Central Light, Heat & Power Company are applying to the Quebec Legislature for an extension of their charter privileges which will enable them to distribute power through the City of Montreal.

The Dominion Light, Heat & Power Company, Montreal, will apply to the Quebec Legislature for permission to increase their capital stock.

Nelson, B.C.

The Nelson Street Railway Company have ordered cars from the Ottawa Car Company, of Ottawa (while rails for extensions will be supplied by Evans, Coleman & Evans, of Vancouver, B.C.). Contracts for building new lines will be let at an early date.

Niagara Falls, Ont.

An Act of incorporation of the Niagara Falls, Welland & Dunnville Electric Railway. The capital stock of the company is \$200,000. Bonds may be issued for \$100,000 a mile. The provisional directors are J. Carlton Gardner, civil engineer, Niagara Falls; George Arnold, F. E. Misener, G. H. Berger and H. A. Rose. The head office will be located here. The company may build a single or double track. They can run in the following townships: Stamford, Thorold, Crowland, Town of Welland, Hamberstone, Wardens, Monroton and Shepshoke. A branch line may be run through Pelham and Thorold. A branch line to St. Catharines is also being discussed.

Regina, Sask.

Mayor R. H. Williams has gone to Winnipeg to make arrangements for the construction of a street railway. Eight miles of track will be laid this year.

The report of the electric plant cost is said shows a surplus of \$27,844, which it is proposed to spend on additional equipment.

(Continued on page 27)

Tenders and For Sale Department

CITY OF STRATFORD

Tenders will be received until 5 p.m. MARCH 29TH, 1910, for approximately 57,000 square yards of Pavement. Specifications and particulars may be had on application. Lowest or any tender not necessarily accepted.

M. FERGUSON,
City Engineer.

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Plant for Sale

For Sale:—The following Second-Hand Plant, located at Durham, Ont., or portion thereof. The whole lot at a reduced price,

25 No. 8 American, square pan, wooden hub, Wheel Scrapers.

28 No. 3 K. & J., round pan, iron hub, Wheel Scrapers.

6 No. 2 Western, square pan, with doors, Wheel Scrapers.

7 No. 2 K & J, round pan, iron hub improved, Wheel Scrapers.

55 Doors and Gates, for No. 3 Wheel Scrapers.

27 Slush Scrapers.

15 Light and Heavy Plows.

Located at Three Rivers, Que.

One Large Travelling Clam Shell Derrick.

One Steam Pile Hammer (Cram Patent), with Steam Hose.

One Thomas Automobile (Model 31), 60 h.p., thoroughly overhauled and painted; location, Toronto.

THE RANDOLPH MACDONALD CO., LIMITED,
14 Crown Life Building, Toronto, Ont.

Tenders for

High Level Intercepting Sewer, Toronto

Sealed tenders, addressed to the Chairman of the Board of Control, City Hall, Toronto Canada, endorsed "Tender for Section No. 1, High Level Interceptor" or "Tender for Don Syphon, High Level Interceptor," etc., as the case may be, for the construction of the several sections of High Level Interceptor mentioned below, will be received by registered post only, until noon of TUESDAY, APRIL 19TH, 1910.

The following are the sizes and approximate lengths of the various sections:

1. Section No. 8, flattened shape, 1216 linear feet, 7-foot 10-inch by 10-foot.

2. Section No. 7, circular, 3246 linear feet, 9-foot 6-inch diameter.

3. Section No. 1, circular, 2072 linear feet, 9-foot 8-inch diameter; and 1336 linear feet, 9-foot diameter.

(Total length Section No. 1, 3408 linear feet.)

4. Section No. 2, circular, 2993 linear feet, 8-foot 9-inch diameter.

5. Don Syphon (crossing under River Don).

Specifications may be obtained from, and original drawings will be on file and can be seen at the Main Drainage Department, City Engineer's Office.

For the convenience of contractors, sets of blue prints have been prepared and will be issued to contractors upon the deposit of \$10.00, which amount will be refunded upon return of blue prints in good condition within thirty days of receiving tenders.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto March 10th, 1910. 12

To Heating Contractors

Sealed tenders addressed to the undersigned will be received until noon on FRIDAY, THE 8TH OF APRIL, 1910, for the installation of a Steam Heating System to heat the Court House and County Buildings in Peterborough.

Particulars for guidance of parties tendering can be had on application to the undersigned.

ED. M. ELLIOTT,
County Clerk.

Peterborough, March 5th, 1910. 12

Tenders For Gas Franchise

Bids, sealed and endorsed "Gas Franchise," will be received by the City Clerk of the Corporation of the City of Fort William, up to APRIL 1ST, 1910, for the letting of a Gas Franchise, including construction of Plant, Mains, etc., and operation.

Conditions, specifications and form of tender, on which bids must be submitted, can be obtained from the undersigned.

Lowest or any tender not necessarily accepted.

JOHN WILSON,
Assistant City Engineer,
Fort William, Ont.

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Temiskaming and Northern Ontario Railway Commission

Sealed tenders addressed to the undersigned, will be received up to 12 o'clock noon, on WEDNESDAY, APRIL 6TH, for the following:—

(A) All the works required in connection with construction of abutments to bridge at M. P. 48.91. Tenders to be marked on the envelope, "Tender for Abutments."

(B) All the works required in connection with construction of substructure of steel trestle for Wabis River, M. P. 119.13. Tenders to be marked on envelope, "Tender for Substructure of Steel Trestle Spans."

Plans and specifications may be seen, and forms of tender procured, at the office of the Secretary-Treasurer, 25 Toronto Street, Toronto, and at the office of the Chief Engineer, North Bay.

Certified cheque on a chartered bank of Canada for the sum of \$200.00, must accompany tenders A and B, and the successful tenderer must also enter into an agreement satisfactory to the Commission for the due execution of the said works, and to furnish additional security for the due performance of contract in the sum of \$400.00 in each case.

The lowest or any tender not necessarily accepted.

A. J. McGEE, Secretary-Treasurer,
25 Toronto Street, Toronto.

Toronto, March 17th, 1910.

Papers inserting this advertisement without authority, will not be paid for same. 18

Tenders for Bridge

Sealed tenders will be received by the undersigned up to noon on SATURDAY, MARCH 26TH, 1910, for the construction of a Concrete Arch Bridge consisting of three spans of 33 feet each, over the River Speed about three miles north of this City.

Plans, specifications and form of tender may be obtained upon application to the undersigned.

Copies of the plans and specifications may be seen at the offices of the Contract Record Confederation Life Building, Toronto.

The lowest or any tender not necessarily accepted.

JAMES HUTCHEON,
Engineer.

Guelph, March 14th, 1910. 12

TENDER

City of Moose Jaw, Sask.

Pavments and Sidewalks

Sealed tenders addressed to the undersigned and endorsed "Tender A," "Tender B," and "Tender C," will be received until 8.30 o'clock p.m. on MONDAY, APRIL 11TH, 1910.

Contract "A"—Furnishing material for and constructing 33,300 square yards of pavement.

Contract "B"—Furnishing material and constructing 13,500 lineal feet of combined curb and gutter.

Contract "C"—Furnishing material for and constructing 116,500 square feet of concrete sidewalk.

Plans and specifications and form of tender may be obtained at the office of Angus Smith, City Engineer, Moose Jaw, Sask.

The lowest or any tender not necessarily accepted.

(Sgd.) W. F. HEAL,
City Clerk.

Moose Jaw, Sask. March 8th, 1910. 12

City of Brantford

Sewer Construction

Sealed tenders addressed to Ald. Joseph Minshall, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received till 12 o'clock noon on THURSDAY, MARCH 31st, 1910, for the furnishing and laying of about 2,180 feet of 12-inch extra strength Sewer Pipe, and 705 feet of 12-inch Cast Iron Pipe, together with 12 manholes; greatest cut 81 feet; average cut, 16½ feet.

Plans and specifications may be seen and instructions to bidders, and forms of tender obtained at the City Engineer's Office.

Each tender must be accompanied by a marked cheque for 5 per cent. of the amount of the tender.

Copies of the plans and specifications may be seen at the office of the Contract Record, Confederation Life Building, Toronto, and at B34 Board of Trade Building, Montreal.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.

City Hall, Brantford, March 4th, 1910. 12

Notice To Contractors

Tenders for Excavation and Intake Works

Sealed tenders, addressed to the undersigned, will be received not later than the NINTH DAY of APRIL, 1910, for Rock and Earth Excavation in the Beauharnois Canal, between Valleyfield and St. Timothee, also for Intake Works at Valleyfield including Coffor Dam and Culverts in Canal.

Plans, specifications and full particulars may be obtained at the office of The Canadian Light and Power Company, Montreal.

E. A. ROBERT,
Managing Director.

12

City of Guelph

Pavement Construction

Sealed tenders will be received by the City Clerk, up till noon on SATURDAY, APRIL 2ND, 1910, for the construction of approximately 15,000 square yards of Street Pavement with concrete curb, concrete base, and tar macadam or similar bituminous surface.

Plans and specifications may be seen and forms of tender obtained at the City Engineer's office on and after March 26th, or at the office of the Contract Record, 504 Confederation Life Building, Toronto.

The lowest or any tender not necessarily accepted.

JAMES HUTCHESON,
City Engineer.

Guelph, March 19th, 1910.

12

Tenders for Pipe and Water Connections

Sealed tenders will be received by the City Clerk, Brandon, Man., until 12 o'clock at noon on FRIDAY, THE FIRST DAY OF APRIL NEXT, for the supplying of

About from 100 to 200 tons of Cast Iron Pipe and Specials;

About 3,000 feet each of 10-inch and 12-inch Sewer Pipe;

Also brass goods for water connections etc.

All tenders to be f.o.b. Brandon, Man.

The lowest or any tender not necessarily accepted.

Further particulars and specifications can be obtained at the City Engineer's office.

R. E. SPEAKMAN,
City Engineer,
Brandon, Man.

13



Supply of Steel Pipe

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on APRIL 5TH, 1910, for the supply of one thousand feet of rivetted steel pipe, seventy-two inches in diameter, and also twenty flexible joints.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto, and at the office of the Canadian Engineer, at B33, Board of Trade Building, Montreal.

The usual conditions relating to tendering as prescribed by City By-Law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman, Board of Control.

City Hall, Toronto, March 18th, 1910.

13

TENDERS

Sealed tenders addressed to either of the undersigned and marked "Tender" will be received until noon on WEDNESDAY, APRIL 6TH, 1910, for the building of Concrete Abutments and Floor for a Steel Bridge to be erected over the Sydenham River between the Townships of Moore and Sombra.

Plans and specifications can be seen at the office of the undersigned, and also at the office of Bell & McCubbin, Civil Engineers, St. Thomas. A marked cheque for \$200.00 must accompany each tender.

T. H. HOLMES,
Collingville, Ont.

NEIL MCGUGAN,
Wilkesport Ont.

March 18th, 1910.

13

Town of North Battleford Province of Saskatchewan

WATER WORKS AND SEWERAGE WORKS

Sealed tenders will be received by the Secretary-Treasurer of the Town of North Battleford until 8 p.m. on TUESDAY, APRIL 19TH, 1910, for the following works:—

Contract "A"—Pipelining, Waterworks, and Sewers.

Contract "D"—Cast Iron Water Pipes.

Contract "E"—Fire Hydrants, Valves, etc.

Contract "L"—Concrete Reservoir.

Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at the office of the Chief Engineer, Winnipeg and Toronto and at the Town Hall, North Battleford.

J. A. FOLEY, Esq., S. COOKSON,
Mayor, Secretary-Treasurer,
North Battleford, Sask. North Battleford, Sask.

WILLIS CHIPMAN, C.E.,
Chief Engineer,
Winnipeg and Toronto.

13

Town of Weyburn Province of Saskatchewan

WATER WORKS AND SEWERAGE WORKS

Sealed tenders will be received by the Secretary-Treasurer of the Town of Weyburn, until 8 p.m. on WEDNESDAY, APRIL 27TH, 1910, for the following works:—

Contract "A"—Pipelining on the Sewerage System.

Contract "B1"—Water Works Pump House.

Contract "B2"—Power House.

Contract "F"—Mechanical Water Filters.

Contract "G"—Water Works Pumping Machinery.

Contract "S"—Sewer Pipes.

Contract "W"—Furnishing Wooden Stave Pipes.

Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at the office of the Chief Engineer Toronto and Winnipeg, and at the Town Hall, Weyburn.

R. H. SMITH Esq., M.D.
Mayor, GEO. ROSS, Esq.,
Weyburn, Sask. Secretary-Treasurer,
Weyburn, Sask.

WILLIS CHIPMAN C.E.,
Chief Engineer,
Winnipeg and Toronto.

13

Positions Wanted

CONCRETE WORK.—A good man, well up in the business, thoroughly understands plans, handling men and getting results, and a hustler, is open for a change, or would take contract, any town. Box 949, Contract Record, Toronto.

ARCHITECTURAL DRAUGHTSMAN, thoroughly experienced in design, detail and construction, is open to engagement with architect or contractor, where he will do the work and not be one of a crowd, distance no object. P. B. Williams, Nicolet P.Q.

Town of Weston Province of Ontario

Water Works

Sealed tenders will be received by the Village Clerk until 8 p.m. on MONDAY, APRIL 18TH, 1910, for the following works:—

Contract "B"—Pump House

Contract "F"—Mechanical Water Filters.

Contract "G"—Electrically Operated Pumping Machinery.

Plans and specifications may be seen at the office of the Chief Engineer, Mad Building, Toronto, or at the Town Hall, Weston.

R. J. BULL, Esq., J. H. TAYLOR, Esq.,
Mayor, Clerk,
Weston, Ont. Weston, Ont.

WILLIS CHIPMAN Chief Engineer,
13 204 Mail Building, Toronto, Ont.

Power Plants, Electricity and Telephones

(Continued from page 25.)

Stratford, Ont.

A by-law will be submitted to the rate-payers for the sum of \$85,000 to provide a plant for distribution of Niagara power from the Hydro-Electric Commission.

Vancouver, B.C.

City Electrician McCrossan, having reported adversely on the lighting system of Granville street bridge, was authorized to call for tenders for reconstructing the lighting system. Estimated cost, \$1,500.

Victoria, B.C.

The acceptance of the tender of the Hinton Electrical Company for sixteen poles at a total cost of \$1,840 has been recommended. Tenders for carbons for the street lighting service to be considered shortly.

The following prices for pillars for lighting system were quoted: Victoria Machinery Depot, \$69 each; Marine Iron Works, \$58.50; E. A. Earl & Company, London, \$47.78; without globes or wiring, or \$58.45 complete; Hutchinson Bros., \$73.50; Findlay, Durham & Brown, \$72.50; wiring and globes not included, \$93 complete; Hayward & Dodds, \$78, with globes of larger sizes, \$86 and \$88. It was decided to call for tenders for 200 pillars and lamp attachments.

Welland, Ont.

C. J. Laughlin, of Hartford, Conn., is asking the Welland Town Council for a twenty year franchise for a street rail way in Welland. Geo. R. Boyd, town clerk.

Wetaskiwin, Alta.

The by-law to raise \$5,000 for extension of power plant has been carried.

Winnipeg, Man.

The civic power committee, on the request of W. W. Coleman and W. M. Lavery, secretary Stonewall Board of Trade, decided to instruct the power engineers to furnish an estimate as soon as possible on the cost of delivering 1,000 h.p. at a sub-station in Stonewall. City electrician, Cambridge.

Tenders recently invited for the erection of a five wire fence and gates along both sides of the city's transmission line, right of way between here and the Brudenhead river, were as follows: Manitoba,

Bridge & Iron Works, Winnipeg, per mile, \$105; W. J. Holmes, per mile, \$170; P. H. Andrews, per mile, \$289. These are merely for the erection of the fence, all the materials having been bought by the power engineers. It is proposed to fence in all the settled portions on the transmission line which, it is estimated, will amount to about twenty-four miles. This, at the price of the lowest tender, would amount to some twenty-five thousand dollars, which is much in excess of the estimates.

Woodstock, Ont.

Tenders addressed to G. C. Eden, city treasurer, will be received until April 6th for \$27,500 electric light and power debentures, 28-year, 4 1-2 per cent. John Morrison, city clerk.

AWARDED.

London, Ont.

Contracts totalling \$50,556 have been awarded by the Water Commission for Hydro-Electric Commission as follows:—Canadian Westinghouse Company, Limited, transformers, switchboards and portable instruments; Canadian General Electric Company, 4 voltage regulators, lamps and reflectors.

Midland, Ont.

In addition to the contract let to the Wm. Hamilton Company, noted in last issue, for 5 turbines, etc., contracts have also been awarded as follows:—Two 200 h.p. exciter turbines, William Hamilton Company, manufactured under the Leffel design; two feed pipes with the regulating stand pipes, Wm. Hamilton Company. All the electrical machinery, Canadian Westinghouse Company, covering up to five 900 k.v.a. generators and two 100 kw. exciters with transformers, switching and lighting arrester equipments for both the Big Chute and Midland stations. Line wire, Northern Aluminum Company; insulators, Pittsburg High Voltage Insulator Company. Pratt & McDougall, of Midland, have the general construction well under way. It is also announced on good authority that the Simcoe Railway & Power Company, for whom this construction is being done, will ultimately construct an electric railroad to serve this district. Mitchell & Mitchell, consulting engineers, Traders Bank Building, Toronto.

Miscellaneous

Calgary, Alta.

Works Board have recommended that they be authorized to call for tenders and let contracts for supply of copper wire up to 50,000 pounds in order to get enough wire on hand to maintain the supply for the department and on account of the rapidly rising market, the rate being now about 18 cents per pound here.

Tenders are being called until March 31st by the C. P. R. management for the following: Regina, brick freight shed; Moose Jaw, extension to present frame freight shed; Weyburne, frame freight shed; Medicine Hat, brick machine shop; Lethbridge, extension to brick station; Calgary, 18 stall brick engine house and attached machine shop; Calgary, addition to present brick machine shop; Calgary, addition to station and standard stores building; Red Deer, brick station; Banff, station building; Laggan, station building; Cranbrook, Y. M. C. A. and other buildings.

London, Ont.

Tenders for the following supplies will be received until March 24th: Cement side-

walks, cement curb and gutter, lumber, hardware, iron castings, gravel, broken stone, sewer pipe and cement, concrete pipe. Specifications, etc., at office of A. O. Graydon, city engineer. Ald. J. A. Tancock, chairman No. 2 committee.

Montreal, Que.

Recent building permits include: B. Damien, 898 Mount Royal avenue, one house containing two dwellings and one store, cost \$5,000; M. E. Field, 176 Dorchester street west, one house containing three dwellings on St. Dominique street, cost \$3,700; A. Trudeau, 302 Clark, one house containing three dwellings on Laurier avenue, cost \$2,800; A. Arsenault, Du Convent, two houses containing six dwellings, cost \$7,500; C. Racine, Ahunatic, Sault Recollet, two houses containing six dwellings, on Laurier avenue, cost \$9,000; A. Russel, 427 Guy street, one house containing one dwelling, cost \$6,500; A. Deschambault, 2245 Mance street, one house containing one dwelling on St. Catherine street west, cost \$9,200; A. Kelly & Company, 43a Mentana street, one house containing three dwellings on St. Hubert street, cost \$6,700; H. Moiseux, 987 Charlevoix street, one house containing three dwellings on Calumet street, cost \$6,000; Les Clares street Viateur, 1259 St. Dominique street, one house containing two dwellings and one store, on St. Denis street, cost \$7,500; Dobrofsky, & Rosenberg, 3 Ontario street west, four houses containing twelve dwellings, on Esplanade avenue and St. Urbain street, cost \$22,000; H. Longton, 229 Dufréne, one house containing two dwellings and one store, on Gilford and Boyer streets, cost \$6,000; Rutherford & Son, Atwater avenue, one house, cost \$8,500; R. Marks, 199 Craig street east, two houses containing four dwellings and two stores, cost \$8,800; Matthewson & Son, 204 McGill street, alterations to building at 206 McGill street, cost \$2,100; A. Delorme, 190 St. Hubert street, alterations to buildings at 187 Wolfe street, cost \$2,500; J. & C. Morgan, Colonial House, alterations to building at 81 Union avenue, cost \$2,000; Armand Bastien, 669 Cowan street, alterations to building, cost \$1,500; Montreal Street Railway, Craig street west, alterations to building on Fleurimont street, cost \$6,000.

Ottawa, Ont.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, this city, will be received until April 11 for improving upper entrance to lock No. 17. Plans, etc., at office of Chief Engineer of the Department of Railways and Canals and at the office of C. D. Sargent, resident engineer, Cornwall, Ont.

St. Anne, Man.

The ratepayers have passed a by-law to issue \$20,000 5 per cent. 20-year debentures for roads, bridges, etc. J. A. Lacerte, clerk.

St. Thomas, Ont.

Until March 31st tenders will be received for the following debentures: \$42,000, Hydro-Electric; \$5,752.08; \$11,652.81; local improvement. W. B. Doherty, clerk.

Vancouver, B.C.

A building permit for the new block to be erected for the Canada Life Assurance Company on the old Leland hotel property site has been issued. This building will be eight stories in height and of steel frame construction. Another large permit was that given to Mr. A. Mitchell, stable, on Hornby street, between Nelson and Helmcken, \$30,000; J. B. Arthur, 2375 Sixth avenue west, \$2,800; W. H. McLeod & Company, 1260 Charles street, \$2,000; J. Sib-

hold, 2715 Second avenue west, \$2,500; A. H. Glover, 1016 Eleventh avenue west, \$2,500; J. E. Christian, frame dwelling and stores, Columbia street, \$3,000; S. D. Stewart, frame dwelling, Comox street, \$5,000; H. Nutrie, frame dwelling, \$2,812; Yukon street, \$8,000; Mrs. H. J. Foote, frame dwelling, 254 Twelfth avenue, \$4,500; H. H. Thompson, 827 Barnard street, \$3,000; G. H. Cottrell, Power street, \$9,000; Passage & Tomlin, 1829 Bismarck street, two houses, \$4,000; T. B. Hydman, 1220 Barclay street, \$6,000; M. McLean, 356 Eleventh avenue west, \$6,000; W. W. Stuart, 13 Fifth avenue east, two houses, \$6,000; McLean & Matheson, 2717 Woodland drive, \$2,600; W. W. Stuart Lumber Company, Front street, \$5,000; William Simpson, Woodland drive, four houses, \$6,000; M. Campbell, 1348 Sixth avenue west, \$3,000.

Victoria, B.C.

Recent building permits include: John Kayton, seven-roomed house on Yates street, \$3,000; L. Tobin, for additions to a tea room on Fort street, \$2,300; W. Berridge, for a six-roomed house on Vancouver street to cost \$2,800; D. O. Cameron, six-roomed house on Harbinger street, \$2,500; A. E. Todd, for a ninety-room apartment house on the corner of Fort and Cook streets, to cost \$40,000; Smith Brothers, for a \$2,600 house on Belcher street and Oak Bay avenue; George Richardson, dwelling on Gore street to cost, \$3,300; Miss A. Boorman, dwelling on Fisguard street, \$2,100; T. Williams, alterations and a new front to store on Yates street, \$3,000; R. Bray, brick stable, 34 Johnson street, to cost \$3,200; Lemon Gonnason Mill Company, concrete kiln and drying room, \$2,000.

Winnipeg, Man.

The permit for the new Bank of Montreal building has been issued, \$950,000. Other permits: Residence on Alexander avenue between Blair and Vincent street, for A. E. Fuljames, valued at \$2,500; dwelling on Redwood avenue between Brown and Sinclair streets for J. Vogel, valued at \$2,000; two dwellings for Dunn & Co., one on Broadway, between Broadway Place and Shore street, and the other on Home street, between Buell and Bath, valued at \$4,000 each.

AWARDED.

Aylmer, Ont.

Baily Brothers, of Aylmer, have obtained the contract from the Government for the building of two large barges to be used in connection with dredging operations on the Ottawa river.

Ottawa, Ont.

Barrett Brothers, this city, have been given the contract for dredging the Carp river.

The B. C. Gazette gives notice of the incorporation of the following companies:—Stewart-Portland Canal Power, Light & Water Company, Limited, capital \$250,000; Vancouver Texada Lime Company, Limited, capital \$50,000; Mather, Yuill & Company, Limited, capital \$50,000, incorporated to carry on the business of mechanical electrical engineering and construction business; John R. Bowes Timber Company, Limited, capital, \$10,000; the Howe Sound Timber Company, Limited, capital \$50,000.

The new steel castings foundry of the Canada Iron Corporation, Limited, Londonderry, N.S., has recently been completed, and has begun active operations; a large number of orders are on hand. It is an up-to-date plant in every detail, and equipped with the most modern appliances for making steel, annealing, polishing, etc. etc.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto March 23, 1910

No. 12

The Cement Convention at London, Ont.

The officers of the Canadian Cement and Concrete Association are deserving of great credit for the enterprising manner in which they have perfected all the details for their second annual convention, which is to be held at London, Ont., March 29-April 1.

There is every indication that there will be an excellent attendance at the Forest City. Despite the criticism that one hears occasionally concerning these conventions, the opinion is gaining ground that the progressive worker cannot afford to miss them. The man who goes to the convention as a visitor can scarcely help getting a certain amount of education, while he who attends as an exhibitor, given average ability, can hardly fail to make sales that will amply compensate him for his time and trouble.

The cement interests are doing their work well. They realize that concrete has to make its own way to a certain extent with the individual user of cement in the East, where there is less eagerness to experiment than in the West. No under-rated value should be placed upon the exhibition, for here one is enabled to see the most up-to-date concrete machinery and to have an ocular demonstration of the latest improvements therein. The Canadian Cement and Concrete Association is comprised of earnest practical workers, and this fact alone bespeaks success. It is only to be expected that the cement industry will experience rapid growth, and the well advised contractor will keep himself posted on the latest developments of the business so as to be able to meet the demands which must inevitably be made on him in the near future.

The Canadian Cement and Concrete Association is directing its efforts to having concrete construction carried out along more satisfactory lines and to gathering in more reliable information concerning the proper uses of cement. An important matter that will be taken up

next week is the framing of standard specifications. The opportunity to take part in such work is not presented every day.

The cement machinery exhibits, which will form an important part of the Show, will provide an opportunity for contractors and others to study the various machinery in operation and to make a satisfactory selection for their needs. In this line we know of a number of interesting improvements that have been produced since the interval of last year's convention, and we feel confident that the exhibition will prove of much interest to all who wish to be in line with up-to-date methods.

The range of subjects covered by those who have prepared papers for the convention is a most extensive one, according to the particulars published in this number and preceding issues. Under the chairmanship of such an authority as Professor Gillespie, every encouragement will be given to interesting and practical discussions, and we look for elucidation upon many interesting points from this source.

Doubtless, at this convention there will be a good representation of those interested in municipal work. For every city, town and village in the country makes use of cement, and it must be in the interests of each one of these municipalities to learn something more concerning the correct and economic uses of a material which during recent years has effected something like a revolution in nearly every form of construction work.

It is not to be supposed that the use of cement has in any way settled down upon the basis of previous knowledge. Every year shows a change toward a wider and greater use of the article, and for many new and hitherto unsuspected uses, as well as a further development along former lines, of which it is an expensive proposition and a real loss to remain in ignorance. The increased knowledge of this year over last will be surprising to those who have not kept closely in touch with the situation.

Copies of the "Contract Record" (April 6th), containing a report of the meeting, will be sent to those who hand their cards to either the editorial or advertising representatives of this journal in attendance at the convention.

The Contract Record and the Reader

Consider the interests in which this journal is published. Are they identified with yours? If they are, read the "Contract Record" intelligently and critically, and let us have the benefit of your suggestions from time to time.

Broadly speaking, there are three kinds of readers of a trade journal: the appreciative reader, the indifferent reader and the growler. With the first and last of these it is easy to deal. The appreciative reader is already pleased, and at least there is some hope for the growler—that is, if renewed endeavor and studied attention on the part of the editorial staff can effect it. But the indifferent reader is a hard case. The object of the "Contract Record" is to discourage indifferent reading: to publish a journal that is so closely bound up with the interests of its readers that they cannot afford to remain indifferent.

A prominent British Columbia architect writes: "I have been greatly interested in the 'Contract Record' and find it full of information necessary for a practical architect."

A busy contractor at Moose Jaw, Sask., says: "I wish to express my appreciation of the constant improvement effected in the 'Contract Record'."

New System of Reinforced Concrete Work

For Harbor Improvements, Piers, Bridges, and Similar Structures
—Complete Details of Interesting and Up-to-date Methods

SPECIALY CONTRIBUTED BY PAUL T. C. DUMAIS, HULL, QUE.

In the season of 1898, after I had completed an important crib work, which had been floated down and was anchored in position for sinking, a sudden hurricane arose and scattered nearly 50,000 cubic feet of solid cribbing. From that time on I have endeavored to improve crib work so as to eliminate such risks. As a result, I have evolved a system (and obtained patents in connection with same) by which a series of sub-structure cribs erected in a sheltered place can be floated safely to the site selected and sunk in position without ballast material, at a great saving of time over that involved by the ordinary method. My investigations revealed the fact that the purpose is fulfilled by means of a watertight crib combined with a watertight, concrete structure.

The system of construction outlined herein relates to a method and apparatus for sinking foundation cribs and consists in the details of construction and operation that will be described and illustrated.

It is well known that an ordinary timber crib (one without a watertight floor) can easily be floated with a portion or the whole of its timber superstructure and

sunk in favorable weather, barring accident, just as well as can be done with watertight cribbing. But how could the floorless, water-soaked crib be navigated to its site? How could it float, if its superstructure consisted of reinforced concrete and weighed three times as much as one composed of timber?

Without the buoyancy imparted to the crib by its watertight platform, a concrete superstructure cannot be erected as desired, unless recourse be had to the compressed air caisson, to coffer damming or to the system of huge steel floats. These devices, however, are very expensive and at times dangerous, and further, they call for considerable engineering skill; besides, in many cases, they cost almost as much as the permanent structures in connection with which they are erected.

It may otherwise be proposed to build the substructures in situ as well as in sheltered spots; at a distance upon cribs floating or held up by floats, to be withdrawn therefrom after the sinking has been performed. This latter method may be less expensive than the coffer-dam and pneumatic caisson methods, but if the desired result be attained through the mere arrangement of the constituent materials, independently of outside appliances, the work must be considered reduced in cost. The method embodied in my system, besides requiring much less skill in the engineering direction, favors the use of labor saving devices, as in surface work, is more rapid in execution, and never exposes the laborers to the risks attendant upon pneumatic caisson.

Water-Tight Platform

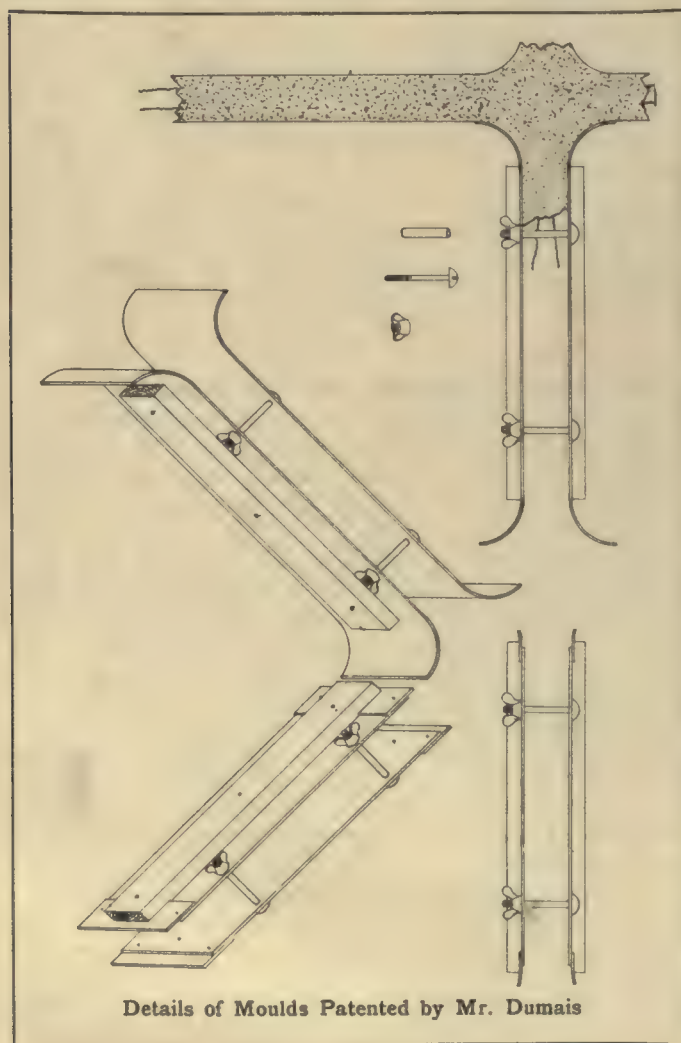
The main feature of this method consists in a watertight platform, crib or caisson, upon which a concrete structure may be erected in a sheltered spot at a distance from the place of sinking; this structure to be floated in place when partially or completely finished, and sunk in desirable weather.

The watertight platform upon which the reinforced walls will be permanently moulded, will consist of two or more tiers of enclosing members, interjoined at equal intervals by cross bracing members; the whole to be covered with a floor made of two layers of plank, 4-inch thick, laid in opposite or parallel directions as may be desired, well seeped with pitch and tar, and having a strong sheet or tarred or paroid roofing paper laid between the same. As apart from keeping the platform watertight, this floor will have to support the pier ballast, reinforcing timbers are provided, and to further strengthen and protect the floor a layer of squared timber is set under the same.

The tarred paper will have to project 2 or 3 feet outside the platform so that after the last plank will be nailed down, the tarred or paroid roofing paper may be folded back on the last planks all round the platform and be well soaked with pitch and tar, so as to make a close and watertight joint between the wooden foundation and the concrete wall.

When the place of construction offers a good sheltered spot, a pier may be constructed of quite a large dimension, over 100 feet, and more.

In this case, the supporting platform does not require

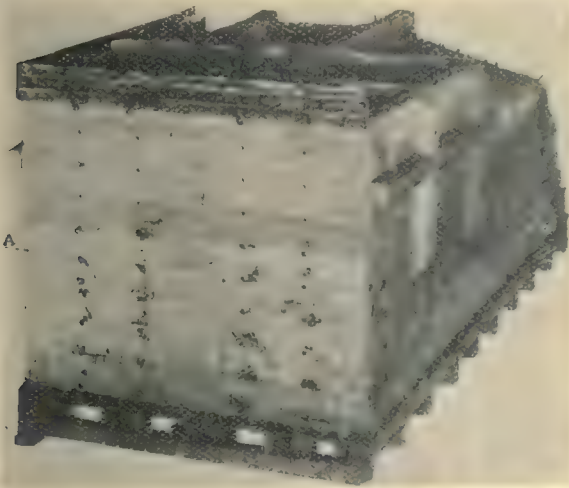


to be very strong, except in regard to the squared timber ballast floor, which is to support the filling, for during the beginning of the construction, if the platform is not exposed to any accident occasioned by storm or high waves, a single frame may be sufficient to support the ballast floor, and when the reinforced concrete walls are moulded up to a height of 5 or 6 feet, they will offer enough rigidity to support the watertight floor and platform to which they are strongly anchored.

As soon as the concrete construction has attained a certain height, the increased weight of the walls will diminish the load carried by the watertight platform. Then the structure will easily carry the same with the assistance of the under-pressure of the buoyancy of the crib.

In starting the construction of the platform the building of this part of the structure may vary in some cases according to the bottom surface of the location where the intended crib, wharf, or breakwater is to permanently stand.

If the bottom be sloping or uneven it will have to be levelled in some way, either by dredging, or by filling in the lower portions and the soft part of the bottom surface with ballast stone to a perfect level. If the bottom of the location is of a slight or regular sloping and com-



Water line at A.

Reinforced Concrete Construction for Piers, Wharves, Breakwaters and Caissons.

posed of hard clay or any other hard composition of soil, the platform may be built the same way as if the bottom ground were level.

In this case the end walls will have to be moulded with such an angle as to be vertical when the platform will rest on the sloping bottom surface.

As in certain cases of pier or other submarine work where the bottom soil has to be more or less penetrated, as also in earth foundations, the under surfaces of the crib-frame are given a wedge-like shape, the same being protected by a metallic shoe or rail firmly bolted thereon in the regular way. The material which I consider the most preferable, especially for the part that rests upon the floating crib or caisson, is reinforced concrete. It is well known that this material has heretofore been used all over the world either in the monolithic form, or with separate members to take the place of ordinary timber framing or masonry.

The floating platform or crib, already described, is the main apparatus of my method. The reinforced concrete walls, are started to form a monolithic superstructure on the top of the watertight floor. They are permanently moulded in place by means of suitable moulds

These moulds, or forms, as they may be called, are made of sheet steel plate, reinforced by a wooden or metal backing suitably rivetted at the outer face of the moulding plates. They are held in place by means of screw-bolts which pass through a sleeve, made of metal, or preferably with tarred paper, the length of which is made to correspond with the thickness of the walls. The moulds can be fixed to make the wall from 4 inches to 8 feet or more in thickness. The sleeve will serve to give a free passage for the bolt, and will remain in the wall, serving also to maintain the outside and inside plates of the mould solid in their right positions by means of the screw bolt, which holds the plate tight on to the sleeve. The mould plate used for the interior walls is given a quarter circle curve at the ends, projecting slightly on a straight line to fit squarely against the end of the other adjoining interior section of the mould plate, so as to give a strong reinforcement at the junction of the interior and exterior walls.

Before laying the first tiers of concrete on the watertight platform, it will be necessary to nail on the top of the tarred paper an angle-shaped wooden rod, at a distance from the edge of the outside of the platform, and under the centre of the wall. This will serve as a recess and close joint between the watertight floor and the concrete wall.

The first bars of reinforced iron will also have to be well anchored in the timber of the platform and stand vertically until the first layer of concrete is in place. Then the iron rods are to be bent so as to lay close onto the concrete in a horizontal position.

Standard Moulds Desirable

It is important that the moulds be made to a certain standard, so that the same moulds can be used for future construction. Each section of mould should be of regular size so as to form a square compartment in the interior of the construction, of between 8 or 9 feet square, and may be 2 feet high—the outside plate to be the same height and of sufficient length to correspond to two or three sections of the interior plates.

Valves of sufficient dimension have to be provided for use in sinking the crib or caisson, such to be placed vertically in the floor or horizontally in the first or second layer of concrete wall. An angle rail or tube may be fixed outside of the wall for the purpose of guiding the device used to open or close the valves.

A layer of 6 inches of concrete only, will be deposited in the mould at a time and then be well rammed in place, after which the reinforced iron will be placed in position. The other 6-inch layers of concrete may be deposited successively until the mould is filled up. Before the last layer of concrete has commenced to settle a V-joint, 3 inches by 3 inches, will be forced on the top and at the centre of the concrete wall, with a proper mould for that purpose, so as to make a good recess for the next layer.

As the wall may have to be reinforced vertically, drift bolts of sufficient diameter and length may be driven in the layer before the setting of the concrete.

All the inner reinforced iron rods of the longitudinal inside and outside walls shall be placed at about two inches from the interior edge of the same, and will be bent so as to follow the curve of the plate mould, and be made to continue and connect at the junction of the interior cross and longitudinal wall, so that all the walls may be well connected and reinforced together with part of their respective reinforcement.

A sufficient quantity of moulds, enough to proceed with the working of the concrete wall for a day or two, will be necessary so as to have the concrete hard enough before taking off the first filled up moulds and replacing

them on the top of the part of the wall already constructed. The mould to be adapted to the concrete wall by introducing the lower bolt of the plate into the sleeve that remains in the upper surface of the hardened wall.

As the walls are raised, the floating crib gradually sinks. To preserve its buoyancy the openings formed by the sleeves, to support the bolts of the mould plates, are kept tightly plugged before the parts of the walls where they are located become immersed. These openings, before being plugged, may be used for the support of scaffolding brackets on either face of the walls, also to fasten vertical or horizontal fenders, in pier work.

When a section of a crib is completed, or is high enough to be sunk on its permanent location without being covered with water, and where it can be easily finished, it is then moved into place either by being



Section of Completed Crib.

towed by boat or cable, and is well anchored in its right position. It will then take but a few minutes, after the valves have been opened simultaneously, until it will rest on the bottom in security—the weight of the crib filled with water being more than sufficient to keep it down in place to await the time of filling. When all the walls of a crib are elevated to the height required by this method of construction, the interior will represent a structure of numerous watertight compartments which may be filled with sand, gravel and earth, instead of ballast stone, which sometimes has to be taken from a long distance to the place of sinking, and thus becomes an important item in the cost of such construction. If a contractor has to pay over one dollar per cubic yard for stone ballast for filling his wooden crib, he will appreciate a method of operation by which he can fill it with sand and gravel which can sometimes be dredged out at 50 feet from his crib and be easily dumped into it with the arm-pole of the dredge. In this case he will certainly save 75 per cent. on the amount of his bill for ballast.

The dredging of 50 feet around a wharf cannot affect its security. In many cases such dredging will prove to be very convenient for navigation, and it may be that the law will require it to be done even at a less distance. Incidentally, there is often in the locality of such construction or in its vicinity any amount of sand, gravel and stone for the aggregate for the concrete as well as for the filling, and this will reduce the cost of the work to a considerable extent.

After the concrete walls have been finished and the filling completed, and if the crib or wharf is not exposed to the high sea waves, the pavement could be made by covering its surface (after it has perfectly settled down) with a layer of two feet of stone to form the foundation of good macadam. If the wharf is too much exposed to the high sea waves, then the pavement should be made of mass reinforced concrete having the top of the concrete walls for its foundation and support. All the neces-

sary mooring posts (nigger heads), as well as ladders, rings and hardwood fenders, may be placed wherever required, with proper reinforcements, in the concrete wall during the construction.

In the erection of large wharves of more than 30 feet width, the application of this method of construction will offer an important economical advantage by building the watertight platform in a frame-like shape, having the side of a width of 10 or 12 feet, with reinforced concrete beams or iron rods crossing from one side of the frame to the other so as to brace them together, leaving only the empty space in the centre to be filled up with the material ballast.

When a wharf has to be built in a harbor or other sheltered place where strong current and heavy waves cannot have any effect on the construction, it will not be necessary for all the watertight compartments to be filled up to increase the weight of the structure. Many of them may be left empty and will be very convenient for the storage of freight, especially coal.

Cost of Cellar Excavation

The accompanying illustration shows work in progress of excavating for a foundation at Cleveland. The contractors agreed to remove 20,000 yards in 40 working days, or an average of 500 yards per day. The task was successfully accomplished with a small steam shovel—an automatic—35 teams, and a hoisting engine, the latter being used to aid the horses up the slope. A small wire cable, as shown in the cut, was hooked to the shaft of the wagon, power slowly applied, and the heavily laden wagon steadily drawn to the street above. Small shovels are peculiarly suited to this kind of work. The one used in this case is mounted on a light carriage with contractors' wheels, which, being moved by the shovel's power, do away with the trouble of rails and tracklaying. The shovel revolves a complete circle, and was timed to



Helping the Team up the Incline.

load 3 yards with its $\frac{5}{8}$ -yard bucket in 45 seconds. The cost of excavating the 20,000 yards was estimated as follows:

Care, feed, lodging 35 teams, $1\frac{1}{2}$ months	\$2,000.00
Pay for 35 teamsters, 40 working days	2,000.00
Pay for 12 laborers, 40 working days	800.00
Steam shovel engineer, 40 working days	150.00
Hoisting engine engineer, 40 working days	125.00
Coal (3 tons a day), 40 working days	300.00
Bosses (\$10 a day), 40 working days	400.00

Total	\$5,775.00
Add 10 to 12 per cent for accidents, repairs, depreciation, etc.	625.00

Total estimated cost \$6,400.00

Methods of Repairing a Concrete Chimney

Moulding a Jacket of Reinforced Concrete, 5 1-2 Inches Thick, around the Structure — Contractors' Ingenious Construction and Operation of Form

The work described consisted in moulding a jacket five inches thick of reinforced concrete around a cracked and leaky chimney at New Haven, Conn.

The original chimney was of reinforced concrete, but it had developed large vertical cracks which allowed the escape of smoke and at times the inflow of air—both of these actions being harmful to the efficiency of the draft. This chimney rested on a brick foundation which was part of the power house building. Above this foundation it was about 80 feet high, with outside diameters of 8 feet at the bottom and 6 feet at the top; it was 4 feet in diameter, inside, and was unlined. The old concrete, forming a wall about 4 inches thick in the cylindrical part of the chimney, had proved seriously defective, aside from developing cracks. It had been laid as a stiff, dry mortar, without stone, and by the time the contractors took hold of the job, the mortar had become so soft and "punky" that it crumbled easily under a blow, and came away from the reinforcing metal with dangerous readiness.

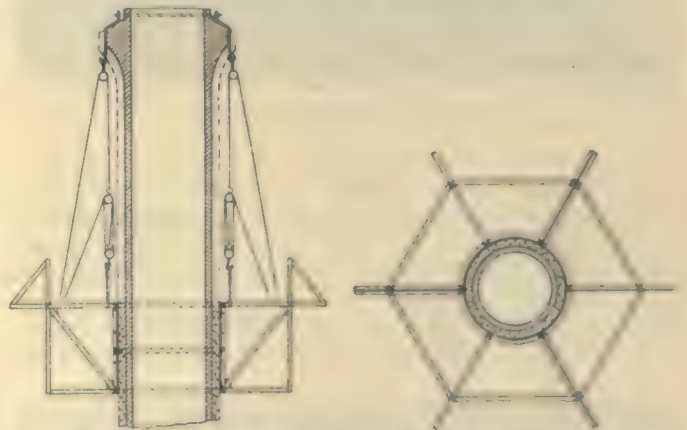
The new concrete jacket put about the old chimney was five inches thick over the whole surface of the old structure. The vertical reinforcement consisted of four sets of square twisted steel bars with 32 in each set, equally spaced, and with the ends of the successive sets lapped. The lowest set of bars $\frac{3}{4}$ -inch thick and 20 feet long, were upset at their lower ends to $\frac{1}{4}$ -inch diameter, and were screwed into an anchor ring four inches wide by $\frac{1}{2}$ -inch thick sunk in the brickwork at the base of the chimney. The other three sets of vertical bars were $\frac{1}{2}$ -inch square and 24 feet, 22 feet and 20 feet long, respectively. Outside this system of lapped vertical bars were placed horizontal hoops of 3.8-inch square twisted steel, spaced six inches apart. The concrete of the shell was mixed 1:2:4, with the stone small.

Before the first section of the concrete jacket was applied the old chimney was carefully wrapped with asbestos felt. This served a double purpose, acting first as an expansion joint between the old and new structures, and serving also to protect the green jacket against too rapid drying by the heat of the inner shell, and against the drawing of moisture from the green concrete into the old chimney.

The aspect of the work which is of especial practical value, was the ingenious construction and operation of the form used by the contractors on the cylindrical portion of the chimney. The form proper consisted of a cylinder of 16 gauge iron, 5 feet high, with an inside diameter of 5 feet 8 inches. This was made in three equal sections divided vertically. The horizontal framing consisted of three $2 \times 2 \times \frac{1}{4}$ -inch angles rolled to a true circular arc. Each section of the form proper therefore constituted a cylindrical surface of 120 degrees braced horizontally by the curved angle bars, one at the top, one at the bottom, and one midway between. Extending horizontally from the top of each of these sections was built a platform braced diagonally to the bottom of the form section with $2 \times 2 \times \frac{1}{4}$ -inch angles, and resting on horizontal angle bars running to the upper corners of each section of the form. These three sections of form and staging combined were fastened together by bolts running through angle bars on the vertical edges of each section of the form and through the pairs of adjacent angle iron supports under the platform. The form and the working platform were suspended by heavy ropes from three 12-inch single blocks, which were themselves hung from a heavy ring set on top of the overhang of the chimney. The cylindrical portion of the jacket, in which

the form was involved, was made in the following manner. The asbestos having been applied over a height of about 5 feet from the top of the cylindrical form, the form was then raised, and concrete was filled into the space between the form and the chimney, and closely tamped about the reinforcing steel. The next forenoon the asbestos and steel were extended farther up the chimney, and the form was hoisted a distance of 4 feet 10 inches, leaving a lap of 2 inches on the concrete placed the day before. The concrete of the second day's work was placed in the afternoon, and was allowed to set until the next morning, when the form was again raised 4 feet 10 inches, and a new ring of concrete was placed that afternoon. The form and platform were prepared for hoisting by loosening the bolts in the facing angle bars which formed the three joints. This allowed the form to swing a little free of the new concrete and permitting of easy movement.

An interesting feature of the preparatory work was the



Sketch Showing Method of Slinging Forms for Jacketing a Chimney with Concrete.

method by which the stepladder reached the top of the chimney. One of the largest cracks in the old structure ran from the top to bottom, and this furnished a good place for driving in stout hooks. At the start, the stepladder climbed up a ladder resting on the roof of the power house, and reaching up on the chimney drove a stout hook into the big crack. From this hook he then hung a small block carrying a rope. This combination made it possible to hoist a second ladder, which was allowed to lap on the first ladder, to which it was lashed. Climbing to the top of the second ladder, the stepladder drove a second hook into the crack in the chimney, reaching up as far as possible. Putting a block and line on this second hook, he was able, after getting down to the power house roof, to raise another ladder, which was lashed to the second ladder. From the top of this third ladder he drove a third hook into the crack, and so extended his track another space upward, and so on. The ladders had hooks at the ends, which held them away from the chimney. They were held firmly in one direction by lashings to the hooks, and the combination was stayed by ropes carried round the chimney every 15 feet. The ladders were taken down by reversing the process of erection. "Engineering-Contracting"

Mr. Theo. Hesper, architect, Victoria, B. C., is visiting Montreal and other eastern cities in the interests of his business.

Interesting Reinforced Concrete Construction

The accompanying photographs represent the stop-butt and shelter at the rifle range, Brandon, Man., constructed by Mr. Paul T. C. Dumais, public works contractor, Hull, Que., the result of whose investigations in reinforced concrete structural work are discussed elsewhere in this issue. The contract for the work at Brandon, Man., was awarded for a timber crib construction. The Department of Militia, however, accepted the offer of Mr. Dumais to carry out the work in reinforced concrete. This resulted in the contractor realizing a profit of more than 8 per cent. over that calculated on the timber crib construction. The dimensions



Stop-Butt, Brandon Rifle Range.

of the butt are as follows: Length, 130 feet; height over grade, 30 feet; width at base, 11 feet; width at top, 4 feet 9 inches; thickness of back and side walls, 8 inches; front wall, timber 8 inches by 8 inches, square cedar. Part of the interior walls are 6 inches thick reinforced horizontally with $\frac{1}{2}$ -inch iron bolted to timber of the front wall. The exterior walls are reinforced, vertically, with 2-inch old water pipe. The butt is filled up



Shelter, Brandon Rifle Range.

with earth and has a reinforced concrete roof, 4 inches thick. The structure has a neat and permanent-like appearance. The targets and shelter are situated 100 feet from the butt.

The annual banquet of the Ottawa Builders' Exchange was held on March 16th at the Grand Union Hotel, Ottawa. Many of Ottawa's most prominent citizens attended the function. Mr. Geo. W. Crain, president of the Exchange, presided. Those present included Mayor Hopewell, Messrs. T. A. Shore, C. P. Meredith, J. A. Findley, T. D. McFarlane, Cecil Bethune, D. J. Driscoll and Wm. Rankin.

Something New in Concrete Piles

Concrete piles, now being used in the reconstruction of Senator Macdonald's wharf at Victoria, B.C., are being made by Thomas Stedham, inventor of a new process by which a framework of iron bars of steel from an inch and a half to two inches in diameter with a harpoon-like end and wire meshed from the four linear rods of iron, is built over with concrete. Mr. Stedham says the concrete piles manufactured by him for this wharf are being used for the first time on this continent. Twenty of them, weighing from three to seven tons each, are being used. They will be sunk, and driven into position with a pile driver similar to the driving of ordinary piles, and when in position will give the wharf greater strength than any local wharf. The concrete piers also have the advantage of being more lasting, offering scant scope to the busy teredo which thrives on the ordinary pile.

Concrete Curbing

A writer in "Municipal Engineering" describes a method of laying a concrete curb which has been found very satisfactory. He says: "We first made curbing with vertical walls on both sides, but soon found out that a much better curb could be made with less cement by making the side next to the gutter battering, and proceeded to do the work in the following manner:



Satisfactory Concrete Curb.

"First excavate to the required depth of curb, say 18 to 20 inches, using the earth on one side as a mould, where conditions will admit of it. If the soil is sandy no provision need be made for drainage. Next we set up a mould 2 inches thick, 12 inches wide, and 16 feet long, held in place with $\frac{7}{8}$ -inch steel stakes, set so as to make a curb 8 inches thick at bottom and 5 inches at the top. Then proceed to fill space with concrete, sliding the mould up as required, until the finish line is reached; float and trowel on the top and 12 inches down on the face. Cut deep into sections with pointing trowel, say 3 in 16 feet. Finish front edge to straight edge with quarter-round. Trim edge next to lawn to straight edge, leaving that edge sharp. This makes an ideal curb, looks well, stands well. Note the manner in which the facing is anchored to the backing, as shown in the sketch. After trowelling, brush the work to give it the appearance of sawed stone. We do not consider it necessary to use any metal in constructing curb."

Mr. W. M. Dodd, architect, Calgary, Alta., will remove to Vancouver, B.C.

To bring about the building of better structures and reduce the cost of fire insurance, it is proposed in London, Ont., to label every building in the city, of public or semi-public occupancy, as to its class of construction, whether "fireproof," "ordinary" or "dangerous."

According to a recent dispatch from Victoria, B.C., there has been such a muddle in the administration of civic affairs in that city that an agitation is afoot for the appointment of a Royal Commission to investigate the matter. An official report claims to show that the big reservoir completed last year at a cost of \$100,000 is useless and will have to be rebuilt.

Notes on Modern Fireproof Construction

Reinforced Concrete Design Relative advantage of medium and high carbon steel for reinforcing—Interesting points of discussion

BY CLARENCE W. NOBLE

In an informal talk on "Fireproof Construction," before the Engineers' Club of Toronto, Mr. Clarence W. Noble, contracting structural engineer, Toronto, brought out several points of interest. He suggested that fireproof construction can properly be divided into three portions. The first will be that dealing with marble, terra cotta and other materials which are handled primarily by the architect, and which only concern the structural engineer indirectly as they add to the loads with which he has to deal. The second will consist of such matters as are finally decided by the insurance companies or by the building code without the allowance of discretion on the part of the structural engineer. Such, for example, would be the arrangement of fire doors, construction of partitions around elevators, and the use of metal frame and wire glass windows. The third general head in which fireproof construction might be divided will be that which concerns fireproofing engineers in ordinary practice. This consists of the construction of the framework of the building, and the construction of partitions.

Mr. Noble gave a short history of modern fireproof construction, starting with office buildings of the present type as first constructed in Chicago. He explained that south of Chicago there is an endless deposit of most excellent fire clay to which engineers and architects naturally turn for the solution of their fireproofing problems. Tile made from this clay was therefore used for floor construction, for the fireproofing of beams and columns and for partitions.

Tests of Various Types of Construction

The speaker then reviewed briefly the excellent tests made by the New York building commissioners on various types of modern fireproof construction. He pointed out that these tests, which consisted of applications of intense fire to small isolated structures about nine feet on the side, was a first-rate test of the fireproof qualities of the materials thus used, but an inadequate test of the type of construction. The failure of fireproof construction when used in actual buildings is not due so much to the heat as to the expansion stresses generated by the heat. In a small isolated structure these expansion stresses are necessarily slight or absent, as the structure has ample room to expand in every direction. When, however, the fireproofing material surrounds a steel frame and thus protects the frame from expansion, the conditions are markedly different from those under which the tests were made. The speaker reviewed several of the great fires which have occurred testing modern fireproof construction, and pointed out that in every instance the failure of the type of construction used showed characteristic features which indicate failure by reason of expansion stresses. The destruction of partitions in tile or plaster block is the result of their crushing against the ceiling. The failure of terra cotta floors is due to the spawling off of the bottom webs in the blocks.

The use of metal lath and metal stud fireproof partitions was then discussed by Mr. Noble, who explained that these partitions are not subject to the usual difficulty, as they buckle when they expand, instead of crushing. Their failure is due to the failure of the plaster, which disintegrates in the heat, and is apt to be washed out by a stream of water thrown on it. Mr. Noble suggested that something better than any of the present types of fireproof partitions would result if metal lath and metal stud frames were to be plastered with Portland cement plaster. Partitions thus con-

structed would not crush and the plaster used would not be washed out by a hose stream.

Reinforced Concrete Design

The speaker then took up several much discussed points connected with reinforced concrete designs. Relative to the often-used specification regarding the straight line formula for obtaining the moment of resistance of a concrete beam, he explained that both the straight line and parabolic formulae have much to be said in their favor. Under actual working stresses the straight line formula used, very closely approximates the facts, while at the point of failure of the beam the parabolic formula very closely represents the facts. If the factor of safety is considered as representing a relationship to the actual stresses in the beam under working conditions, the straight formula should be used, while if it is regarded as a relationship between the point of failure of the beam and its working load, the parabolic formula should be used. Mr. Noble expressed a personal preference for the parabolic formula, but stated that it made very little difference which was used. He explained, somewhat humorously, the specification in favor of the straight line formula by stating that there is a general tendency on the part of people who have to decide these matters, to avoid a careful technical investigation of such points by accepting the most expensive alternative, on the assumption that it is the best.

Two other open questions in reinforced concrete illustrate this tendency. One was the denominator to be used in the bending moment formula. Mr. Noble explained that while wl^2 was the formula first advanced, it is not by any means the only one which can be used. The denominator in the formula for a moment at the centre of the span depends entirely on what denominator is used for the moment over the point of support. The sum of these two must always equal $wl^2/8$.

wl^2 implies a bending moment so small for the points of support that the material necessary to resist it will, on account of the sharp curvature at this point, be stretched beyond its elastic limit. When this occurs the bending moment on the centre of the span will necessarily reduce to $wl^2/8$.

Mr. Noble therefore strongly urged the use of a greater amount of material over the points of support, and explained that when such material is used the use of wl^2 at the centre of the span is excessive.

The continuance of the use of wl^2 in the face of the fact that better practice would indicate a different arrangement. Mr. Noble attributes to the general tendency to take the most expensive alternative rather than to make a careful technical investigation.

Medium and High Carbon Steel for Reinforcement

Mr. Noble also discussed the relative advantages of the use of medium and high carbon steel for concrete reinforcement. He pointed out that medium steel is generally used in the construction of the steel framework of buildings owing to the fact that material so used has to be punched, sheared and rivetted during the process of fabrication.

High carbon steel, if used for such purposes, would have a cost for shop work so high as to make it more expensive

than medium steel. Bars used for concrete reinforcement are not subject to this limitation. Yet as the majority of engineers now engaged in reinforced concrete designs gained their experience in structural steel, they continue the habits which they acquired while designing steel structures, and still use medium steel as the standard concrete reinforcement. The speaker pointed out that the elastic limit is now universally regarded as the criterion for the factor of safety of a reinforced concrete beam, and therefore the question to be decided as between medium or high carbon steel is merely one of the cost of a given amount of elastic limit in the two kinds of material.

The usual working stresses used with medium steel give a factor of safety in a reinforced concrete beam not greatly in excess of two for live and dead load. A factor of safety of three, if high carbon steel is used, can be obtained at a less cost than a factor of safety of two, with medium steel. While it is true that the variation in the elastic limit is high, carbon steel covers a wider range than with medium steel, the statement made implies discount of this variation, as it is true even if the assumed elastic limit of high carbon steel is placed at the minimum value, while the assumed elastic limit of medium steel is placed on the average value.

The tendency to use medium steel in the face of the superior cheapness of high carbon steel, Mr. Noble attributed to the general tendency to take the most expensive type on the assumption that it is the best. With this tendency Mr. Noble emphatically disagrees, claiming that for a given amount of money he can give nearly twice the amount of strength, together with mechanical bond, by using a grade of steel having an elastic limit of 55,000 pounds per square inch, instead of a grade of steel having an elastic limit of 35,000 pounds per square inch.

DISCUSSION

After the speaker had concluded his talk, there was an informal discussion on the part of the members. Mr. Young inquired if the speaker regarded the formation of hair cracks due to the higher working stresses he proposed for his high carbon steel, as affecting the reliability of the structure, owing to the possibility of the steel rusting out.

Mr. Noble answered by explaining that these hair cracks are so minute that they had never yet been seen, even by the use of a magnifying glass. The tests which discovered them also showed that they are extremely irregular in their shape. The elements causing rust are air, moisture and carbon dioxide gas, all of which must be present at the same time. The carbon dioxide together with the water forms a very weak acid, which attacks the steel. In beams, the steel is at least two inches away from the surface of the concrete. The concrete is always impregnated with an excess of free lime, which is liberated during the setting up of the cement. This lime is frequently visible on the surface of concrete construction and continues to Effloresce for an indefinite period after the concrete is set up. It is reasonable to suppose that this tendency of the free lime to work to the surface extends along the interior surface of the minute hair cracks as well as along the external surface of the construction. The speaker claimed that it is practically impossible for the weak carbonic acid to work into the hair cracks in such quantities as to neutralize the ever-renewing supply of free lime and reach the steel. He pointed out that even should this be the case, the steel will be found to be coated with a protective covering resulting from the chemical action of the cement on the steel surface.

Gravel Versus Limestone

A Comparison of the Relative Merits of These Materials as a Factor in Concrete Aggregate

Comparing the relative value of washed gravel and crushed limestone as a factor in concrete aggregate, Arthur B. Hewson presented some interesting figures and facts before a recent meeting of the Architects' Business Association of Chicago. He contended that any given quantities of cement, sand and gravel mixed in the usual proportions, such as 1:2:4 or 1:3:6, will make at least 7½ per cent. more concrete than equal quantities of cement, sand and limestone; also that, at prevailing prices for gravel and stone, the former is decidedly the more economical, at the same time showing greater strength efficiency and fire-resistance.

The explanation of the greater bulk of gravel concrete, said Mr. Hewson, is that gravel, on account of the rounded shape of its particles, averages 7½ per cent. less in voids than crushed stone. When you mix concrete 1:2:4 or 1:3:6 you have 50 per cent. of sand to fill the voids in the coarse aggregate. If the voids in crushed stone absorb 95 per cent. of the sand and the voids in the gravel only 80 per cent., it naturally follows that 15 per cent. more of the sand appears in the gravel concrete, thereby increasing its bulk 7½ per cent. Practically all authorities agree that the voids in the averaged washed gravel are 40 per cent and in the average crushed stone 47.4 per cent.

Continuing, Mr. Hewson said: "It is agreed that the strongest concrete is that in which there is just sufficient sand to fill the voids in the coarse aggregate plus a small percentage to cover inequality in mixing, with the same conditions obtaining between the sand and cement. When you add more sand than this, you weaken your concrete. Does it not follow that, if gravel concrete excels limestone when compared in identical proportions, it would still further excel in comparisons where the sand is in the same proportion to the voids in both materials? For illustration, would not a 1½:3:7 gravel concrete excel a 1:2:4 limestone concrete? Would it not be proportionately rich in cement? Would it not give an equal bulk of concrete and a greater strength efficiency with less sand and less cement? Furthermore, if a 1:2:4 limestone mixture produces a smooth finish, will not a 1½:3:7 gravel concrete do the same, since the proportion of mortar to the voids is identical in both cases?

"In confined spaces where the intervals between the reinforcing bars are small or the concrete must be forced through wire mesh, a denser and therefore stronger concrete can be obtained with gravel. The rounded particles work into place more readily and lie snug to the steel. There are few jagged edges to catch on the steel or on companion particles, forming pockets which reduce the strength and damage the appearance of the surfaces.

"Gravel concrete, properly proportioned, will produce water-tight walls, where limestone will fail under the same conditions. This is also due to the lesser proportion of voids and the closer association of the particles.

"With regard to the fire resistance of gravel concrete, Bulletin No. 370 of the U. S. Geological Survey shows its superiority over limestone. The limestone is badly damaged by calcination. This bulletin also shows that fireproofing tile, sand-lime brick and practically every other material except solid concrete are useless for fireproofing."

The Smart-Turner Machine Company, Limited, Hamilton, Ont., have sent us a copy of their power pump catalogue, No. 7, an informative, well illustrated booklet containing 64 pages and 135 cuts, devoted to the explanation of the special features of the centrifugal pumps, gas and gasoline engines, and other up-to-date products of this concern.

Standard Regulations for Concrete Users

Practical Code Relating to the Best Methods of Selecting, Mixing and Using Materials—Of Special Interest to Convention Delegates

A committee representing a number of national associations, including the American Society of Civil Engineers and the American Society for Testing Materials, has recently issued an elaborate report on the best methods of selecting, mixing and using various forms of concrete. This report may well be considered as a standard code of regulations, and the following extracts, relating to practical features of the work, are here given as a handy reference summary:

The materials to be used in concrete should be carefully selected of uniform quality and proportioned with a view to securing as nearly as possible a maximum density.

Proportions.

Unit of Measure.—The unit of measure should be the barrel, which should be taken as containing 3.8 cubic feet. Four bags, containing ninety-four pounds each on an average, should be considered the equivalent of one barrel. Fine and coarse aggregate should be measured separately as loosely thrown into the measuring receptacle.

Relation of Fine and Coarse Aggregate.—The fine and coarse aggregate should be used in such relative proportions as will ensure the maximum density. In unimportant work it is sufficient to do this by individual judgment, using correspondingly higher proportions of cement; for important work these proportions should be carefully determined by density experiments and the sizing of the fine and coarse aggregates should be uniformly maintained or the proportions changed to meet the varying sizes.

Relation of Cement and Aggregate.—For reinforced concrete construction a density proportion based on 1 should generally be used; i. e., one part of cement to a total of six parts of fine and coarse aggregates measured separately.

In columns richer mixtures are often required, while for massive masonry or rubble concrete a leaner mixture of 1:9, or even 1:12, may be used. These proportions should be determined by the strength or wearing qualities required in the construction at the critical period of its use. Experienced judgment based on individual observations and tests of similar conditions in similar localities, is the best guide as to the proper proportions for any particular case.

The ingredients of concrete should be thoroughly mixed to the desired consistency, and the mixing should continue until the cement is uniformly distributed, and the mass is uniform in color and homogeneity, since maximum density, and therefore greatest strength, of a given mixture depends largely on thorough and complete mixing.

Mixing.

Measuring Ingredients.—Methods of measurements of the proportions of the various ingredients, including the water, should be used, which will secure separate uniform measurements at all times.

Machine Mixing.—When the conditions will permit, a machine of a type which insures proportioning of the materials throughout the mass should be used since a more thorough and uniform consistency can therefore be obtained.

Hand Mixing.—When it is necessary to mix by hand the mixing should be on a water-tight platform, and special precautions should be taken to turn the materials until they are homogeneous in appearance and color.

Consistency.—The materials should be mixed wet enough to produce a concrete of such consistency as will flow into the forms and about the metal reinforcement, and which, at the

same time, can be conveyed from the mixer to the forms without separation of the coarse aggregate from the mortar.

Retempering.—Retempering mortar or concrete, i. e., retempering with water after it has partially set, should not be permitted.

Placing of Concrete.

Methods.—Concrete after the addition of water to the mix should be handled rapidly, and in as small masses as practicable, from the place of mixing to the place of final deposit, and under no circumstances should concrete be used that has partially set before final placing. A slow-setting cement should be used when a long time is likely to occur between moving and final placing.

The concrete should be deposited in such a manner as will permit the most thorough compacting, such as can be obtained by working with a straight shovel or slicing tool kept moving up and down until all the ingredients have settled in their proper place by gravity and the surplus water has been forced to the surface.

In depositing the concrete under water special care should be exercised to prevent the cement from being floated away, and to prevent the formation of laitance, which hardens very slowly and forms a poor surface on which to deposit fresh concrete. Laitance is formed in both still and running water and should be removed before placing fresh concrete.

Before placing the concrete care should be taken to see that the forms are substantial and thoroughly wetted and the space to be occupied by the concrete free from debris. When the placing of the concrete is suspended, all necessary grooves for joining future work should be made before the concrete has had time to set.

When work is resumed, concrete previously placed should be roughened, thoroughly cleaned from foreign material and laitance, drenched and slushed with a mortar consisting of one part Portland cement and not more than two parts fine aggregate.

The faces of concrete exposed to premature drying should be kept wet for a period of at least seven days.

Freezing Weather.—Concrete for reinforced structures should not be mixed or deposited at a freezing temperature unless special precautions are taken to avoid the use of materials containing frost or covered with ice crystals, and to provide means to prevent the concrete from freezing after being placed in position and until it has thoroughly hardened.

Rubble Concrete.—Where the concrete is to be deposited in massive work, its value may be improved and its cost materially reduced through the use of clean stones thoroughly imbedded in the concrete as near together as possible and still entirely surrounded by concrete.

Forms.

Forms should be substantial and unyielding, so that the concrete shall conform to the designed dimensions and contours, and should be tight to prevent the leakage of mortar.

The time for removal of forms is one of the most important steps in the erection of a structure of concrete or reinforced concrete. Care should be taken to inspect the concrete, and ascertain its hardness before removing the forms.

So many conditions affect the hardening of concrete that the proper time for the removal of forms should be decided by some competent and responsible person, especially where the atmospheric conditions are unfavorable.

Temperature Changes.

Concrete is sensitive to temperature changes, and it is necessary to take this fact into account in designing and erecting

concrete structures. In some positions the concrete is subjected to a much greater fluctuation in temperature than in others, and in such cases joints are necessary. The frequency of these joints will depend, first, upon the range of temperature to which concrete will be subjected; second, upon the quantity and position of the reinforcement. These points should be determined and provided for in the design. In massive work, such as

retaining walls, abutments, etc., built without reinforcement, joints should be provided, approximately every 50 ft. throughout the length of the structure. To provide against the structures being thrown out of line by unequal settlement, each section of the wall may be tongued and grooved into the adjoining section. To provide against unsightly cracks, due to unequal settlement, a joint should be made at all sharp angles.

Portland Cement Products for Residences

Unlimited Scope Due to Improved Methods of Utilizing Concrete —Variation of Design—Practical Observations of a Contractor*

By EUGENE G. GRAVES

While engaged in the contracting business a few years ago, I was impressed with the universal complaint of home builders at the high prices of lumber. Each time we moved to a new job, the owner invariably opened a discussion on the increasing expense of building materials. Pointing to some building on the premises, which had been built some ten or twenty years before by either himself or his father, he would quote us a price paid for lumber then, and would show that it seldom equalled more than one-half or two-thirds of the price which he was compelled to pay for that which we were framing. The lumber that we used was not only higher in price but was practically always of an inferior grade, as a result of grading by a lower standard—which was the natural outcome in the case of lumber, as is the case with any commodity which is constantly becoming harder to obtain.

The shortage of choice lumber for building purposes has caused various other kinds of lumber to spring into prominence in the market, and at prices that have increased directly as the supply of the choicest kinds has failed. We can only conclude from this that so long as we continue to substitute, from time to time, less satisfactory kinds of lumber for the better varieties, we shall gradually lower the standard of the principal element of construction in residence buildings.

General Substitute for Lumber

With this consideration in mind, many artisans in the building trades have been on the lookout for some general substitute for lumber as it is principally used in residence construction. One of the most desirable qualities of any substitute material is that it shall be fireproof. Also, besides being fireproof, the new building material should be one such that the best grades of it can be readily obtained at any shipping point so that its use can become universal in all localities. On account of the brief acquaintance which they have already made with it, the one material which suggests itself at once to many builders as embodying more than both of these requirements, is Portland cement.

It will be well at this time to remind the prospective builder that Portland cement is practically never used by itself as a building material. Technically, Portland cement is the finely pulverized product resulting from the calcination to incipient fusion of an intimate mixture of properly proportioned argillaceous and calcareous materials, and to which no addition greater than three per cent. has been made subsequent to calcination. Therefore, in referring to Portland cement as used in the construction of buildings, we will consider only Portland cement products. Such products or materials are obtained by adding more or less water to a mixture of Portland cement with an aggregate which is usually composed of sand, sand and lime, sand and gravel, sand and broken stone, or sand with gravel and cinders. Other aggregates are sometimes used, depending upon the purpose

for which the resulting product is being made, and the abundance or scarcity of one or more of the materials just mentioned. Of most importance among Portland cement products are concrete, grout, cement mortar, and cement plaster. (Cement plaster, when used on surfaces which are exposed to the weather, is commonly called "stucco.") Concrete is used in building construction in the forms of monolithic concrete reinforced, monolithic concrete not reinforced, concrete blocks of many sizes and designs, concrete bricks, and concrete roofing tiles.

Heard from the Opposition.

Those builders who do not approve of the use of Portland cement products for building up the walls, enclosing, and roofing buildings for residence purposes, contend that such materials do not offer as great a range of variation in outward appearance as should be manifest in a town or city which is largely built up with flats or tenement houses and surrounded with suburban dwellings. They declare that when houses are walled with concrete or stucco, the possibilities of architectural design are practically lost, and that such houses bear a striking resemblance to each other, which is emphasized by a displeasing and inevitable "machine made" appearance. They refer conclusively to the fact that many of the first concrete houses were very damp on the inside at certain seasons of the year. And, finally, they turn to some experimental specimen of monolithic concrete construction, for which more lumber was probably used in the forms for moulding the concrete than would have been required to have framed the structure outright with dimension lumber, and complain that more lumber is required for building a concrete house than for a frame house. These three general criticisms practically represent the sum and substance of the prejudice that the concrete residence building confronts to-day.

The Other Side of the Story

On the other hand, men who have made a study of Portland cement products for building purposes, find that, with the improved methods for utilizing concrete, the number of designs obtainable for residence buildings is unlimited. They find that the inside of the exterior walls of a building, in which the walls, floor partitions, and roof are composed of concrete, may be as dry as if the whole structure were framed with wood. They inform us that, in practice to-day, the use of considerable quantities of lumber for form construction has been largely dispensed with in favor of patented forms for moulding monolithic concrete. In addition to these points, they mention with much satisfaction the fact that, inasmuch as a concrete house requires no painting, is non-decaying, is fireproof and takes a lower rate of insurance, it is a far better investment than a house constructed principally of wood. Moreover, the fire insurance rates are considerably lower on concrete construction.

Such are the differences of opinion which one hears to-day on the uses of Portland cement products, and which, for discussion, we will narrow down to the following questions: (1)

*Extracted from the Cement World.

Do residence buildings which are constructed principally of Portland cement products necessarily bear a striking resemblance to each other? (2) Is it probable, that in such a residence building, the inside of the exterior walls will not be dry? (3) Is the use of a large amount of lumber necessary in the construction of a residence building in which the principal elements of construction are Portland cement products? (4) Is a residence building of this type a better investment than one constructed principally of wood?

There is hardly a community anywhere in the country but has some kind of building in which the experimental use of Portland cement is painfully apparent. Perhaps it is the result of the enthusiasm of some contractor who has not known before that concrete construction is a science in itself and is by no means a side issue. Or, it may be that some farmer attempted a hothouse of monolithic concrete, or a silo of concrete blocks. In either case, such a structure offers to the opponents of Portland cement products a plausible argument, they believe, against the use of such materials. In a tone of derision they call our attention to one or more of these structures and criticize freely the clumsy proportions of them and consequent lack of expression in design. They do not mention the fact that the contractor or farmer who conceived the building was probably a man with such a poor sense of design that he could not have built a structure of a more pleasing appearance even though he had been given free access to a whole lumber yard. No. The examples that they refer us to are the results of the earliest experiments with Portland cement and are in no respect a criterion of present standards of concrete construction.

Wide Range in Field of Design

Portland cement products offer to-day an infinite number of variations in design. Depending upon the experience and ability of the builder, monolithic concrete, either reinforced or not, can be moulded with plain surfaces, with indentations and offsets, or with panels and figures in relief. Concrete is moulded into building blocks of any desirable size, ranging in face measure from 4 inches wide by 4 inches high, to 16 inches wide by 16 inches high, and from 16 to 24 inches wide by 4, 6 or 8 inches high. The faces of these blocks are often moulded in many designs. Some are quarry faced, some panel faced, and some are moulded with special figures in relief. Besides having different sizes and shapes, and differently designed faces, they may be moulded in a variety of colours. To make white concrete, use one part white Portland cement, one-fourth part pulverized lime, one-half part pulverized marble, and one part light colored sand; for red concrete, use one sack of Portland cement with 200 pounds of sand and five pounds of violet oxide of iron (raw), and in a similar manner bright red, brown, dark blue, gray, and black colors may be obtained. In addition to these qualities, concrete can be moulded into any special shape desired for ornamental purposes.

Still another form of concrete, which often performs an important part in architectural design, is the concrete roofing tile. Tiles, again, may be made in a wide range of color, shape and size. We see, therefore, that in constructing a residence building principally of Portland cement products, the builder may, if he chooses, build the entire structure in one monolithic unit or from a thousand suitable unit pieces. These may be used in any one of a large range of colors, or they may be worked out by a definite color scheme comprised of an assortment of colors; and, in addition to this, either the one great piece of monolithic concrete, or the thousand of unit pieces, can be moulded in the design of any one of an infinite number of the designs of classic architecture.

Are we to believe, then, that such a building can have no variation of architectural treatment? And can we believe that a group of them would necessarily show a distinct similarity of design?

Reinforced Concrete Sewer Pipe*

By OWEN MCKAY, Walkerville, Ont.

Last season I was employed by the council of the town of Sandwich to prepare plans and specifications for a sewer on Bedford street and also a main outlet sewer from Bedford street, on Park street, across the marsh to the channel bank of the River Detroit, which should have sufficient capacity to afford an outlet for a sewer system, comprising about 200 acres in the southerly portion of the town. As a large portion of this outlet sewer was laid through a marsh, a few remarks on the subject may prove of interest.

About 540 feet of this main outlet, west of Bedford street, was laid on dry land, 1,400 feet in a marsh, and 200 feet in water, including the timber box culvert. The marsh soil consisted of from one to three feet of peat or bog soil, overlying clay subsoil, and covered with water to the depth of from 8 inches to 24 inches at the ordinary summer level.

I recommended a two-ring brick sewer, 48 inches internal diameter, from Bedford street to the edge of the marsh, and as brick would be unsuitable for sewer construction in the marsh itself owing to the fact that it would be submerged at greater or less depths, I decided on recommending a Jackson reinforced concrete pipe sewer, 48 inches internal diameter, as manufactured by the Jackson Concrete Pipe Company, Jackson, Mich.

The sewer pipe is strongly reinforced by No. 9 wire, also heavy longitudinal and transverse iron bands. These longitudinal bands, cause the pipes, where laid, to interlock one with the other and thus make a perfect bond after the joints are cemented.

The pipes were made on the ground, as close to the work as circumstances would permit, by setting up the steel forms of the proper radius, oiling them well to prevent the concrete from adhering to the steel, and pouring the concrete into the form and carefully tamping the same, thus ensuring the work being done under proper inspection. After the concrete had been allowed to set, the forms were removed and the process repeated until the pipes were all made.

After the work was completed in the marsh, the pipes were laid in the water, out 125 feet from the beach, in a similar manner, excepting that a line of sheath piling was driven on each side to prevent the wash, from passing boats or high winds, from undermining the pipes. By this method we got an almost perfect sewer, the pipes being all interlocked and the socket joints filled with cement mortar 1 to 2 and brushed on the inside with neat cement. The concrete pipes being moulded in steel moulds, had a very smooth surface and will make a perfect sewer carrier. The concrete in the sewer pipe was mixed in the proportion of one part Portland cement to 5 parts of clean, coarse lake gravel.

I believe that concrete will soon supercede all forms of material for sewer construction for the larger size of sewers, say from two feet in diameter and upwards. It would, however, be an improvement if manufacturers would make egg-shaped concrete pipes as well as circular shapes for the large sizes.

I am also of the opinion that better results will be obtained by making the pipes in moulds on the surface, laying them in the trenches after they have been properly cured, and cementing the joints, owing to the fact that the interior surface will be smoother and of more uniform shape and size than if the sewer were constructed by laying concrete in the trench. The material and workmanship would also be subject to closer and more effective inspection.

Cost of brick sewer, 48-inch internal diameter, per ft.	\$4.50
Cost of 48-inch concrete pipe sewer in plan, including excavation, concrete base, etc., per foot	4.60
Cost of timber box outlet, per foot	10.00

*Extracted from paper read at the Annual Convention of Ontario Land Surveyors

An Attractive Concrete Block Residence

The accompanying illustration is that of a comfortable suburban home in Bowmanville, Ont., owned by Mr. F. A. Foster. This house is a fine example of what can be done with concrete. The main structure is built of concrete blocks made on the London face-down, adjustable concrete block machine. The sills, steps, window-heads, porch columns, balusters and all exterior cement ornaments are made on moulds manufactured by the same firm. Mr. Foster purchased the machines and moulds himself, and had the products made on the ground, where the structure was erected under his own supervision.

The foundation of this structure was built with 12-inch concrete blocks having a $3\frac{1}{2}$ -inch core opening, the first storey, built with 10-inch concrete blocks, having a $2\frac{1}{2}$ -inch core opening, and the second storey, built of 8-inch concrete blocks, having a $2\frac{1}{2}$ -inch core opening. It will be noted that these sizes of core openings are smaller than are generally used, but we commend Mr.

and concrete stress"; if a concrete is selected, such that 500 pounds per square inch is considered a safe working stress, then with a stress ratio of 15 the steel stress will be $15 \times 500 = 7,500$ pounds per square inch. The uneconomical use of the steel is manifest and theories of column reinforcement have not been confined to an endeavor to make the ratio smaller. Strangely enough, the idea has been to use more steel, so placed that it will confine the concrete, to permit of the use of higher stresses.

Here and there experimenters have announced that by using a better concrete, higher stresses might be used in this material, with a lessening of steel. This opinion has been gaining in force, until at the recent convention of the National Association of Cement Users, Professor Gillespie, of Toronto University, presented a paper which will go far towards settling the matter. Professor Gillespie advocates a rich, dense concrete for columns and the longitudinal reinforcement is used merely to guard against possible flexure and to provide toughness to resist shocks. In the discussion some question was raised as to difficulties that might be en-



A View of the Attractive Concrete Block Residence Erected by Mr. F. A. Foster, of Bowmanville, Ont.

Foster for using a block of this description and thus ensuring a solid wall. Contractors everywhere are beginning to realize that in the past too much has been expected from the concrete block as far as crushing strength is concerned, and in many cases buildings have been erected where the walls have been much too light. Too large a core opening has been used in the block, which has resulted in unsightly cracks in the wall. Architects are now demanding that concrete blocks shall have a more moderate sized core opening, giving a greater bedding surface for the block, and the sooner the block maker learns that he must meet the architectural requirements, the sooner the concrete block industry will become worthy of recognition.

Reinforced Concrete Columns

The question of cost is paramount in deciding between the use of concrete columns and steel fireproofed columns for buildings having floors and frame of reinforced concrete. This is a question to be settled for each structure.

Theory indicates that a concrete column reinforced with longitudinal rods or bars will be strengthened by the steel in proportion as the areas are influenced by the ratio of deformation of the steel and concrete. This ratio is preferably named by Professor Talbot "the ratio between steel stress

countered in securing in actual work as good a concrete as was obtained in the laboratory.

The objectors lost sight of the speaker's point that cement is the cheapest and most efficient reinforcement for columns. Professor Withey, of the University of Wisconsin, showed this very plainly. Professor Berry, of the University of Pennsylvania, within the past few weeks demonstrated the fact that reinforcement adds very little to the actual strength of concrete, the function of reinforcement being principally to guard against sudden failure. Manufacturers of reinforcing for columns publish results of tests to prove that spiral reinforcement wonderfully strengthens columns, but always the fact appears that the best results occur with the best concrete.

Flexure does not enter. Building ordinances limit the ratio of l/d , and the case is one of compression pure and simple. Professor Gillespie proportioned his concrete by weight, 70 pounds of cement and 70 pounds of trap rock from $\frac{1}{8}$ -inch to $\frac{3}{4}$ -inch, making 1 cubic foot of concrete, with the necessary water. The comparative costs given in his paper show how much can be spent on cement and how materially the cost is reduced by comparison with a highly reinforced column of leaner concrete. There should be little difficulty in securing in actual building operations a concrete having an ultimate strength of 4,000 pounds per square inch and over by paying some attention to grading of aggregates. Such concrete it would be sinful to wrap in wire bands,

Official Details of the Cement Convention

Programme of Arrangements for the Second Annual Meeting of the Canadian Cement and Concrete Association—Additional Information of Interest

The finishing touches have yet to be put upon the details for the second annual convention and exhibition of the Canadian Cement and Concrete Association, but the following may be accepted as the substance of the official programme. Judging by the range of subjects covered by the papers, the convention should be a most interesting one, and there is every reason to believe that the exhibition will be most successful. A rumor is heard that the next convention will be held at either Montreal or Winnipeg. It would seem particularly desirable to choose the former city. It is important in the interest of the Association to clean up the work in Eastern Canada before entering upon that in the west, which will be found comparatively easy in proper course.

Tuesday, March 29th

2.30 P.M.

Annual Address by the President, Peter Gillespie, Lecturer in Theory of Construction, University of Toronto.

"Concrete Construction"—Cecil B. Smith, of Smith, Kerry & Chace, consulting engineers, Toronto, Winnipeg and Calgary.

"Use of Concrete in Dwelling-House Architecture"—Ernest Wilby, Architect, Detroit, Mich. (Paper to be read by the Secretary).

"Waterproofing of Concrete"—R. A. Plumb, chemist, Detroit, Mich.

8.00 P.M.

"Use of Cement in Architecture"—F. S. Baker, President Royal Architectural Institute of Canada.

"What Concrete Means to the Farmer"—Percy H. Wilson, secretary of the Association of American Portland Cement Manufacturers, Philadelphia, Pa.

"Inexpensive Homes of Concrete"—M. D. Morrill, architect, Washington, D.C. (Paper to be read by the Secretary).

Wednesday, March 30th.

10.30 A.M.

Discussion of Proposed Standard Specifications.

2.30 P.M.

"Concrete Bridges"—A. W. Connor, of Bowman & Connor, consulting engineers, Toronto.

"An Analysis of Concrete Bridge Failures"—C. R. Young, of Barber & Young, bridge and structural engineers, Toronto.

"Concrete Roadway Construction"—C. W. Boynton, Chief Inspecting Engineer, Universal Portland Cement Company, Chicago, Ill.

"Concrete"—James Bell, of Bell & McCubbin, civil engineers, St. Thomas, Ont.

8.00 P.M.

"The Engineer and the Finished Work"—A. W. Campbell, Deputy Minister Railways and Canals, Ottawa.

"Construction of Concrete Highway Bridges"—Chas. Talbot, County Engineer of Middlesex, London, Ont.

"Concrete Pavements"—James Pearson, President Constructing & Paving Company, Toronto.

Thursday, March 31st.

10.30 A.M.

Election of Officers.

2.30 P.M.

"Concrete in Europe"—Richard L. Humphrey, President

National Association of Cement Users, and Director United States Structural Materials Testing Laboratories, Pittsburg, Pa.

"Some Experiments with Cement Tile"—W. H. Day, Professor of Physics, Ontario Agricultural College, Guelph, Ont.

"Uses of Concrete on the Farm"—Philip L. Wormeley, Testing Engineer, Office of Public Roads, United States Department of Agriculture, Washington, D.C.

"Hardening of Portland Cement"—A. G. Larson, chemist, Grey & Bruce Portland Cement Company, Owen Sound, Ont.

8.00 P.M.

Annual Dinner of the Association at the Tecumseh House.

Friday, April 1st

2.30 P.M.

"Government Testing Laboratories"—Richard L. Humphrey, President National Association of Cement Users, and



Professor Gillespie, Toronto, President Canadian Cement and Concrete Association.

Director United States Structural Materials Testing Laboratories, Pittsburg, Pa.

"Commercial Aspect of Reinforced Concrete in Canada"—Gustave Kahn, general sales manager, Trussed Concrete Steel Company of Canada, Toronto, Ont.

"What the Concrete Block Means to Canada"—J. Augustine Smith, secretary and sales manager, Ideal Concrete Machinery Company, South Bend, Indiana.

"Concrete from the Contractors' Standpoint"—D. C. Raymond, vice-president, Bishop Construction Company, Montreal and Toronto.

General Information

Reduced Railroad Rates.—The Eastern Passenger Association has granted reduced fares on the certificate plan to delegates attending this convention. Delegates will purchase, at their home station, one-way tickets to London, obtaining at the same time from their local agents, receipts on a standard form for the money so paid. These receipts, when validated by the secretary of the Canadian Cement and Concrete Association, will entitle the holders thereof to return tickets free of charge, provided not less than 300 certificates are pre-

sented. A charge of 25 cents is made by the Eastern Canadian Passenger Association for the service of issuing the return ticket. A representative of the railways will be present at the Exhibition Hall, Princess Rink.

The Exhibition

The municipality of London has kindly placed at the disposal of the Association the spacious Princess Rink, where interesting exhibits may be seen illustrating processes, products and machinery connected with the various uses of cement and concrete.

Among the exhibitors who have applied for space up to the time of going to press are the following:

Wetlaufer Bros., Toronto.

John T. Hepburn, Toronto.



Mr. R. E. W. Hagarty, Toronto, the energetic secretary of the Canadian Cement and Concrete Convention.

Scott Machine Company, London.

Somers Bros. Manufacturing Company, Urbana, Ill.

Rapid Cement Machinery Company, St. Paul, Minn.

Crapp Concrete Machinery Company, Chicago, Ill.

E. E. Benner, Chicago, Ill.

Diamond Concrete Machinery Company, Chicago, Ill.

Merillat Culvert Core Company, Winfield, Iowa.

W. R. Goit Company, Limited, Fort Erie, Ont.

C. S. Wert, Kendallville, Ind.

Trussed Concrete Steel Company, Walkerville, Ont.

Ideal Concrete Machinery Company, London.

London Concrete Machinery Company, London.

Dennis Wire & Iron Company, Limited, London.

Roman Stone Company, Toronto.

United States Gypsum Company, Chicago, Ill.

Down Draft Furnace Company, Galt, Ont.

W. J. Anthistle, London.

Canada Foundry Company, Toronto.

Alfred Rogers, Toronto.

Canadian Art Stone Company, Toronto.

Peerless Cement Brick Company, Toronto, Ont.

London Engine Supply Company, London, Ont.

London Hotels

Tecumseh, Richmond street, near G.T.R. \$2.50 per day

Grigg House, Richmond street, near G.T.R. . 2.00 per day

City Hotel, cor. Dundas & Talbot streets..... 1.50 per day

London House, cor. Dundas & Talbot streets.... 1.50 per day

Dominion House, cor. York & Clarence streets.. 1.50 per day

Fraser House, King street \$1.25 and 1.50 per day

Leading Canadian Contractors

Mr. Paul T. C. Dumais, civil engineer and contractor, of Hull, Que., who contributes an interesting article to this issue, was born at Kamouraska, Que., on January 2nd, 1847. He graduated at Ste. Anne College in 1864. and from the Quebec Military School in 1866. His first professional experience was obtained in 1866 and 1867 as assistant engineer on U. S. Harbor Improvement, Lake Michigan. Upon the termination of this work, Mr. Dumais went to Europe, and from 1868 to 1870 took active service in the regular army in Italy, retiring with the rank of sergeant. Returning to Canada, Mr. Dumais engaged in land surveying, in Quebec, from 1871 to 1878. In the latter year he was admitted Provincial Land Surveyor. Four years later he qualified at Ottawa as a Dominion Land Surveyor. Following this he was engaged on local and government survey work.

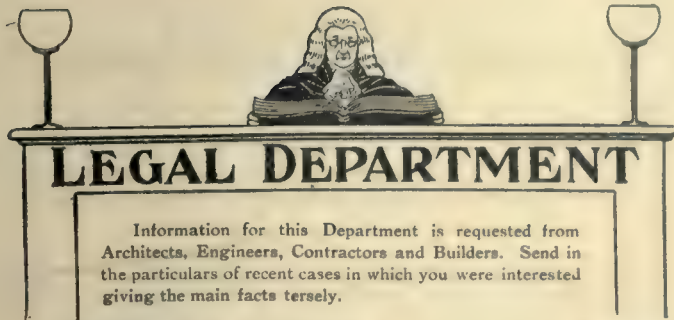
In 1885-6 he was chief engineer on the construction of the Temiskaming Colonization Railway. From 1899 to 1902 he was working upon land, hydrographic and underground surveys in the Yukon. Since then he has confined his labors almost exclusively to general contracting. During the last few years he has carried out several important harbor works on the St. Lawrence river. In 1906 and 1907 Mr. Dumais obtained Canadian and United States patents for a new and improved system



Mr. Paul T. C. Dumais, a prominent engineering-contractor of Hull, Que.

of reinforced concrete construction for piers, bridges, wharves, coffer dams and tunnels, concerning which detailed information is given elsewhere.

The members of the Winnipeg Builders' Exchange meet every Friday evening for a card party and social time. A regular card tournament is under way and prizes will be awarded for cribbage, pedro and bridge. Single prizes will be given for cribbage, and in pedro and bridge, team prizes will be given. A big smoker is planned for this week, when the prizes will be awarded to the successful rinks in the builders' bonspiel, lately concluded. The president, Mr. W. H. Carter, is donating a beautiful cup in this connection.



Improper Use of Trademark.—The appeal brought by the Standard Ideal Company, of Port Hope, Ont., from the decision given against them and in favor of the Standard Sanitary Manufacturing Company, of Pittsburgh, Pa., in a lower court, by Mr. Justice Archibald, has been decided with costs against the Canadian company. In the first action the court held that the defendants, the Canadian company, had advertised their goods as "Standard" with intent to deceive the public. The judgment appealed from was confirmed by the higher court, the defendants being restrained from using the word "Standard" in connection with enamelled bathtubs, wash stands, lavatories, sinks, laundry trays and other articles of toilet use, and their attachments, either by stamping, circular, advertising or other form of designation.

Incurring Risk Voluntarily.—Kimball v. Butler Bros.—This was an appeal by the plaintiff from the judgment of the Divisional court dismissing the action. The plaintiff, the widow of Wallace Kimball, deceased, brought action to recover damages for the death of her husband while in the employment of the defendant, under circumstances of alleged negligence on their part. The deceased was a civil engineer and held the position of superintendent of shaft No. 2, in the construction of a tunnel under the Detroit river. A fire occurred in shaft No. 4 and deceased voluntarily went down with others to extinguish the fire and assist in the rescue of workmen. In doing so he lost his life, and the present action for damages resulted. The plaintiff claimed negligence on the part of the defendants in not maintaining proper supervision of the work, in adequate superintendence, and in the absence of the proper appliances for extinguishing fire, as well as in not providing sufficient ways of egress from the shaft. The court found that the deceased was not employed where the fire occurred, that he acted deliberately, with a knowledge of the risk he was incurring, and that the defendants were not liable. The judgment of the Divisional court was accordingly affirmed.

Delay in Completing Contract.—Findlay v. Stevens.—Divisional Court of Ontario.—The plaintiff, a contractor, brought action for balance alleged to be due for the slating of a roof. The defendant counter claimed for damages, alleging that the work was not completed within the specified time. The contractor, Findlay, agreed to carry out the slating and tiling work by a certain date for a certain sum. If he could not finish the work within the stated time he was to be discharged by the architect. By another clause provision was made that when other contractors were employed on the work, each should be responsible for loss caused by failure to finish the work in the proper time, and that any contractor suffering damage should call the attention of the proprietor to the fact. It was agreed that if the contractor should fail to finish the work at the proper time he should be subjected to a penalty of \$1 per day during the time that the work remained un-

completed, due allowance to be made for the extension of time for additional alterations and for delay occasioned by the default of other contractors for other parts of the work. It appeared that the carpenter's work was not done on the roof until after the time specified for the completion of Findlay's contract.

The court held that the contractor was not liable to the penalty owing to the fact that he was delayed by the proprietor's workmen. The penalty clause was at an end when the contract limit expired and was for the specific period only.

The architect has power of extension during the currency of written contracts, but not thereafter. These powers, however, do not affect the duration of the contract as to its time limit; the work is still to be done within the given limit, and beyond that the term as to penalties is not to be carried into any subsequent unwritten contract for the work.

Damage Caused by Defective Sprinkler Tank.—Hees vs. Ontario Wind Engine & Pump Company. Court of Appeal. Plaintiff entered into a contract with the defendant company for the erection of a 40,000 gallon sprinkler tank to be used in connection with their factory. When the sprinkler tank was completed it was partially filled with water, whereupon the structure erected by the defendant collapsed and the tank and structure fell against the defendants' factory, causing considerable destruction. Plaintiff claimed \$18,000 damages. The defendant company contended that the damage was caused by the improper interference of plaintiff in filling the tank before it should have been filled. At the previous trial judgment was given plaintiff for damage sustained and costs. The Court of Appeal dismissed the appeal with costs.

Payment for Work and Materials.—In the action, Gamble vs. Arnold, in the Saskatchewan Court, the plaintiff, assignee of the Kelly Plumbing, Heating and Light Company, Limited, brought action on a promissory note for \$529.50, an itemized account for work done and material supplied for \$554.59, both being for furnishing in the Wascana Hotel, owned by the defendant. The defendant was unable to show that it was part of the agreement that no payment should be made except on production of certificate from the architect. The court found that the evidence of the architect did not go further than to show that he was to supervise the work, and that it was plainly by mere inference that he added that the certificate was required. Evidence of the materials having been supplied and the work performed was found sufficient. Judgment was given plaintiff for \$663.16.

The Universal Portland Cement Company, Chicago and Pittsburg, have favored us with a copy of an interesting work entitled "Representative Cement Houses." The descriptive matter contained in this book will be of great interest to the progressive architect and contractor. The variety of designs illustrate the wide possibilities of cement residence construction. The authors have divided the subject into five classes, the first embracing the various forms of reinforced concrete houses, including the monolithic type; the second including the cement block or hollow tile structure with a coat of cement plaster on the exterior; the third, the plain cement block or tile structure with no exterior coat of plaster; the fourth, that with a frame structure of wood, with an exterior coat of cement plaster; and the fifth, cement brick houses. The practical information and cost data contained in this little work will meet a long-felt want for accurate and definite particulars as to what can be done in the way of cement house construction.



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Personal News and Notes

Assistant City Engineer Scott, Toronto, has received a tempting offer to leave the city, but it is understood that he has no intention of severing his present connection.

Mr. Henry Brown, mechanical engineer of the Missisquoi Marble Company, Quebec, has resigned that position, having obtained a charter to operate as the Dominion Marble Company, with offices and works at South Stukely, Que.

At a meeting of the Toronto Carpenters' Union held last Saturday the members decided to turn down the builders' offer of 35 cents an hour. A committee was appointed to negotiate for 40 cents an hour, 7 cents higher than the present schedule.

A report from Halifax, N.S., states that the representative of a large English cement manufacturing concern has been investigating the Maritime Provinces as a future field for establishing cement works, to be operated independently of the Canadian merger.

Mr. Mason H. Baker, of St. Thomas, Ont., has been appointed assistant city engineer of that city at a salary of \$1,200 a year. Mr. Baker assumes his position with the prospect of being appointed city engineer at the end of the year in succession to Mr. Jas. A. Bell, who is resigning.

The premises of the Engineers' Club of Toronto, at 96 King Street West, are to be remodelled and ready for opening by the first of May. The new social club will provide billiard-rooms, bowling-alleys, lecture room, technical library, grill-room and general dining-room.

The Barron & Cole Company, of New York City, owing to the increased demand in second hand contractors' equipment, are opening up a special department to handle this particular line, and have put Mr. George E. Ray, formerly of the Russell Contracting Company, also of New York, in charge, as manager.

City Engineer Rust, Toronto, has received from the United States photographs of a power tamping machine which does away with manual labor in the pounding of earth in trenches. The machine is so constructed that a heavy pounder can be hoisted or dropped automatically and restore the excavated earth to its former solid condition. Mr. Rust will write for more particulars about the construction of the machine, and may recommend that one be purchased for his department.

The following are some of the applications received for the position of city engineer of St. Thomas, Ont., together with the remuneration asked for. The information may be of interest in that it throws some light upon the salaries obtaining and expected in municipal work: S. D. Egan, late of Chatham, Eng., gold medallist, experience in England, New Zealand, South Africa and Canada, \$1,200; E. P. Phillips, Toronto, 1906, since town engineer of Oshawa and Bracebridge, \$1,200; J. M. Wilson, Toronto, assistant waterworks engineer at Toronto, \$1,800; E. R. Blackwell, Mem. Can. Soc. C.E., general experience since 1882, \$1,500; Alex. Lindsay, since 1905 assistant city engineer of Spokane, Wash., \$1,800; M. T. Meadowcroft, municipal experience in Chicago and other places, \$1,500; G. A. Ball, Toronto, English B.Sc., experience in England, \$960; Mason H. Baker (the successful applicant), late of the Saskatoon Public Works Department, \$1,200.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Fort Erie, Ont.

On April 15th tenders will be received for \$50,000 30-year waterworks debentures. B. F. Matthews, clerk.

Calgary, Alta.

Tenders are being called by this municipality until April 22nd for construction of sewers, water mains, etc. For further information see advertisement in this issue.

Hamilton, Ont.

Tenders are being called until April 9th for the construction of a cement sidewalk in the township of Barton. Specifications at office of J. Walter Gage, reeve, 34 Main street east. Alf. G. E. Bryant, township clerk.

London, Ont.

The estimates made by the Water Commissioners include: Service extension, \$6,000; main extension, \$10,000; metres and hydrants, \$7,500.

Moose Jaw, Sask.

On April 11th a bylaw will be voted on to issue \$140,000 20-year four and a half per cent. pavement debentures. W. F. Heal, city clerk.

Tenders addressed to W. F. Neal, city clerk, will be received until April 11th for trenching and laying 7,100 feet of sewer pipe. For further particulars see advertisement in this issue.

North Vancouver, B.C.

The Board of Works was empowered to proceed with street improvement work, pending the passing of the \$25,000 bylaw for that purpose.

Ottawa, Ont.

City Engineer Ker submitted plans for the west end drainage system with a septic tank in Mechanicsville. The board approved and the plans will now be forwarded to the provincial board of health for approval.

Prescott, Ont.

This municipality will shortly invite tenders for the extension of their sewerage system, including one septic tank. A bylaw to raise \$22,000 for this purpose has been carried.

Quebec, Que.

April 14th is the date set for the receiving of tenders for supply of annual supplies. Noted in last issue.

Regina, Sask.

The plans prepared and submitted by J. A. McPherson, of the sewerage system will be forwarded to Toronto for approval of T. Aird Murray, the Government consulting engineer.

Saskatoon, Sask.

Tenders addressed to J. H. Truesdale, city clerk, will be received until April 11

for all labor necessary for laying water mains and sewer pipes and furnishing certain materials therefore. Plans, etc., at office of George T. Clark, city engineer, this city. W. Hopkins, mayor.

Toronto, Ont.

The Ontario Railway Board has given the city permission to issue \$45,000 debentures to cover the cost of laying trunk sewers in the east end annex.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until April 5th for dredging slips, sewers, etc. Specifications at office of city engineer.

The city engineer has recommended that St. Clair avenue be widened from Avenue road to Bathurst street. Estimated cost, \$170,000.

Vancouver, B.C.

The Board of Works are considering a new sewer bylaw. Many additional sewers are needed.

Victoria, B.C.

Council decided they would invite contractors to submit bulk tenders for sidewalk and paving work. G. H. Bryson, acting city engineer.

Winnipeg, Man.

Tenders were called for the supply of 137,000 pounds of lead pipe for the waterworks department to be in in three weeks.

AWARDED.

Ottawa, Ont.

The following tenders were received for annual supply of hydrants and valves for Waterworks Department: Thos. Lawson & Sons, Ottawa, \$2,962.50; T. McAvity & Sons, St. John, N. B., \$3,148.25; Canada Foundry Company, Limited, Toronto, \$3,258.01; Kerr Engine Company, Walkerville, Ont., \$3,657.00; Chaudiere Foundry Company, Ottawa, \$4,515.80; Canadian Fairbanks Company, Montreal, irregular. The following gives the price of each article in tender of Thos. Lawson & Sons, Limited, the successful tenderer: Improved, 3 way hydrant as per a., \$40.00; improved special hydrant with water crane attached, as per sample, \$40.00; 4-inch stop valves, as per sample, \$4.00; 5-inch stop valves, as per sample, \$4.50; 6-inch stop valves, as per sample, \$12.00; 8-inch stop valves, as per sample, \$15.00; 12-inch stop valves, as per sample, \$25.00; 15-inch stop valves, as per sample, \$25.00; \$24-inch stop valves, as per sample, 100.00.

The following is a list of tenders for supply of brass goods: James Robertson Company, Limited, Toronto, \$1,672.10; McKinley & Northwood, Ottawa, \$1,762.10; Empire Manufacturing Company, London, Ont., \$1,835.50; F. G. Johnson & Company, Ottawa, \$1,938.70. The list below gives the price of each article, as per sample, in the tender of James Robertson Company, Limited, of Toronto, which was accepted: 1/2 inch brass stop-cocks, \$1.23; 3/4 inch brass stop-cocks, \$1.35; 1 inch brass stop-cocks, \$3.70; 1-inch brass stop-cocks, \$3.70;

1/2 inch brass couplings, 50 cents; 3/4 inch brass couplings, 63 cents; 1 inch brass couplings, \$1.13; 1/2 inch off 3/4 inch Y branches, \$1.21; 3/4 inch off 1 inch Y branches, \$1.27; 3/4 inch taper nozzles, 50 cents; 1/2 inch taper nozzles, 34 cents; 3/4 inch taper nozzles, 58 cents; 1 inch taper nozzles, 89 cents.

The following tendered for supply of oils and grease: Canadian Oils Company, Limited, Ottawa, \$417.00; Queen City Oil Company, Limited, Ottawa, \$423.73; also for lead pipe and pig lead: McKinley & Northwood, Ottawa, \$1,527.60; J. Watkinson & Company, Montreal, \$1,582.25. The lowest was accepted in each case. The list below gives the price in regard to lead pipe and pig lead in the accepted tender: 3-8 inch lead pipe, weight per yard, 4 lb. \$0.04; 1-2 inch lead pipe, weight per yard, 5 lb., \$4.74; 5-8 inch lead pipe, weight per yard, 7 lb., \$4.74; 3-4 inch lead pipe, weight per yard, 9 lb., \$4.74; 1 inch lead pipe, weight per yard, 12 lb., \$4.74; pig lead, best, \$3.70.

The following tendered for annual supply of cast iron pipe: Alex. Freck, Limited, Ottawa, \$8,901.63; Staveley Coal and Iron Company, Limited, Chesterfield, Eng., \$8,726.77; John Coates & Company, Ottawa, \$8,703.42; T. S. Kirby, & Company, Ottawa, 9,074.13. The council decided to accept the tender of John Coates & Company of Ottawa, for pipe made in England. Noted in last issue.

Prince Albert, Sask.

The tender of the American Sewer Pipe Company was accepted. The J. Morris Brass Manufacturing Company's tender for fittings was accepted.

Toronto, Ont.

The Board awarded the contract for one 42 inch hydraulically operated stop valve for the main pumping station to Canadian Fairbanks Company, Toronto, at \$1,190.

Railroads, Bridges and Wharves

Cypress River, Man.

Tenders are being called until March 31 for the construction of station here, by the C. P. R. Plans, etc., at office of Division Engineer, Frank Lee, Winnipeg.

Calgary, Alta.

Tenders are being called until May 1st by the C. P. R. for all excavation required to complete the canal system in the eastern section of the company's irrigation block, Alberta, amounting to upwards of 25,000,000 cubic yards of material. Plans, etc., at office of assistant chief engineer, this city. J. S. Dennis, assistant to second vice president, C. P. R.

Fort William, Ont.

A bylaw has been passed to issue \$10,000 bridge debentures. A. McNaughton, city clerk.

Lindsay Ont.

Tenders are being called until April 13th for supply and erection of a two steel

bridge spans etc., over Little Bob river near the village of Bobcaygeon. For further information see advertisement in this issue.

Prince Albert, Sask.

Mayor Holmes is authority for the statement that the Hudson Bay Pacific would build from Prince Albert.

Regina, Sask.

The government of Saskatchewan will shortly call for tenders for the construction of the reinforced concrete abutments for a bridge near the town of Arcola, and tenders for two small reinforced concrete bridges near the towns of Estevan and Weyburn, in the Province of Saskatchewan. Tenders will also be called for the construction of reinforced concrete bridge abutments for some seven other bridges.

Sarnia, Ont.

Tenders addressed to Thos. T. Holmes, Collinville, Ont., will be received until April 6th for the erection of concrete abutments and concrete floor for a bridge over the Sydenham river. Plans at residence of the above.

Windsor, Ont.

It is understood that the members of the Dominion Railway Commission have expressed themselves as favorably disposed towards the proposed subway beneath the tracks of the Michigan Central Railway at the mouth of the tunnel.

Winnipeg Man.

Tenders are being called for the construction of concrete work necessary for the Fort Garry station viaduct.

The C. P. R., it is understood, have let contracts as follows: Foley, Welch & Stewart, a large part of the work in the west, and J. C. McArthur & Company, the bulk of the work near Winnipeg. In Alberta the Kipp extension will be built by Foley, Welch & Stewart. This line has been completed to the Little Bow river. Next year the line will be continued until a junction is affected with the Calgary-Macleod branch. The extension of the Langdon branch will also be built by the Foley, Welch & Stewart firm. The Weyburn extension will be built by the J. D. McArthur Company. Only twenty-five miles of the dump will be completed this year. The J. D. McArthur Company will also build the Outlook extension. The work of constructing this road from the Macklin end is a separate contract and the report is that Janse, McDonald & Timothy had been awarded the contract. The contract for the G. T. P. line from Regina toward Estevan and Portal has been awarded to the J. D. McArthur Company.

AWARDED.

Brandon, Man.

John Bradley, of this city, has been awarded the contract for building the C. P. R. line from Craven to Colonsey. The road will be 110 miles in length.

Prince Albert Sask.

Chief Engineer Atwood has announced that the Hudson Bay & Pacific Railway would be started this year and will be built by British capitalists headed by A. J. Spicer and it is believed the British government is interested in it as a military route to the Far West. A. J. Taylor of New York, has been awarded the contract.

Sydney, N.S.

The contract for the construction of branch of the I. C. R. from here to Orange River has been awarded to A. Kirk, Antigonish, N. S. It is estimated at \$250,000.

Thornton, Ont.

At a meeting of the council of Essa, the contract for steel bridge with concrete floor over the Nottawasaga river was awarded to the Ontario Bridge Company for \$2,900. G. C. Allan's tender for concrete abutments for bridge on No. 5 side road was accepted for \$2,300. J. Coxworth, clerk.

Yorkton, Sask.

Peter Vergin has been awarded the contract for building 30 miles of the G.T.P. to Canora.

Public Buildings, Churches, Schools, etc.

Aberdeen, B.C.

Tenders are being called until April 11th for the erection and completion of a large one-room frame school building in the Chilliwack electoral district. Plans, etc., at offices of the Government agent, New Westminster and at the Department of Public Works, Victoria, B.C. F. C. Gamble, public works engineer.

Belleville, Ont.

The Board of Education of this city at a special meeting will ask the City Council to submit a bylaw to the ratepayers to borrow \$50,000 for a new collegiate institute.

Brandon, Man.

The plan submitted by Thos. Sinclair, architect, has been accepted by the congregation of Knox Church for their new building on the corner of Fifteenth street and Victoria avenue. Estimated expenditure, \$25,000.

Chase, B.C.

Tenders are being called until April 12 for the erection and completion of a two-room frame school house here. Plans, etc., at office of Government agent, Kamloops, B.C., and at Public Works Department, Victoria. F. C. Gamble, public works engineer.

Duncan, B.C.

Tenders addressed to Messrs. Pott and Peterson this place, are being called for erection of brick building, concrete block finish, until April 4th. Plans, etc., at office of A. Maxwell Muir, C.E., 1208 Government street, Victoria, B.C.

Eyebrook, Sask.

Tenders addressed to W. J. Macdonald, this place, will be received until April 15th for the erection of a brick veneer church. Plans, etc., at office of the Macdonald Realty Company, this place.

Edmonton, Alta.

Tenders are invited for the erection of the Royal Alexandra Hospital, Edmonton, until April 1st. Plans and specifications at Winnipeg Builders' Exchange. Roland W. Lines, architect, Edmonton.

Headingley, Man.

Tenders addressed to C. W. Johnstone, secretary-treasurer, school board, will be received until March 31st for plans, etc., for a 2-room school house for District No. 9.

Hamilton, Ont.

It is possible that the registry office may not be built, the lowest tenders aggregating \$50,000, while the bylaw called for the expenditure of \$38,000.

The building committee of the First Methodist Church have reported favorably

re the erection of a new church and will advertise for competitive plans for an edifice to cost about \$35,000.

Tenders addressed to J. L. McLaren, chairman, Board of Control, will be received until March 31st for the several works required in the alterations and additions to the Nurses' Home at the City Hospital. Plans, etc., at office of the architects, Stewart & Witton, Hamilton.

Kildonan, Man.

A meeting of the ratepayers of East Kildonan school district will be called to select a new school site for a new school building to be erected in the East Kildonan school district.

Kipling, Sask.

Tenders are being called until April 15 for the erection and completion of a 4-roomed brick veneer school building here. Plans, etc., at office of John Sproat, secretary-treasurer, this place.

Lethbridge, Alta.

The Y. M. C. A. campaign brought \$50,000. The committee will erect a \$60,000 building. Noted in issue of March 9th.

London, Ont.

The council will be asked by the Board of Education to issue debentures for a new school to replace the Colborne street school. Noted in issue of January 19th.

Meaford, Ont.

Architect Forster, Owen Sound, has estimated the cost of remodelling the public school building at \$8,000.

Moose Jaw, Sask.

The Curling Club are considering the erection of a new rink. President, Mr. F. Marlatt.

Montreal, Que.

The Catholic School Commission have decided to erect a modern 16-room school to cost \$100,000. Competitive plans invited from local French-Canadian architects.

St. Agnes' Roman Catholic Church was damaged to the extent of \$8,000 on the 27th inst.

Plans for the new Mount Royal Riding Academy, to be erected near the M. A. A. A., will be finally approved shortly. E. J. Sheppard, president of the Montreal Arena Company, president, and A. Gardner and Mr. Laurendeau, on the executive.

New Westminster, B.C.

The city will co-operate with various athletic clubs towards the construction of a new grand stand in Queen's Park, to seat about 3,000 people.

Ottawa, Ont.

The council has approved of the plans and estimates reported by Architect C. P. Meredith, Sparks Chambers, which call for an expenditure of \$55,239 in the renovation of the City Hall and the installation of permanent fixtures. Tenders will be called shortly.

Negotiations are in progress for the erection of a theatre on Sparks street, probably to be controlled by the management of the Nickel theatre on Albert street.

The Board of Control are asking for tenders for the alterations and improvements to the City Hall estimated cost about \$60,000.

Tenders addressed to N. Tessier, secretary, Department of Public Works, will be received until April 15th for restoration of and additional storey to Military Stores building. Plans, etc., at above Department.

J. A. Ewart, architect, will be asked to prepare specifications for calling for ten-

ders for the fittings required for the new registry office.

Prince Albert, Sask.

Word has been received here that an armory will be built next year at a cost of \$10,000. The city will supply the site.

Peterborough, Ont.

Bids will be received until April 8th by E. M. Elliott, County Clerk, for installing a steam heating system to heat the court house and county buildings in this place.

Parkhill, Ont.

Tenders addressed to N. Tesier, secretary, Department of Public Works, Ottawa, Ont., will be received until April 12th for interior fittings, post office. Plans, etc., on application to Mr. Jas. Phelan, clerk of works, this place; Mr. T. A. Hastings, clerk of works, postal station "F," Toronto, and at the Department of Public Works, Ottawa.

Regina, Sask.

Plans and specifications for the erection of a new building for the Grey Nuns have been prepared by E. & W. S. Maxwell, architects, 6 Beaver Hall Square, Montreal, and are on view at their office.

St. Charles, Man.

On March 21st the ratepayers will vote on a bylaw to issue \$40,000 school debentures, rural municipality of Assiniboia. F. Ness, Secretary-Treasurer, St. Charles, Man.

Toronto, Ont.

It is understood that the congregation of Central Presbyterian Church, corner of Grosvenor and St. Vincent streets, is seriously considering disposing of the present church property and securing a new site in the northern part of the city.

Tenders addressed to Arthur W. Holmes, architect, 10 Bloor street east, will be received until April 2nd for the brick and cut stone, terra cotta and reinforced concrete and carpenter's work required in the erection of a Community House for the Sisters of St. Joseph, at the House of Providence, Power street.

A committee, composed of W. E. Raney, Traders' Bank Building, A. S. Grant and others, will investigate as to the advisability of erecting an institutional church building for the Presbyterian denomination, and report at September meeting.

Tenders addressed to W. C. Wilkinson, secretary-treasurer, Board of Education, will be received until April 4th for the several trades required in the enlargement of Balmy Beach School. Plans, etc., at offices of City Hall.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until April 5th for the complete supply and installation of a low pressure steam heating system in St. Lawrence Hall. Plans, etc., at offices of the Property Department, City Hall, Ont.

The Y. M. C. A. have purchased property with frontage of 156 feet on the southeast corner of College and Dovercourt road. Estimated expenditure on building, \$150,000.

Tenders addressed to J. P. Hynes, architect, 199 Yonge street, will be received until April 9th for an extension to the Church of Our Lady of Lourdes, Sherbourne street.

Tenders addressed to Darling & Pearson, 2 Leader Lane, will be received until April 3rd for the excavation of basement and foundations of the main building, Toronto

General Hospital, College street. Plans, etc., at office of the above.

Vancouver, B.C.

Plans for a palmhouse and conservatory to be erected in Stanley Park are being considered by the committee in charge of the Oppenheimer memorial. The plan submitted by A. Campbell Hope, 336 Hastings street, calls for one large building with two wings.

Mr. J. F. Harley, representative of the Shuberts and Liebler Consolidated Attraction Company, New York, has been here looking for a suitable site for a theatre.

Winnipeg, Man.

The Thistle Curling Club and the members of the Builders' Exchange have decided to build a large curling plant upon which work will start in the summer.

Dr. Sharpe has submitted plans for the various hospital buildings. The bylaw to raise \$600,000 for hospital will be submitted to the ratepayers. Hospital committee, G. V. Hastings, D. E. Sprague and A. Strang.

The governors of the university decided in favor of F. W. Heubach's offer of Tuxedo Park as a site for the proposed university buildings. Noted in issue of February 23rd.

The St. Charles Country Club was destroyed by fire on the 24th inst. Loss \$50,000.

AWARDED.

Annapolis Royal, N.S.

The contract for the building of the new Roman Catholic church has been secured by Mr. Allen, of Middleton, and work will shortly be commenced.

Barrie, Ont.

The following tenders for heating gaol were received. The lowest received the contract: Phillips & Company, Orillia, \$1,451; J. Neelands, Barrie, \$1,419; Orillia Hardware Company, Orillia, \$1,908; Armstrong Bros., Midland, \$2,070; Landon & Flesher, Barrie, \$1,720; J. R. Hambly, Barrie, \$1,548; Purdy & Mansel, Toronto, \$1,964.

Berlin, Ont.

Following contracts for the new market building were recently awarded: Mason work, Steckenreiter and Koenig, \$3,830; carpenter work, Ovens & Jacobi, \$2,212; plumbing, Conrad Bros., \$207; tin work, Weichel & Son, \$329; painting, C. Wolfe, \$145.

Clayoquot, B.C.

Mr. Maltby has been appointed the contractor by the government for building the new district school house. Work will begin at once.

Hull, Que.

The contract for the building of the new St. Jean Baptiste School has been awarded to Louis Lemieux at \$5,400. A. Archambault will supply the fittings for \$1,500. Work will be commenced at once.

Hamilton, Ont.

Adam Clarke & Son have been awarded the contract for plumbing at the new lava tory, House of Refuge, \$461.

Montreal, Que.

General contract for the erection of a Roman Catholic presbytery at La Prairie, Que., has been awarded to Francis Du Fresno, general contractor, St. Laurent, Que. The building will be of pressed brick construction, with concrete foundation. G. A. Monette, 97 St. James street, architect.

Ottawa, Ont.

M. M. O'Connell, 372 Bank street, has been awarded the contract for plumbing,

heating and ventilating of the new golf club, on the Aylmer road.

Portage la Prairie, Man.

The contract for the alterations and additions to the hospital here has been awarded to Bedman & Osborne, \$947.

Prince Rupert, B.C.

The contract for the new school house has been awarded to A. J. Prudholme.

Strathcona, Alta.

Contractor Grant, of Edmonton, has the contract for the building of the Methodist College; excavation contract, Radford & Smith, of this city. Architect, Mr. Magoon, of Edmonton.

Yorkton, Sask.

S. Brown, of Winnipeg, Man., has been awarded the contract for erecting the new collegiate institute, \$56,860.

Residences

Cobourg, Ont.

Tenders addressed to Power & Son, architects, Kingston, will be received until April 4th for the erection and completion of a residence for G. M. Roger Esq., county judge. Plans, etc., at office of Col. N. F. MacNacht, county clerk, Cobourg.

Chatham, Ont.

Tenders will be received by Jas. L. Wilson & Son, architects, until April 2nd, for all trades in the erection of a concrete, brick and frame residence for Mr. Joseph Neff. The drawings, specifications, etc., can be seen at office of the former.

Edmonton, Alta.

On Saskatchewan avenue Mr. G. W. Marriott will erect a fine brick residence. Cost, \$4,500.

Mr. Hugh Duncan intends to build a brick residence on Main street north at a cost of \$4,000.

Montreal, Que.

Tenders are being received this week for the erection of a residence on Ontario avenue for Mr. J. M. Wilson. Saxe & Archibald, architects, 59 Beaver Hall Hill.

Joseph Perrault, architect, 2106 Park avenue, has prepared plans for a residence to be erected for Mr. H. Pelletier, at the corner of boulevard St. Joseph and St. Urbain street.

Toronto, Ont.

Humber Heights, residence owned by National Trust Company, was destroyed by fire on the 25th inst. Estimated loss, \$4,500.

Mr. Alexander Park has a permit for a three storey brick apartment house at the southeast corner of Winchester and Metcalfe streets. Cost \$26,000.

Walkerville, Ont.

Donaldson & Meier, Penobscot Building, Detroit, Mich., are preparing plans and specifications for a new residence for T. W. McGregor, 239 Brush street, above here, on Lake St. Clair.

Winnipeg, Man.

William Bruce is preparing plans for an apartment house to be erected this spring on Spence street, to cost \$50,000, and also for a \$50,000 residence for R. J. McKenna, to be erected on Ruby street. Angus Brown is having plans prepared for a \$7,000 house in Norwood.

Tenders addressed to George H. Teeter, architect, 604 Builders' Exchange, will be received until April 1st for the erection of a frame residence on Kingsway, Crescentwood, for Mr. J. H. Wye.

AWARDED.**Montreal, Que.**

The contract for alterations to the property at 10-12 University street, for Eadie-Douglas, Limited, has been awarded to T. Wand, general contractor. Saxe & Archibald, 59 Beaver Hall Hill, architects.

Strathcona, Alta.

Ald. Congdon has the contract for the residence to be erected near the university grounds, for Mr. W. R. Pearce, at a cost of \$4,500, architects, Wilson & Herrald; also a bungalow for Dr. Broadus.

Business Buildings and Industrial Plants**Belleville, Ont.**

It is said to be definitely settled that the C. N. R. station will be on what is known as the old Cricket field, near Bay front, just north of the rolling mills. The station and yard will cover four acres.

Berlin, Ont.

J. Kaufman will erect an addition to his planing mill, 40 by 100 feet, four storeys, of reinforced concrete. Estimated cost about \$14,000.

Brandon, Man.

The citizens feel that a new fire hall is needed and steps may be taken to erect one. H. Brown, clerk.

Arrangements are under way for the establishment of a distributing warehouse for the B. F. Nelson Manufacturing Company, of Minneapolis, Minn., makers of high grade roofing and building paper. This is thought to be the first step towards the erection of a plant here. Mr. Harwood, secretary, board of trade. F. P. Barker, Canadian business manager.

Chatham, Ont.

Tenders addressed to J. L. Wilson & Son, architects, will be received until March 31st for all trades in the erection of a concrete, brick and frame addition and renovations, also an office building for the Dowsley Spring & Axle Company.

The Royal Bank of Canada has been for some time anxious to establish a branch here, and has been negotiating for a site opposite the post office.

Calgary, Alta.

The G. T. P. are said to have secured options on sites suitable for a union depot here.

Senator Loughheed will erect a skyscraper, on Seventh avenue at a cost of \$300,000, to be completed within the year.

Craik, Sask.

Tenders addressed to E. A. Phillips, secretary-treasurer Farmers' Elevator and Trading Company, will be received until April 2nd for the building of a 60,000-bushel elevator, with up-to-date equipment.

Campbellville, Ont.

The C. P. R. station was destroyed by fire on the 26th inst.

Eburne, B.C.

The ratepayers' association will build a \$60,000 hotel. Messrs. Wells, W. F. Stewart, Hutchison, Marsden and Dixon are on the building committee.

Fort William, Ont.

The Canadian Bank of Commerce have purchased fifty feet on Victoria avenue. Expenditure for site and building, over \$100,000. No definite announcement has been made in regard to plans. A. A. Wilson, local manager.

The International Harvester Company will build a four storey warehouse, 500 by 90 feet, of concrete and brick, to cost about \$250,000, for which a site has been secured on C. P. R. property. J. G. Uffendel, local representative.

Gilbert Plains, Man.

The Canadian Elevator Company's elevator was destroyed by fire on the 24th inst.

Hamilton, Ont.

The installation of a steel rod mill in connection with the Hamilton Steel & Iron Company's plant is now practically assured. President, Wilcox.

Kingston, Ont.

The bylaw to exempt the Government dry dock from taxation after the lease to the Kingston Shipbuilding Company was carried. It is the intention of the company to start the establishment of a \$50,000 plant, to be ready for the opening of navigation. The company will eventually establish a complete shipbuilding plant.

Medicine Hat, Alta.

Six large American industries will, within the next thirty days, establish branches or remove their entire plants here. The industries include a 3,000 barrel flour mill and elevator, a sash and door factory, a general machine shop, a foundry, a saw-mill, a machinery manufacturing company and a farm implement manufacturing firm.

Moose Jaw, Sask.

The Macleod-Hamelin Company have plans out for a 25-foot addition to the rear of their present store premises. Pending the erection of a large department building this will afford temporary relief.

Montreal, Que.

The United Shoe Manufacturing Company of Canada have purchased ten acres of land at the Park avenue extension adjoining the C. P. R. tracks, and will erect an extensive factory building. Mr. H. C. Stone, architect, 80 St. Francois Xavier street, is preparing the plans.

Robt. Findlay architect, 10 Phillips Place, is calling for tenders up to the 1st of April, 1910, for the painting and glazing of the Anglo-Canadian Leather Company's property on Notre Dame street west.

It is expected that a definite announcement will soon be made regarding the construction of an addition to the new Wilder building, completed last fall.

North Toronto, Ont.

Davis Bros.' stores, 73-75 Yonge street, were damaged by fire on the 23rd inst. Estimated damage, \$5,000.

Nelson, B.C.

The Rossland Engineering Works will be moved to Nelson on April 1st and amalgamated with the Nelson Iron Works, to be known as the Consolidated Engineering Works of Nelson, Limited. W. M. Cunliffe of the Rossland company joins B. A. Isaacs and R. W. Hinton of the local company and the works here will be considerably enlarged.

Owen Sound, Ont.

Tenders are being called until March 31 by Corbet Foundry & Machine Company, for the different trades and material required for the erection of a foundry and machine shop.

Oshawa, Ont.

The Malleable Iron Works Company will shortly begin another extension, 40 by 40 feet, to their plant.

Ottawa, Ont.

C. J. Burritt, architect, is calling for tenders for extensive alterations to the Slater block, 201 Sparks street, to be occupied by the Willis Piano Company.

Weeks & Keefer, architects, 229 Sparks street, were the successful competitors among the six who submitted plans for the six-storey business block to be erected for Messrs. Rosenthal & Sons, on Sparks street.

Messrs. Cowie, Kemp and Edey have sold the southwest corner of Bank and James street, on which, it is stated, stores will be erected. Nimmo & Soper effected the sale.

Port Arthur, Ont.

Hon. Mr. Pugsley made the statement in the House of Commons that the G. T. P. would erect a 10,000,000 bushel elevator here.

Prince Albert, Sask.

The Northern Produce Company have secured a site of ten acres on Miller's Hill on which will be erected a \$50,000 abattoir shortly. Plans of the building have to be submitted for the approval of the council before April 4th. Dr. J. A. Moran is interested.

Portage la Prairie, Man.

Plans are being prepared for the Urban Mutual Assurance Company for their new brick building. Work will not begin until the latter part of May. Noted in issue of March 16th.

Prince Rupert, B.C.

The Bank of B. N. A. will erect a building on the corner of Third avenue and Fulton street. H. E. Wallace, formerly of Rossland, will erect departmental stores on the corner of Fulton and Third avenue. O. M. Helgersen is erecting a building on the corner of Sixth street and Second avenue.

Stewart, B.C.

Finch & Finch will establish a department store here.

Saskatoon, Sask.

Tenders addressed to the Saskatchewan Milling & Elevator Company, Limited, this place, will be received until April 1st for the erection of 1,000 barrel brick mill building, frame flour house and concrete storage tanks. Plans etc., at office of the company, 517 Grain Exchange, Winnipeg, Man.

Truro, N.S.

Construction will probably start in the second week of April on the new Foundry & Machine Company's building. Charles Hill and Davidson Hill are interested in the promotion of a wood-working factory.

Toronto, Ont.

Messrs. Gourlay, Winter & Leeming intend to erect a four storey and basement piano factory on Logan avenue, to cost \$50,000. Plans filed with the city architect. The building will be of mill construction.

Wickson & Gregg, architects, 59 Yonge street, are preparing plans for the erection of a warehouse for John Wanless & Company.

Vancouver, B.C.

An eight storey reinforced concrete block will be built on the north side of Pender street. Inkster & Ward, 421 Richards street, effected the sale.

Plans have been presented to Building Inspector Jarrett for extensive alterations to the Hotel Rainier.

The following motion was adopted by the Board of Trade: "That the municipal

council be asked to place in their first money bylaws a sum of \$300,000 for the purpose of purchasing the water frontage on the Fraser river for industrial purposes."

W. T. Whiteway, architect, Molson's Bank Building, has designed the plans for the 10-storey steel block near Carrall street, to be erected for William Holden. Estimated cost of structure, \$250,000.

Victoria, B.C.

Anxious to establish a soap manufactory on the Pacific coast the W. & L. Bailey Company of Colborne, Ont., has written to Mayor Morley as to the prospects for locating here

Plans are being prepared by G. C. Meshier Company for a concrete and brick three storey block for Finch & Finch, 1107 Government street. Estimated cost, \$20,000. Tenders will be called as soon as the plans have been approved.

Windsor, Ont.

The Dominion railway Commission have inspected the location for the proposed new station for the Michigan Central Railway at the mouth of the tunnel and have approved.

The block occupied by D. M. Ferry & Company, and owned by the Molsons Bank was destroyed by fire on the 25th inst.

Winnipeg, Man.

Property with frontage of 132 feet on Marion street, 110 feet on St. Mary's road, 230 feet on Smith street and 100 feet on Lillian, has been sold through F. W. Heubach & Company. It is expected that arrangements for the erection of an apartment block with stores on ground floor will be started shortly.

Tenders will be received by Douglas & Company, 86 Princess street, for a brick and stone warehouse on Adelaide street, also tenders for excavation. Plans and specifications at office of above.

Excavations commence this week for a three storey business building being erected on the corner of Notre Dame and Princess streets. Estimated expenditure, \$150,000; materials, concrete, brick and stone.

The Bank of Commerce announce that they will practically tear down their present building and double its size, taking in adjoining property at a cost of \$600,000.

AWARDED.

Brantford, Ont.

The Brantford Cordage Company, of West Brantford, have decided to enlarge their premises, contract for which has been let to Schultz Bros., who will start work at once.

Fort William, Ont.

The contract for the erection of annex to Victoria Hotel has been awarded to Seaman & Penniman, \$30,000.

Hamilton, Ont.

The following contracts in connection with the steel building to be erected for the Sawyer-Massey Company were awarded: Hamilton Bridge Works, structural steel; George E. Mills, mason work; Thos. Irwin & Son, roofing.

Montreal, Que.

The J. F. Jago & Company have been awarded the contract for the reinforced concrete work in connection with the construction on the Guaranteed Milk Company's new building.

The contract for the stone, brick and wood work on a four storey building to be erected on St. Lawrence Boulevard, has been awarded to Paquet & Godbout. The

other contracts have not yet been awarded. Eugene Payette architect, 15 St. James street.

Ottawa, Ont.

Architect Albert Ewart has awarded a contract to Messrs. J. & C. Low, for alterations to the Arcade building, Sparks street.

Toronto, Ont.

The contract for the galvanized iron work, windows, roofing and ceilings for the Gideon Miller Building has been awarded to A. B. Ormsby, Limited, Toronto.

Vancouver B.C.

The contract for the superstructure for the Canada Life Building has been awarded to McDonald & Wilson of this city. Estimated cost, \$200,000. A. A. Cox, architect, Montreal and Vancouver.

Power Plants, Electricity and Telephones

Brandon, Man.

The Brandon Electric Light Company has applied to the city council for power to instal in the city of Brandon a system to supply heat for public use.

Coaticook, Que.

The bylaw to borrow \$122,000 for the purpose of improving the light plant, and other purposes, was carried.

Fort Frances, Ont.

A bylaw will be submitted to the ratepayers on the 8th of April for the purpose of providing \$10,000 for the construction of a municipal electric lighting system.

Kamloops, B.C.

This municipality agrees to take power from the Shuswap Power Company in accordance with Engineer Dutcher's recommendation. When the matter is finally settled, the company will spend, it is estimated, about a million dollars.

Moose Jaw, Sask.

The city council decided, subject to the conditions being acceptable to the proposers, to make the draft franchise for a street railway received from Ottawa form the basis of a bylaw to be submitted as soon as possible. At present it provides that three miles of railway are to be constructed this year, a similar amount next year, the city to control the line of route and time schedule.

Montreal, Que.

Tenders addressed to E. A. Robert, managing director, Canadian Light & Power Company, will be received until April 9th for rock and earth excavation in the Beauharnois canal, between Valleyfield and St. Timothee; also for intake works at Valleyfield, including coffer dam, and culverts in the canal. Plans, etc., at office of above.

North Gower, Ont.

A new telephone system to cover North Gower and Marlborough will be established with central office at North Gower. Capital, \$30,000. President, H. G. Blair, and J. A. Craig, secretary-treasurer.

Prince Rupert, B.C.

Tenders are being called by electric light committee for boilers, engines, condensers, pumps and piping, together with electrical apparatus, until May 3rd. Plans, etc., obtained from Thomas Dunn, chairman of committee, this city, or from James Milne, consulting engineer, Loo Building.

Regina, Sask.

At a special meeting of the city council, it was decided, subject to the ratification

of the ratepayers, that a street railway franchise be granted to J. W. Mac G. Grady, J. A. Anderson and J. Gables, of Winnipeg. The contract provides that seven miles of track shall be laid by December, 1910.

Sherbrooke, Que.

The bylaw granting a 25 year's franchise to Sherbrooke Railway Company was carried. The company promise to spend \$50,000 in extensions and developments to power plant. C. B. Hibbard, Montreal, representative of company.

Stirling, Ont.

The ratepayers voted in favor of the bylaw to issue electric light debentures for \$10,000.

Winnipeg, Man.

A recommendation from the city electrician that the Board of Control be instructed to call for tenders for 100 luminous arc lamps, 6.6 amperes, for street lighting, was adopted by the fire, water and light committee recently. Estimated cost, \$17,000.

Tenders were received by the Board of Control for fencing the power transmission right of way. These were all considered too high, and new tenders will be called.

W. G. Chace, engineer, will call for tenders at once for the following works:— The erection of the power sub-station on McPhillips street, estimated to cost \$10,000; the equipment of the sub-station, estimated cost \$47,000; a conduit from the terminal station, along Higgins avenue, to the sub-station, estimated cost \$48,000, and a 20-duct conduit on the west side of Main street, from the C. P. R. subway to Portage avenue, estimated cost \$21,000. The work is to be proceeded with as soon as possible. Tenders on cables and wire for the power distribution will be called in the near future.

AWARDED.

Hull, Que.

Contract for the construction of an addition to the city power house was awarded to E. R. Bisson, of Hull, at \$13,386.40. Other tenders were: Carrier & Wilson, Hull, Que., \$17,527; Noel & Ouillette, Hull, Que., \$15,800.

Ottawa, Ont.

The Municipal Electric Commission has awarded the following contracts for supplies: Transformers, Canadian General Electric Company, \$795.00; meters, Ferrante, Limited, \$632.00; lathe, General Supply Company, \$198.00; hardware, Thos. Birkett & Son Company, 144.93; arc lamp carbons, Engineering Equipment & Supply Company, \$741.71; Insulators, Canadian General Electric Company, \$66.00; arc lamp globes, Garrioch, Godard & Company, \$139.12; locust toppins, Canadian General Electric Company, \$37.00; tape, Canadian General Electric Company, \$88.00; large split knobs, Canadian General Electric Company, 9.00; porcelain insulator knobs, Canadian General Electric Company, \$15.50; portable meters, Dawson & Company, Limited, \$124.90; motor, Garrioch, Godard & Company, \$141.00; switch board panels and regulators, Canadian General Electric Company, 1,000.00.

Garrioch, Godard & Company have been awarded the contract for Sunbeam lamps at \$1,440. The Sunbeam Incandescent Lamp Company also tendered at the same price. For wire the lowest tenderers were Garrioch, Godard & Company, and the Canadian General Electric Company, each for \$1,584.00. The contract has been divided between Garrioch, Godard & Company

(Continued on page 30)

Tenders and For Sale Department

Tenders for Pipe and Water Connections

Sealed tenders will be received by the City Clerk, Brandon, Man., until 12 o'clock at noon on FRIDAY, THE FIRST DAY OF APRIL NEXT, for the supplying of

About from 100 to 200 tons of Cast Iron Pipe and Specials;

About 8,000 feet each of 10-inch and 12-inch Sewer Pipe;

Also brass goods for water connections etc. All tenders to be f.o.b. Brandon, Man.

The lowest or any tender not necessarily accepted.

Further particulars and specifications can be obtained at the City Engineer's office.

R. E. SPEAKMAN,
City Engineer,
Brandon, Man.

13



Supply of Steel Pipe

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on APRIL 5TH, 1910, for the supply of one thousand feet of rivetted steel pipe, seventy-two inches in diameter, and also twenty flexible joints.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto, and at the office of the Canadian Engineer, at B33, Board of Trade Building, Montreal.

The usual conditions relating to tendering as prescribed by City By-Law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman, Board of Control.

City Hall, Toronto, March 18th, 1910. 13

Town of Weyburn Province of Saskatchewan

WATER WORKS AND SEWERAGE WORKS

Sealed tenders will be received by the Secretary-Treasurer of the Town of Weyburn, until 8 p.m. on WEDNESDAY, APRIL 27TH, 1910, for the following works:—

Contract "A"—Pipelining on the Sewerage System.

Contract "B1"—Water Works Pump House.

Contract "B2"—Power House.

Contract "F"—Mechanical Water Filters.

Contract "G"—Water Works Pumping Machinery.

Contract "S"—Sewer Pipes.

Contract "W"—Furnishing Wooden Stave Pipes.

Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at the office of the Chief Engineer Toronto and Winnipeg, and at the Town Hall, Weyburn.

R. H. SMITH Esq., M.D.
Mayor, Weyburn, Sask.

GEO. ROSS, Esq.,
Secretary-Treasurer,
Weyburn, Sask.

WILLIS CHIPMAN C.E.,
Chief Engineer,
Winnipeg and Toronto.

13

Plant for Sale

For Sale:—The following Second-Hand Plant, located at Durham, Ont., or portion thereof. The whole lot at a reduced price.

25 No. 3 American, square pan, wooden hub, Wheel Scrapers.

28 No. 3 K. & J., round pan, iron hub, Wheel Scrapers.

6 No. 3 Western, square pan, with doors, Wheel Scrapers.

7 No. 2, K & J, round pan, iron hub improved, Wheel Scrapers.

55 Doors and Gates, for No. 3 Wheel Scrapers.

27 Slush Scrapers.

15 Light and Heavy Plows.

Located at Three Rivers, Que.

One Large Travelling Clam Shell Derrick.

One Steam Pile Hammer (Cram Patent), with Steam Hose.

One Thomas Automobile (Model 31), 60 h.p., thoroughly overhauled and painted; location, Toronto.

THE RANDOLPH MACDONALD CO., LIMITED,
14 Crown Life Building, Toronto, Ont.

Town of Weston Province of Ontario

Water Works

Sealed tenders will be received by the Village Clerk until 8 p.m. on MONDAY, APRIL 18TH, 1910, for the following works:—

Contract "B"—Pump House.

Contract "F"—Mechanical Water Filters.

Contract "G"—Electrically Operated Pumping Machinery.

Plans and specifications may be seen at the office of the Chief Engineer, Mail Building, Toronto, or at the Town Hall, Weston.

R. J. BULL, Esq., J. H. TAYLOR, Esq.,
Mayor, Clerk,
Weston, Ont.

WILLIS CHIPMAN Chief Engineer,
13 204 Mail Building, Toronto, Ont.

Town of North Battleford Province of Saskatchewan

WATER WORKS AND SEWERAGE WORKS

Sealed tenders will be received by the Secretary-Treasurer of the Town of North Battleford until 8 p.m. on TUESDAY, APRIL 19TH, 1910, for the following works:—

Contract "A"—Pipelining, Waterworks, and Sewers.

Contract "D"—Cast Iron Water Pipes.

Contract "E"—Fire Hydrants, Vales, etc.

Contract "L"—Concrete Reservoir.

Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at the office of the Chief Engineer, Winnipeg and Toronto and at the Town Hall, North Battleford.

J. A. FOLEY, Esq., S. COOKSON,
Mayor, Secretary-Treasurer,
North Battleford, Sask.

WILLIS CHIPMAN, C.E.,
Chief Engineer,
Winnipeg and Toronto.

13

TENDERS

Sealed tenders addressed to either of the undersigned and marked "Tender" will be received until noon on WEDNESDAY, APRIL 6TH, 1910, for the building of Concrete Abutments and Floor for a Steel Bridge to be erected over the Sydenham River between the Townships of Moore and Sombra.

Plans and specifications can be seen at the office of the undersigned, and also at the office of Bell & McCubbin, Civil Engineers, St. Thomas. A marked cheque for \$200.00 must accompany each tender.

T. H. HOLMES,
Colinville, Ont.
NEIL MCGUGAN,
Wilkesport Ont.

March 18th, 1910. 13



Temiskaming and North- ern Ontario Railway Commission

Sealed tenders addressed to the undersigned, will be received up to 12 o'clock noon, on WEDNESDAY, APRIL 6TH, for the following:—

(A) All the works required in connection with construction of abutments to bridge at M. P. 48.91. Tenders to be marked on the envelope, "Tender for Abutments."

(B) All the works required in connection with construction of substructure of steel trestle for Wabigoon River, M. P. 119.13. Tenders to be marked on envelope, "Tender for Substructure of Steel Trestle Spans."

Plans and specifications may be seen, and forms of tender procured, at the office of the Secretary-Treasurer, 25 Toronto Street, Toronto, and at the office of the Chief Engineer, North Bay.

Certified cheque on a chartered bank of Canada for the sum of \$200.00, must accompany tenders A and B, and the successful tenderer must also enter into an agreement satisfactory to the Commission for the due execution of the said works, and to furnish additional security for the due performance of contract in the sum of \$400.00 in each case.

The lowest or any tender not necessarily accepted.

A. J. McGEE, Secretary-Treasurer,
25 Toronto Street, Toronto.

Toronto, March 17th, 1910.

Papers inserting this advertisement without authority, will not be paid for same. 13

Positions Wanted

CONCRETE WORK.—A good man, well up in the business, thoroughly understands plans, handling men and getting results, and a hustler, is open for a change, or would take contract, any town. Box 949, Contract Record, Toronto. 14

Miscellaneous

WANTED TO FORM PARTNERSHIP with a practical contractor, or one who wishes to enlarge and needs more financial assistance. Apply Box 952 Contract Record, Toronto. 14

The City of Calgary

Tenders will be received by the City Commissioners up to and including APRIL 22ND, 1910, at 4 o'clock p.m., for supplying the City of Calgary with the following material:

Salt Glazed, Vitrified Clay Sewer Pipe, according to specifications to be furnished by the City Engineer. Tender to state price, f.o.b. Calgary.

A marked cheque for \$100 to accompany each tender.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,
City Clerk.

Dated at Calgary March 17th, 1910.

16

Tenders

Toronto General Hospital

Tenders will be received by the undersigned up till noon, the 3RD APRIL next, for the excavation of Basement and Foundations of the Main Building, Toronto General Hospital, College street.

Plans and specifications may be seen at the office of the architects.

The lowest or any tender not necessarily accepted.

DARLING & PEARSON,
2 Leader Lane.

County of Victoria

Tenders for

Steel Bridge Spans

Tenders, so marked, will be received by the undersigned until WEDNESDAY, APRIL 13TH, 1910, for the supply and erection of two (2) Steel Bridge Spans of sixty (60) feet each over all for a bridge in two parts separated by a fill of about 100 feet, across Little Bob River, near the Village of Boicaygon.

The spans are to be of sufficient width to provide a clear fourteen (14) feet roadway, unobstructed, to be constructed for the reception of a concrete floor and in all respects to conform to the Ontario Government specifications, 1909.

The tenders are to include the supply of wire bonding for the concrete floor, of corrugated steel and of approved strength.

Tenderers are to furnish with their tenders plans of the spans, with all requisite details, and certified by the Department of Public Works of Ontario.

Further particulars on application.
No tender necessarily accepted.

J. R. McNEILLIE,
County Clerk.

Lindsay, March 26th, 1910.

14

Township of East Zorra

Tenders Wanted

Tenders will be received by the undersigned up to 3 o'clock p.m. of MONDAY, APRIL 11TH 1910, for the erection of a Steel Bridge and Concrete Abutments therefor, in the Township of East Zorra, Oxford County, Ont., bridge to be 70 feet long over all and 14 feet clear width, with concrete reinforced floor, and guaranteed to carry a moving load of 15 tons. Tenderers to furnish plan and short specification of proposed work and may offer for the whole work or for erected bridge, or for abutments, or for floor only. For further particulars apply to

JAMES ANDERSON,
Clerk, East Zorra,
Hickson P.O., Ont.

14

Tender

City of Moose Jaw, Sask.

Sewer Construction

Sealed tenders, addressed to the undersigned and endorsed "Tender for Sewer Construction," will be received until 3:30 p.m. on MONDAY, APRIL 11TH, 1910, for Trenching and Laying 7,100 Lineal Feet of 10 inch and 12 inch Sewer Pipe.

Plans and specifications may be seen at the office of Angus Smith City Engineer. The lowest or any tender not necessarily accepted.

W. F. HEAL,
City Clerk.

Moose Jaw, Sask., March 19th, 1910.

13

Toronto Board of Education

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received until MONDAY NOON, APRIL 4TH, 1910, for the several trades required in the enlargement of Balm Beach School.

Plans and specifications may be seen and all information obtained at the offices of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in the said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, Chairman of Committee.
W. C. WILKINSON, Sec.-Treas.

13

TOWN OF DUNNVILLE

Province of Ontario

Notice to Contractors

Sealed tenders will be received by the Town Clerk until 3 p.m. on TUESDAY, APRIL 19TH, 1910, for the following works:

- For constructing Sewage Pumping Station.
- 3,000 feet of wrought iron pipe, and brass valves.
- Laying of the above for Compressed Air Line.
- Air Compressors.
- 400 manhole steps.

No tender necessarily accepted.

ROBT. BENNET, ESQ., J. W. HOLMES, ESQ.,
Mayor, Dunnville, Ont. Town Clerk,
Dunnville, Ont.

WILLIS CHIPMAN,
Chief Engineer, Toronto, Ont.



Tenders for Pipe Laying, etc.

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to TUESDAY, APRIL 5TH, 1910, for the supply of 16-inch special castings, kerbs, and pipe-laying for the season of 1910.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.

City Hall, Toronto, March 22, 1910.



Tenders for Steam Heating System

Tenders addressed to the undersigned will be received by registered post only, up to 12 o'clock noon on TUESDAY, APRIL 5TH, 1910, for the complete supply and installation of a low pressure steam heating system in St. Lawrence Hall.

Copy of specifications may be seen and tender form obtained, together with all information relative thereto, at the offices of the Property Department, City Hall, Toronto.

The usual conditions pertaining to tendering, as prescribed by city by-law, must be strictly complied with, and envelopes containing tenders must be plainly marked on outside as to contents.

The lowest or any tender not necessarily accepted.

G. R. GEARY, K.C. (Mayor),
Chairman Board of Control.

City Hall, Toronto, March 21st, 1910

The City of Calgary

Tenders will be received by the Commissioners of the City of Calgary up to and including the 22ND DAY OF APRIL, 1910, at 4 o'clock p.m., for the construction of the following works, according to plans and specifications to be furnished by the City Engineer.

Five miles of sewer, including pipe.
Three miles of water mains, city supplying pipe.

A marked cheque for \$500 to accompany each tender.

A bond of maintenance for one year signed by a satisfactory surety company to be delivered when work is completed.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,
City Clerk.

Dated at Calgary, 15th March, 1910.

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Business Notes

Rodier & Drolet, electricians, Montreal, Que., have dissolved.

Hotte Foisey & Company, contractors, Montreal, Que., have dissolved.

Tobermory Lumber Company, Tobermory, Ont., is stated to have assigned.

Dolmer & Bennett, contractors, Winnipeg, Man., are stated to have dissolved.

Corey & Campbell, Bedford, Que., sash and door manufacturers, have dissolved.

A. King & Company, contractors, Montreal, Que., A. King & D. Williams, registered.

Thomas MacKarell & Company, lumber merchants, Montreal, Que., have dissolved partnership.

Martin & Tremblay, plumbers, Montreal, Que., Joseph A. Martin and Arthur Tremblay, have registered.

Power Plants, Electricity and Telephones

(Continued from page 27)

and the Canadian General Electric Company, one-half to each.

St. Thomas, Ont.

The power committee awarded the contract for general supplies to Ingram & Davey at \$1,561.44. James Gardiner, Jr., Company, of Bolivar, Penn., received the contract for a new gas bench at \$495. The tender of Parker, Russell Company, of St. Louis, was for \$624. The Wartschore Foundry Company, of Hamilton, and the Canada Foundry Company, of Toronto, offered to furnish 30,000 tons of cast iron pipe at \$34 and \$34.50 per ton respectively. The former company secured the contract.

Miscellaneous

Kelowna, Man.

On March 30th the ratepayers will vote upon bylaws to borrow \$30,400 for the rebuilding of the power house, destroyed by fire last June and \$10,000 for an extension of the waterworks system.

London, Ont.

The cement contract was awarded to W. Hraman & Son for \$1.59 a barrel. The next lowest tender was \$1.75.

Montreal, Que.

Recent building permits include: Alph. Masse, 424 Cuvillier street, house containing two dwellings, \$2,000; Jos. Jeannette, 62 St. Edward, house containing three dwellings, \$3,000; J. L. Rinfret & Company, 834 Papineau avenue, house containing five dwellings, \$4,000; Henri Pelodeau, 2238 Park avenue, two houses containing six dwellings, \$12,000; A. Cadieux, 1277 St. Dominique street, three houses containing nine dwellings, \$8,000; M. Larese & Company, 1169 Simard street, house containing three dwellings, \$4,000; George S. Gordon, 574 Clark street, house containing three dwellings, \$4,500; J. A. Jarry, 817 Boulevard St. Joseph, two apartments containing thirty-two dwellings, \$40,000; A. Filatraux, St. Rose street, Maisonneuve, house containing three dwellings, \$3,500; E. Paquin, Cote des Neiges, house containing three dwellings, and one store, \$4,000; G. Guindon, 213 Iberville street, house containing three dwellings, \$3,000; M. Workman, 326 Notre Dame street west, alterations to dwelling, \$2,500; Montreal Street Railway, Craig street west, alterations to building, \$6,000.

Nanaimo, B.C.

Among the estimates for the present year, the sum of \$6,667.20 is available for roads, streets, bridges and other works.

Ottawa, Ont.

The Department of Public Works will send engineers to survey the proposed new route of communication between Montreal and Lake Champlain and thence by the Hudson to New York.

Tenders addressed to N. Tesier, secretary, Department of Public Works, will be received until April 12th for dredging required in Cobourg, Goderich, Kincardine, Sault Ste. Marie, etc. Specification on application to the above mentioned.

Contracts for supplies were awarded to the following: For Sand—Louis Cousineau & Baptiste St. Jean, 87 cents per cubic yard. Cement—H. Dupuis & Son 45 1-2 cents per 100 lbs. Broken Stone—The Fleming Dupuis Supply Company, bulk, \$12.510. Vitriified Clay Pipe—T. Sidney & Company, Scotch pipe on price list, 72 per

cent. Stone Setts—T. Sidney Kirby & Company, ordinary block, \$65 per thousand; track block, \$75 per thousand. Brick—The Peerless Brick & Tile Company, \$8.30 per thousand. Plank and Cedar—W. H. McAuliffe, \$11,360. Asphalt—Referred to city engineer for report. The following is a list of details of accepted tenders for supplies: Broken Stone—The Fleming Dupuis Supply Company—1,000 tons limestone, quarry debris, 85 cents per ton; 1,000 tons limestone, run of crusher, 2 1-2 inch and under, \$1.20 per ton; 4,000 tons broken limestone, 2 inch to 3-4 inch, \$1.40 per ton; 1,000 tons broken limestone, double screened, not exceeding 5-8 inch and under, \$1.81 per ton; 500 tons fine limestone, 5-8 inch and under 90 cents per ton; 1000 tons Nepean sandstone 5-8 inch and under, \$2.60 per ton. Vitriified Clay Pipe—T. Sidney Kirby & Company—Straight pipe, per foot 4-inch, 20 cents; 6-inch, 30 cents; 9-inch, 60 cents; 12-inch, \$1.00; 15-inch, \$1.35; 18-inch, \$1.70; 24-inch, \$2.5. Single junction, 3 feet long, 4-inch, 1.10; 6-inch, \$1.65; 9-inch, \$3.30; 12-inch, 5.50; 15-inch, 7.45; 18-inch, \$9.35; 24-inch, \$17.88. Bends and curves, per foot, 4-inch 65 cents; 6-inch \$1.10; 9-inch, \$2.40; 12-inch, 4.00; 15-inch, 5.40; 18-inch, \$6.80; 24-inch, \$13.00. Stoppers, 4-inch, 7 \$6.80; 24-inch, \$13.00. Stoppers, per foot, 4-inch, 7 cents; 6-inch, 10 cents; 9-inch, 20 cents; 12-inch, 33 cents; 15-inch, 45 cents; 18-inch, 57 cents; 24-inch, 1.08. Slants, per foot, 4-inch, 30 cents; 6-inch, 45 cents; 9-inch, 90 cents; 12-inch, \$1.50; 15-inch, \$2.00; 18-inch, \$2.55; 24-inch, \$4.88. Discount allowed on above price list—72 per cent.

Building permits were issued as follows: F. Hassell, 1937 Sixth avenue east, \$2,200; J. M. Clark, 568 Twelfth avenue east, \$2,000; T. Booker, 510 Tenth avenue east, \$2,500; J. Burmeister, 3022 Glen drive, \$1,700; A. E. Littler, 558 Thirteenth avenue west, \$2,500; Union Bank, Cordova street, \$12,500; E. Urquart, 2373 First avenue west, 4,000; C. Tullidge, 1946 Sixth avenue west, \$2,700; Western Home & Improvement Company, Charles street, between Park and Salisbury, five houses, 12,500; C. A. Gilbert, 1465 Broadway west, \$12,000; C. Godfrey, 1175 Eleventh avenue west, \$4,500; A. M. Sharp, 1870 Pendrell street, 2,500; W. J. Latimer, 2065 Hastings street, \$2,200; C. Carmworth, 356 Fifteenth avenue west, \$4,000; Lewis & Marshall, 235 Fourteenth avenue west, 3,800; M. R. Cochran, 1137 Tenth avenue east, \$2,200; Geo. Davidson, frame dwelling, 648 Victoria drive, \$4,500; Ramsay Bros., frame addition, Powell street, \$4,000; P. W. Bell, frame dwelling, 1346 Twelfth avenue, \$3,800; H. O. Hatt & Company, 636 Tenth avenue west, two houses, \$8,000; Crowe & McDonald, 3230 Point Grey road, \$2,800; T. Hewton, 1117 Tenth avenue east, \$2,200; A. Whiteside, 2705 Scott street, \$2,000; M. Currie, 1556 Graveley street, \$3,000; Capt. Capp, 1110 Victoria drive, \$8,000; M. Carscallen, 1576 Napier street, \$2,700; Mrs. Kidd, 1944 Barnard street, 2,500.

Prince Albert, Sask.

Manville & Company were awarded the contract for cement at \$2.98 a barrel; Agnew Bros. the contract for nails; the American Sewer Pipe Company the contract for sewer pipe, and the J. Morrison Brass Company, of Toronto, the contract for fittings.

Regina, Sask.

The following bylaws were carried: Market building, \$16,000; Albert street subway, \$41,000; waterworks extensions, \$10,000; sewerage extensions, \$10,000; exhibition grounds improvements, \$25,000.

Sydney, N.S.

It is learned that the Sydney Cement Company has completed a contract to supply the Dominion Iron & Steel Company with 12,500 barrels of cement, the Steel Company retaining the option to increase that amount to 25,000 barrels within the year. Sydney Pressed Brick Company have also secured a large order from the Steel Company.

Woodstock, Ont.

Tenders addressed to G. C. Eden, city treasurer, will be received until April 6th for the following long term debentures:—\$27,500 4 1-2 per cent. light and power, due December 30th, 1938; \$7,000 4 1-2 per cent. consolidation debentures, due November 30th, 1939; \$3,000 4 1-2 per cent. park debentures, due December 31st, 1949. John Morrison, city clerk.

Welland, Ont.

Tenders will be received until April 7th for \$115,242 four and a half per cent. 10, 20 and 30 year debentures. J. Hamilton Bugar, treasurer.

Winnipeg, Man.

The fire and water committee recommended that tenders be called for a motor hose wagon for the high pressure area of the city.

J. Sveinsson has secured a permit for the erection of a three storey apartment block on the northeast corner of Argyle and Sutherland. Cost \$35,000. Other permits include: Forrester & Cook fur factory, east side Fort, between Portage and Granville, six storeys high, 25,000; Manitoba Gypsum Company, two dwellings, east side Dundas, between Alberta and Geneva, \$2,000; R. M. Mills, two dwellings, north side Alexander, between Keewatin street and Worth \$3,600; Mrs. T. Munro, dwelling, south side Dorchester, between Stafford and Harrow, \$4,000; A. G. Davidson, house, north side Rosedale, between Pembina and Nassau, \$2,500; W. W. Fleming, dwelling, Chestnut street, between Buell and Ida, \$10,800; F. S. Parlu, dwelling, Dunderin avenue, between Walnut and Maryland, \$6,500; F. E. Smith, dwelling, Maplewood avenue, between Pembina and Hay street, \$4,000; T. Crone, dwelling, Rosedale, between John and Nassau, \$2,500; H. Halderson, dwelling, Aubrey street, between Portage avenue and River avenue, \$3,000; John Lenius, dwelling, College avenue, between Powers and Andrews, \$2,000.

AWARDED.

Vancouver, B.C.

The contract for the protection of the Pitt Meadows Land was awarded to the Vancouver firm of Ironside, Rannie & Campbell, for 100,000.

Victoria, B.C.

The city council have awarded contracts for material for road and sidewalk work as follows: Filling sand and 20 per cent. of the gravel to the Lineham-Scott Sand & Gravel Company, and the balance of the gravel to the Royal Bay Company. The Lineham company tenders for filling at 88 cents and sand at \$1.08 per yard and gravel at \$1.35. The Royal Bay Company will supply gravel at \$1.15 per yard.

Waterloo, Ont.

The town council awarded tenders for the construction of the new market building and decided to authorize the issue of debentures to raise the sum of \$6,000 for improvements and extensions in connection with the waterworks plant and \$5,000 for extensions and laying of gas mains.

C. Larin & Company, painters, Montreal, have dissolved.

Contract Record

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Municipal Progress, Advance Information

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Toronto March 30, 1910

No. 13

Civic Improvement at Toronto

The time seems opportune for the appointment of a special commission to do something for the improvement and beautification of the city of Toronto. There has been considerable discussion along this line in recent years, and most people seem to be alive to the fact that the city lends itself exceptionally to artistic and enlightened improvement planning — moreover, several interesting schemes have been put forward, but the fact remains that very little has been done and the seasons come and go with practically nothing accomplished. An object of this kind should appeal to a young and energetic man like Mayor Geary.

An example was provided recently by the city of Montreal, which endorsed the proposal of the City Improvement League to apply to the Quebec Legislature for the appointment of an independent commission of five members to work for the improvement of the city and district, for the provision of better means of street communication and transit, and for laying out suitable parks and recreation grounds. This new board will be known as the Metropolitan Parks Commission. Not that the name means much. The point is that the city will have a properly constituted and financed body striving not only for a "Greater" but for a "Better" Montreal, under a concerted system of development.

Without considering the efforts that are being expended in this direction across the border, and to go farther afield for another recent example we have the action of the French Parliament in passing a bill authorizing the city of Paris to contract a loan of no less than \$180,000,000 for the embellishment and sanitary im-

provement of Paris. The programme submitted in this connection is one of the most ambitious ever considered. Nearly \$20,000,000 will be appropriated for the improvement of school buildings; large sums will be spent in the paving of streets and promenades; municipal buildings will be repaired or rebuilt; old buildings will be demolished to make room for new structures, and streets of squalid, unsanitary buildings will give place to flower-ing gardens and waving grasses.

It would not be necessary for Toronto to involve itself to this extent. Neither perhaps would it be advisable to undertake the work with any lofty scheme in view, but certainly a commission should be appointed to give some consideration to the matter.

Municipalities Waste Valuable Time

It is to be hoped that the municipalities which have sewer, paving or other street work, or public buildings in view, will take time by the forelock and dispose of all possible preliminaries before the active construction season is very far advanced. Every year it is the experience of some communities to have the first half of the season wasted in the preliminaries which ought to have been done during the winter. Dilatoriness of this kind is the bane of municipal contractors. Tenders should be asked ahead of time to afford the proper opportunity for carrying out the work satisfactorily and reduce the risk and annoyance attendant upon "scampering."

Proposed Standard for Cast Iron Pipe

The Gartshore-Thomson Pipe & Foundry Company, Limited, Hamilton, Ont., write: "In our opinion the question of having a standard specification for cast iron pipe is a matter for the engineers to decide."

The National Iron Works, Limited, Toronto, Ont., write us as follows: "The standardization of cast iron pipe would be of direct benefit both to engineers and manufacturers, but would require the absolute co-operation of both parties to be a success. The American Waterworks Association have drawn up a specification which should be satisfactory to the most exacting engineer."

One of our leading city engineers writes:

"My opinion is that a standard specification is desirable, and would lead to economy in the production of pipe. It will, however, be necessary that the manufacturers consent to, and be in full sympathy with any specification adopted by the Canadian Society of Civil Engineers, before the same can become universally adopted. It is the intention of the Canadian Society of Civil Engineers to endeavor to arrive at a thorough understanding with the manufacturers before deciding upon a standard specification. Though the arrangement of a standard seems a simple matter, it was a great many years before the various societies in the United States could agree. In fact, there are still, I believe, two 'standard' specifications in use there."

Rural Sewage Disposal and Water Supply

A Simple, Safe and Sanitary Manner of Disposing of Domestic Sewage—Description of Pneumatic System of Water Supply

In the matter of public sanitation, the question of disposing of sewage in small towns and villages, as well as in less populated districts, where by reason of its great cost a general system of sewerage is impossible, is daily becoming of greater importance, and as the title of my paper would indicate, that is the phase of the question with which I propose to deal. The system to which I intend to refer is known as the septic tank system, and I believe that nearly all who have studied it are agreed that it is at once the most natural, most

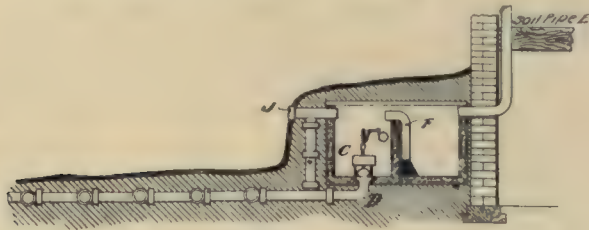


Fig. 1

scientific, simple and economical system in use to-day. and speaking from a personal knowledge of scores of these systems, I am in a position to say that it is worthy of all the good things that are said about it. I have prepared a few sketches by means of which the fundamental principles that govern it may be the more easily understood, for the benefit of those who may be in need of information on the subject, and in order to emphasize the necessity of carrying out every detail in constructing a system as hereafter described. It is a matter of common knowledge that living earth—or top soil—is a powerful purifying agent, but comparatively few are aware that the presence in it of countless numbers of bacteria, or microbes, is alone responsible for the chemical changes brought about in waste matter placed beneath its surface, and that these bacteria, through their action, not only remove and destroy the dangerous properties of such waste matter, but actually convert them into plant food, which, being taken up by

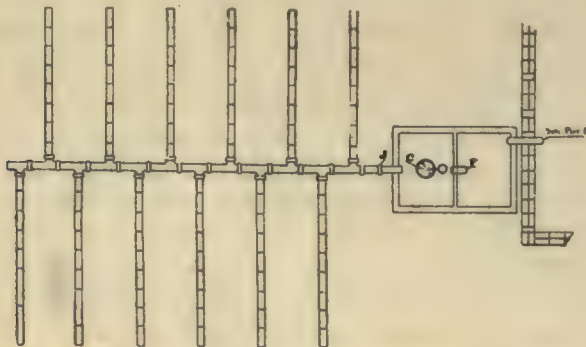


Fig. 2

the vegetation, is again consumed for the sustenance of life.

Pasteur divided these microbes into two classes, viz., anaerobes, or those which lived apart from air, and derive

their oxygen from decaying compounds, and aerobes, or those which require plenty of fresh air for their development, and as both classes are considered necessary for the complete reduction of waste matter, it will be seen that if sewage is placed too deeply in the earth, as, for instance, in a cesspool, where, owing to the absence of air, the necessary aerobic bacteria cannot exist, it may pass down deeper in a putrid state, and finding its way to the water supply, not infrequently results in an outbreak of typhoid fever or some other intestinal disease. The two classes of microbes referred to have properties somewhat differing from each other, but the net result of their work under proper conditions is the breaking down of the solids in the sewage, the disintegrating of its constituents and the conversion of the whole into liquid and gases, in which form it leaves the septic tank, the former to be distributed under the surface of the earth, where by reason of its contact with free oxygen, bacterial life is most active, there to be still further reduced and finally converted into nitrates, which are readily taken up by the vegetation on the surface, and

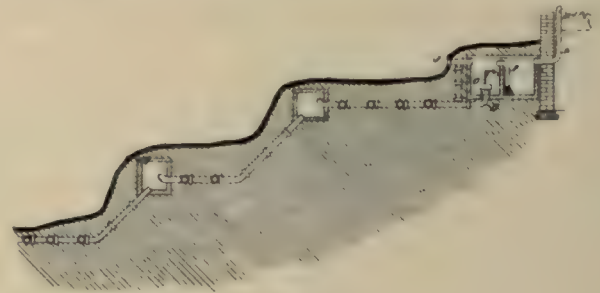


Fig. 3

the latter passing up high into the air, as hereafter described. With this brief reference, then, to the principles of the system, I propose to indicate how it should be constructed.

In fig. 1 is shown a section of a complete system built on level ground, with the tank placed close to the wall of the building—where, in fact, the large majority of those now in use are located. The tank should be built of brick or stone, laid in and lined with cement, or of solid concrete, the main object being to have it impervious to moisture. It will be noticed that the tank is divided into two compartments, an overflow pipe "F" being built into the dividing wall, the mouth of the said overflow being within seven or eight inches of the bottom of the tank, and being covered with a wire screen about the size of an ordinary pail, the mesh of which screen not exceeding three-quarters of an inch.

The main soil pipe is represented by "E" and should be directly connected with the closet, bath, sink, etc. It extends from the same compartment in which the overflow is placed, to a point two or three feet above the roof, acting not only as a conductor of sewage to the tank but also as a channel by which any gases in excess of those in solution may pass out to the atmosphere at a height which renders it impossible for them to inconvenience the occupants of the building. "J" in the second compartment admits fresh air, which passes free-

*Paper read before the Central Railway and Engineering Club, by Mr. M. J. Quinn, Manager of the National Equipment Company, Toronto.

ly over the centre partition—spaces being left in the top of the latter for the purpose—and up through the soil pipe to the roof. In the centre of the second compartment is placed an automatic valve, "C," which is caulked into a four-inch cast iron bend, as ordinarily used by plumbers, and which is securely built into the bottom of the tank during its construction. The top of the hub of the bend is usually left slightly lower than the level of the floor of the tank. From the said iron

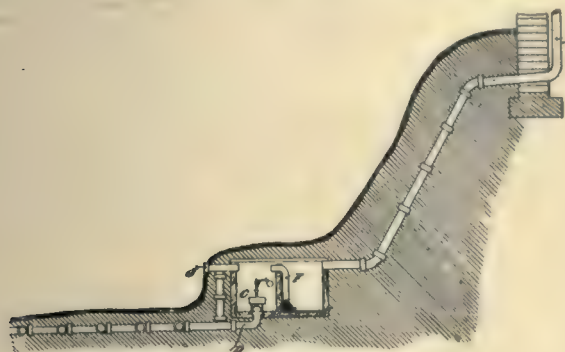


Fig. 4

bend is run a line of glazed tile pipe, four inches in diameter, having a connection with the fresh air pipe, for the purpose of ventilation, and a number of openings placed at intervals of two feet or more, from which are run branches of four-inch field tile with loosely butted joints.

Fig. 2 shows a plan of the whole system and illustrates one way in which the tile may be laid, though as will be manifest, they would do equally well if all laid on one side of the main carrier in any number of branches, of any length, providing a sufficient number in the aggregate are laid, and the rows are not placed closer together than two feet in light soil, and a somewhat greater distance in heavy soil. The field tile should not be placed more than one foot below the surface, and must be perfectly level, for the reason that if given a fall the earth surrounding the low ends of the system would

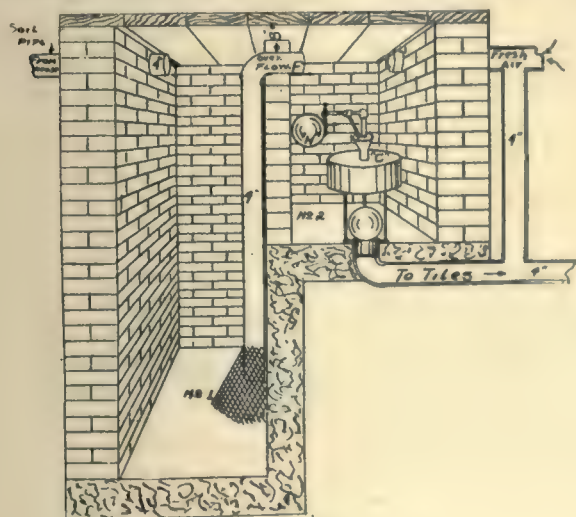


Fig. 5

receive more than its share of liquid sewage, and might in time become fouled. While, if level, the earth surrounding every tile has an equal amount of work to do, and will produce most satisfactory results.

Briefly, then, the operation of the system is as follows:—

The sewage from the building enters through soil pipe "E," filling the first compartment, in which all

solid matter is retained until it is reduced by the contained bacteria, which multiply and develop very rapidly. In a liquid form it is allowed to enter the second compartment through over-flow "F," which is turned down because of the presence of the bulk of the organic matter in suspension on or near the surface. When the liquid has risen in the second compartment to the height at which the unlocking float on the valve has been set, the valve automatically opens and discharges the contents of that compartment, be it 50 or 1,000 gallons, into the system of field tiles, through which it percolates into the surrounding earth, to be taken care of by nature as already described. The valve is made to discharge liquid sewage at a maximum depth of 24 inches, and a minimum depth of 17 inches, and the top or unlocking float may be set at any point between these two levels. As the tank takes from 12 to 24 hours to fill, it will be obvious that there will be abundance of time in which the water in the tiles may soak away before it again discharges. To prevent the gases of decomposition escaping through other than the proper channel, the tank must be covered first with rough plank, and then

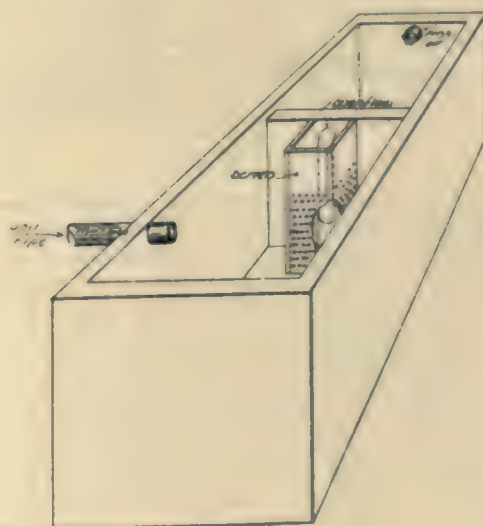


Fig. 6

with five or six inches of earth, which, in turn, if desired, may be sodded over. In figuring out the size of tank necessary, the following may be taken as a safe rule, viz.: for every occupant of a private house or hotel, allow three cubic feet of space in each compartment, while for a school or factory, where, as in the case of a house, nothing but domestic sewage is to be treated, one-third less space will be sufficient, and for every cubic foot in one compartment (or one-half the tank) lay 18 feet of four-inch field tile. It will be obvious that, as in the case of ordinary stable manure, human excreta, if deposited in its solid state just below the surface of the earth, would entirely disappear in a very short time, and the system just described is merely a most convenient and sanitary way of automatically accomplishing that very desirable result, and the accompanying advantage of not only depositing it in the earth partially treated, but in a much more favorable condition to receive final treatment than could possibly obtain if the former method were adopted.

Anticipating the difficulty which will be encountered where there is a considerable fall in the ground surrounding the building to be drained, I would refer you to fig. 3, which shows a number of terraces each receiving a portion of the effluent from the tank. It will be noticed that the end of the glazed tile is turned up a few inches on

the brow of each terrace, the result of which arrangement being that all the field tiles at each level will fill before the sewage can rise and overflow to the tiles on the next lower level, where the same operation takes place, and so on for any number of terraces, and as will be apparent, the sewage passing into the tiles on a high level cannot possibly escape to those lower down, so that the earth surrounding every tile will have its full complement of work to perform.

Fig. 4, the horizontal scale of which is somewhat exaggerated, shows the proper relative position of the tank to the house where the field tiles have to be placed on a level considerably below that on which the building

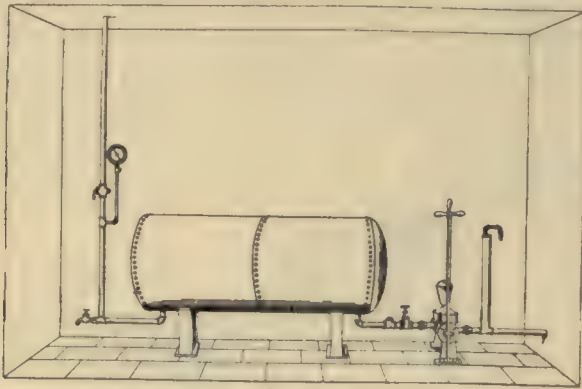


Fig. 7

stands. In such a case it will be evident that were the tank placed on the high level, the discharge would come down with sufficient velocity to wash out both earth and tiles, while the discharge from the house to the tank, as shown, will not have any injurious effect on the latter. It sometimes happens, where large tanks are required, as, for instance, in schools, factories, etc., that ground room is limited and it would prove difficult to install a tank of the proper cubical contents and a maximum depth of not more than three feet. In such a case it is permissible to build compartment No. 1 as deep as five or six feet, giving it the same cubical area as No. 2, which, however, in no case should exceed three feet in depth, such an arrangement is shown in fig. 5, which also shows that the overflow pipe is carried to a point as near the floor as it would be if the tank were shallower.

The arrangement of the overflow screen, shown in fig. 6, has proven to be a very satisfactory one. As will be plain, it is merely three pieces of board, which, with the cement partition, make a box about ten or eleven inches each way inside. It is closely perforated with $\frac{3}{4}$ -inch holes up to a height of about eighteen inches, and is secured in place by a couple of pieces of wood reaching to the opposite side of the tank. It has the advantage of longer life than the wire screen and of being easily removed should occasion at any time require it.

In answer to a question which arises in the minds of most people who have given consideration to the system, I may say that it will not freeze in winter, even when the frost penetrates the ground for several feet every where except where the tiles are laid.

In conclusion I would simply refer to a few of the principal points which should be kept in mind in constructing such a system, viz.:

Have the tank covered with a few inches of earth, to prevent the escape of gases, except through the soil pipe stack. See that the valve discharges at least once before the tank is covered in. See that no trap is placed on the main soil pipe to prevent the free passage of air across the tank and up to the roof, and that the neces-

sary space for the air is left in the top of the centre partition; and, finally, take care that no disinfectants or chemicals of any kind are allowed to enter the tank, if the life of the bacteria, upon which the system depends for its success, is to be preserved.

Water Service Systems for Rural Homes, Institutions, etc.

As has already been noted, the tendency on the part of those living beyond the confines of thickly populated districts to demand facilities for the promotion of both comfort and health equal to those, which, until comparatively recent years, have been enjoyed only by those living in large cities, has been annually increasing, and to such an extent has success crowned the efforts of those who set about devising methods by which these very reasonable demands might be satisfied, that it may be safely said that in respect to sewage disposal, water supply, artificial lighting, etc., the rural resident may enjoy at no great cost all of the advantages possessed by urban residents.

The question of sewage disposal having been dealt with, a brief description of the most approved and up-to-date method employed to provide a first class water service system may not be out of place, and I present further illustrations, with the assistance of which the theory of what is known as the pneumatic water system is clearly demonstrated. Until very recent years, where any attempt was made to introduce a water supply into a building, where a regular water service was not available, it was the practice to erect a reservoir on the top of either a house or barn, or else on the tower of a wind-mill, or on one built especially for the purpose. This method, however, had many inherent disadvantages, among which were the absence of reasonable pressure, the effect of the atmospheric temperature during both winter and summer—particularly where the tank was placed in the house or barn, of birds, bats, vermin, etc., being drowned and contaminating the supply, not to speak of the constant contact of the water with dust, bacteria, and bad odors. Another important drawback was the liability to leakage, and the consequent damage where the tank was placed under the house roof, to plaster and decorations below. Then, again, special protection had to be made for carrying the sometimes enormous weight of water stored in large tanks. All of these diffi-

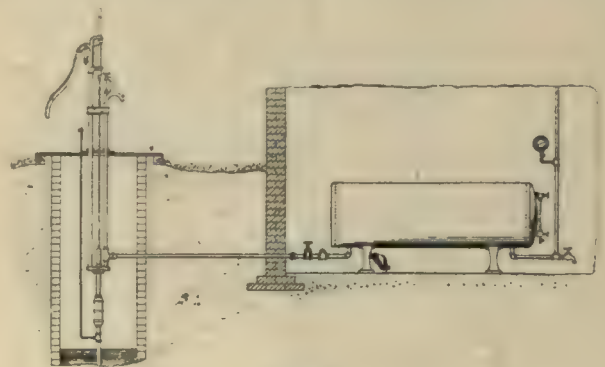


Fig. 8

culties and disadvantages have been overcome by the use of the pneumatic water supply system, which has been in use in the United States for 16 or 18 years, and is already becoming quite popular in many sections of Canada.

In fig. 7 is shown the simplest type of the system under discussion, which consists of a pump with necessary connections and a perfectly air-tight tank to the bottom of which is connected two pipes, one to convey

water from the pump to the tank and the other from the tank to the plumbing fixtures in the basement and upper floors. Such an arrangement constitutes a pneumatic system. As the water is forced into the bottom of the tank and begins to displace some of the air, the latter is compressed into an ever decreasing space, creating a force known as pressure, and if a tap connected to the discharge pipe in the basement were opened all of the water in the tank would be forced out by the compressed air again expanding to its normal volume. The inlet and discharge pipes from the tank being connected to the bottom thereof absolutely preventing the escape of the air until all of the water has escaped. As you are aware, for one pound of pressure indicated by the gauge, water can be forced up through a vertical pipe to a height of 2.7 inches. Therefore, 60 pounds pressure will elevate water 135 feet above the tank. So that while all of the water would be discharged from a basement tap, a less amount would be discharged from the fixtures at a great elevation.

With an absolutely air tight tank, the contained air can be lost only in one way, viz.: its absorption by the water due to temperature variations in the latter. As a rule, loss due to this cause is almost infinitesimal. Pro-

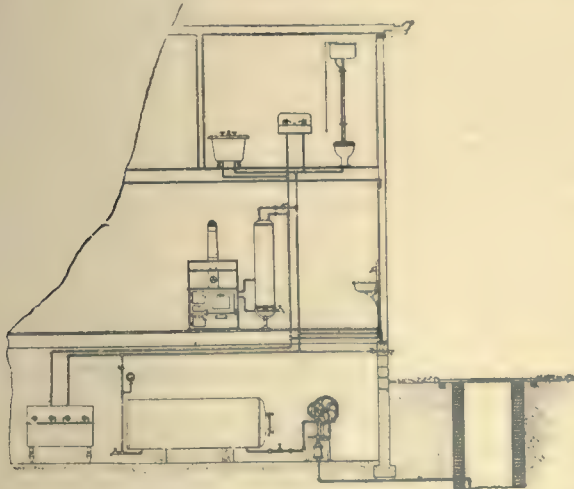


Fig. 9

vision is made, however, for the supply of more air when such becomes necessary, by one of three methods, viz.:

First, at a convenient point on the suction pipe is a small stop cock, or check valve, which may be opened by hand when occasion demands, permitting the entrance of a small amount of air with the water being delivered into the tank. The second method is by means of a combination water and air hand pump, which is ordinarily supplied with these systems. The third method, which, however, need only be considered in connection with a system of considerable size, is a special air compressor, worked either by hand or from a counter shaft, as may be desired.

The necessity for having an absolutely air tight tank can scarcely be exaggerated, for, as will be clear to you, the continued successful operation of the system depends upon retaining the air cushion at a high state of efficiency. For example, if a tank loses a few cubic inches of air per day it will only be the matter of a short time until the efficiency of the system will be materially decreased; the amount of water which may be obtained from the tank being decreased just to the extent that the air has been allowed to escape, and every one familiar with the building of tanks is aware that the ordinary storage tank which would be tight under water pressure, is very unlikely to hold air, for the same reason

that a wire basket which would hold potatoes would not hold sand.

One of the advantages of the pneumatic system is the fact that almost any desired quantity of water may be stored because a foundation in the ground is easily obtainable, whereas a most expensive substructure may be necessary in the case of an elevated tank. Another is its electricity, for if at any time, owing to increased requirements, an additional supply is needed, it is only necessary to connect up one or more tanks of any size that may be desired, using only one connection between the additional tanks and the previously established system, as will be obvious, the water will come back from the tank through the pipe by which it entered. Still another advantage is the possibility of having a considerable quantity of water at high pressure in case of fire. Every year many serious fires might be prevented if an adequate supply of water had been available during the incipient stage.

The pump shown in fig. 7 is of the type used where the source of supply is 20 feet or less below its base. Fig. 8 illustrates the type of pump used where water is found at a greater depth than that mentioned, and is built on the well known principle which permits the placing of the cylinder within a few feet of the water, no matter how far below the base of the pump it may be found. Fig. 9 illustrates the conventional house plumbing system furnished with water from a pneumatic tank located in the basement. In this case a hot air engine is the motive power, but as will be obvious, a pump operated by hand, gasoline engine, electric motor, etc., may be substituted therefor. The electrically operated pump, equipped with an automatic controller, is undoubtedly the most convenient type of pumping apparatus used in connection with this system.

There are various types of automatic controllers, several of which can be absolutely depended upon to provide any range of pressures required. The usual differential being 20 to 30 pounds, allowing for a maximum pressure of 50 pounds, and a minimum pressure of say 25 pounds. Thus the motor is not started too frequently and the system requires no attention whatever on the part of the owner beyond oiling his motor and pump at regular intervals.

These systems are provided with tanks ranging from 140 gallons to 20,000 gallons, the larger size being the practical limit, so far as space is concerned, of the ordinary freight car, so that where greater capacities of water are needed, two or more tanks may be connected together.

The following verdict was returned by a Winnipeg jury last week: "We find that the deceased was killed by the collapse of a portion of the roof of the Union depot, in the city of Winnipeg, on March 12th, 1910, shortly after the noon hour, while working for the Lyall Mitchell Construction Company. We strongly recommend that in future a stringent test be made as to the proper setting of all cement work utilized in construction of buildings in Winnipeg."

Mr. W. A. Littlejohn, city clerk of Toronto, has returned to the city after a vacation of two months in Bermuda and the Southern States. Mr. Littlejohn is much improved in health.

We regret to report the death of Mr. Robt. I. Pettigrew, a well known building contractor and an old resident of Toronto.

Use of Concrete in Factory Construction

Its Advantages and Disadvantages—Its Wide Application, and its Limitations—Conditions under which it is not Economical to Build of Concrete

BY H. F. PORTER, C. E.

Portland cement in its various applications is by no means a cure-all material for factory construction. No material will ever meet all conditions. But cement does possess unique advantages and offers possibilities in detail construction that are becoming more generally understood. And cement either alone or reinforced with steel is adaptable not only for new factory construction and for additions to old buildings, but for the construction of many small details in the factory — machine foundations, retaining walls, cisterns, shipping platforms, stairways, and so on.

For these various purposes concrete has both technical and practical advantages and disadvantages. Technically, the composition of concrete gives it advantages over any other material of construction. No other material admits of such scope in design or construction. Its application is limited only by the ingenuity of the designer and the skill of the constructor. Its plasticity makes it applicable to any form in any position, and its strength when hardened and scientifically reinforced with steel is equal to the most exacting demands.

Concrete gains constantly in strength, whereas all other materials progressively lose, requiring an ever increasing amount of money to be spent for repairs and ultimately complete replacement. Tests on cement briquets show that a block of cement twenty years old is fifty per cent. stronger than a block one year old. This valuable property of resistance arises from the immunity of its constituents from the ordinary agents of deterioration. It has been shown repeatedly that the steel used for reinforcement in concrete, moreover, is rust proof. A very thin skim of cement seems to afford adequate protection against rust, and even if the steel is coated with a film of rust when it is embedded in the concrete, it loses what it has and is smooth and bright when removed.

Cement resists abrasion and has great compressive strength, therefore is particularly adaptable for foundations, retaining walls and all work of a massive nature where the forces internal and external are mostly compressive. But for purposes where the material is brought into tension, as in beams, arches, lintels and slabs, and where the temperature strains are considerable, concrete of itself is insufficient, and it is necessary to combine it with a material strong in tension.

Steel, the strongest material in tension, admirably fulfils this need. The coefficients of expansion of the two materials are practically the same, so that they change length simultaneously; the concrete in changing from the fluid and plastic state to the solid state shrinks slightly and grips the steel tightly. In fact, steel embedded in cement and concrete will break in two before it will pull out.

Reinforced concrete has all the properties of cement together with the properties of concrete as a building material. It is strong in compression and in tension.

Another technical advantage of concrete as a material of construction is that it resists heavy shocks. The vibratory effect of a heavy shock produces no appreciable effect on a concrete floor beyond mashing it a bit at the point of contact. A similar shock would cause a tile

floor to fly into many pieces and a wooden floor to split and splinter. On a concrete floor the shock seems to be widely distributed, and therefore no one point receives the brunt of the blow. Engine foundations and floors for carrying heavy machinery can consequently be built of concrete to good advantage. In one factory in which concrete floors have been used, heavy presses are used on the upper storeys without resulting vibration.

Concrete, if properly made, is practically impermeable, and if not in every case waterproof, it is at least moisture and damp proof. It is also virtually immune to the action of corrosive gases in the atmosphere and to oils and acids. Strong acid does attack concrete, but the effect is usually confined to the etching of the surface; in fact, acids are frequently made use of to secure an artistic effect on the surface of the concrete. The extent of the penetration of the acid when used in this way depends largely upon the nature of the aggregates, as the crushed rock and sand, with which Portland cement is mixed to form concrete, are technically known. If these aggregates are composed of siliceous or igneous rock, the effect of the acid is very slight; but if the aggregates are of the nature of a limestone, a strong acid will in time entirely ruin the concrete. This is a point to be remembered when making concrete. Only the best material should be used in mixing the concrete. Oil may rot cement, but only if the surfacing is poorly done; as a matter of fact, linseed oil is frequently used to keep cement from "dusting" and to increase the smoothness and impermeability of the surface.

But concrete construction naturally enough has its limitations and there are honest objections to it. The chief limitation of concrete is due to its dead weight. There is a practical limit to the height of structures and to the length of span of horizontal members. In the second place, the very fact that concrete is permanent makes it difficult to alter.

Concrete Not Economical Under Some Conditions

But while the dead weight of concrete is its greatest drawback, this limitation does not hold in many factories, because factory buildings are not skyscrapers. It is not practicable on account of the dead weight of concrete to erect buildings on soils which have low bearing value. and for tall structures the girth of the piers on the lower storeys is not only unsightly and uneconomical but often seriously encroaches on the available floor space. This difficulty has been overcome in several instances by using cores of steel for piers on the lower storeys, thereby reducing the girth of the piers to a convenient and uniform size throughout the building. This, of course, increases the first cost, but the gain in floor space and sightliness more than offsets this.

A more practical limitation of concrete in factory work, due to its dead weight, is its unfitness for long girder spans. Up to 50 or 60 feet it is both feasible and economical to build spans of concrete, but if the girders have to be longer than this, it is generally advisable to use steel girders or trusses. Also for roof spans of one-storey mill building steel girders are generally advisable.

There is a system of high, concrete girder construction which claims to solve the problem of long-span con-

crete construction. While this fact is yet to be demonstrated conclusively, it seems promising. Roof trusses, too, have been fashioned of concrete, but this is more the vogue abroad than on this continent, where up to the present time it has not been found economical to attempt such construction.

The second technical limitation of concrete — its permanence — makes it necessary to design the building very carefully. If a little foresight and sound judgment is used in planning the building, a slight additional outlay at the start for stronger piers and foundations will permit of the addition of extra storeys or extensions laterally or lengthwise. In general, partitions may be placed at will in a concrete structure and special alterations which involve the body of the building, although difficult and costly, are not impossible.

Concrete Factory Buildings will Meet Future Conditions

If it is desired to put up a single storey structure of great roof span, the excessive cost of centreing for such a building may make it an uneconomical form of structure. But even in this case by the exercise of a little compromise and ingenuity concrete may be made economical and practical. In one plant, the difference in the time of building determined the use of the concrete, even for the saw-tooth roof structure. But by combining a self-sustaining reinforcement in combination with an underbody of structural steel the internal centreing was eliminated. The concrete was poured directly on the reinforcement, and the under side was plastered up with cement mortar. This formed a strong, durable and economical decking and, while the structure as a whole on account of the exposed underbody was by no means as fire and decay proof as an all concrete building, it was fairly substantial and permanent.

The practical advantages of concrete are many. Without going into detail concerning the initial cost, the final cost, the saving in time of erection and reduction of fixed charges, the practical advantages which follow from the technical advantages of concrete as a building material often outweigh the technical advantages.

No material of construction affords greater possibilities for a well lighted building than does concrete. The combination of large window and skylight area with light colored or white interiors makes it possible to get the maximum of daylight. In fact, with concrete as a building material there is apt to be too much light rather than too little.

That a material so smooth and impermeable ranks high from the viewpoint of sanitation is self evident. No construction is so easy to keep clean. The floors and walls of a concrete factory can be washed and kept as fresh as when new.

Concrete buildings are naturally cool in summer and warm in winter on account of the low conductivity of the material. A gas jet has been known to keep a good sized room comfortably warm in a concrete house during a northern winter.

Because a concrete structure is stiff and free from vibration it is peculiarly adapted to the requirements of manufacturing in which the stability of machines is an important consideration. It not only saves the wear and tear on machinery, due to vibration, thus increasing its life and usefulness, but it also facilitates the operation and in this way is an aid in reducing factory costs.

Because of the solidity of the concrete flooring in a factory it is possible to arrange and rearrange machines to great advantage without taking into consideration special foundations. Machinery in a concrete building can be located above the floor and the shafting below, and it is perfectly possible to build concrete floors of

such uniformly distributed strength and stiffness as to permit the location of the operating apparatus in groups and units and to make the most effective utilization of the floor space.

More Economical to Construct Concrete Buildings in Warm Weather

The most practical limitation in the application of concrete lies in the difficulty, danger and expense attending the construction of a building of concrete during cold weather. Not that it cannot be done with entire safety, but the extra expense involved, due to the precautions necessary to protect the concrete from the action of the frost and the decreased efficiency of the workmen on account of the cold, may run the cost of a concrete building up anywhere from 5 to 50 per cent.

One of the prime advantages of concrete is that it can be put up quickly in favorable weather with a good organization in charge and urged on by the spur of necessity; and it is questionable if it ever pays, for the slight gain in time, to attempt operations at the approach of the winter season or to carry over into the cold weather any work that can safely be left incomplete.

Another practical objection to concreting in the winter time is the length of time required for the concrete to set. Because the cement sets very slowly in low temperatures much additional money is tied up in centres.

In one instance it was possible to uncentre and use a floor cast in April sooner than the one below it cast in February. Moreover, the floor cast in April was installed in one-quarter of the time and at half the expense of the one in February. In this instance it would have been far wiser to have postponed the entire work until April.

On the other hand, in another building just the opposite was true. The building was partly up but was requiring so long a time to erect that it became necessary to push the installation regardless of the weather, and the extra expense involved was more than compensated for by the saving in time.

Some Conditions Unfavorable to Putting Up Buildings of Concrete

Extremely hot weather also is unfavorable to concreting, as concrete has been known to set under the influence of a boiling, noon-day sun of midsummer before it could be placed in a mould.

All these conditions should be taken into consideration when considering the time of the year in which to put up a new plant. As a prominent architect stated recently, architects see with concrete the realization of their fondest ideals of design. But great care should be exercised in the planning and executing of a concrete building. Because of its very simplicity and its apparent ease of construction, concrete has been misused in a number of instances.

Word has been received from Trieste, Austria, of the death of Mr. Edwin Doidge, a well known building contractor of Winnipeg, who, accompanied by his wife, left the western city on December 27th last for a European tour, from which he expected to return about the middle of May. Particulars of Mr. Doidge's death have not yet come to hand. The deceased gentleman was one of the pioneer contractors of western Canada. He went west with the Red River expedition in 1870. In recent years he was successful in obtaining many important civil contracts. Mr. Doidge held the rank of major in the 13th Field Battery, and was a member of the Masonic Order.

Interesting Bridge Work in the Rockies

Constructional Difficulties Encountered in the Erection of Two Viaducts on the Boundary Division of the Canadian Pacific Railway

The accompanying photographs were taken during the construction of some interesting bridge work completed recently by the Hamilton Bridge Works Company, Limited, on the Boundary section of the C.P.R., in the Rocky Mountains, about 30 or 40 miles from Nelson, B.C. The two bridges erected were duplicates in almost every respect.

Owing to the location and the abrupt slopes of the canyons over which the structures were to be erected



No. 1. Derrick Car and Gang—Showing Compressor Car, to left of Picture

and the fact that the distance from the top of the bridge to the bottom of the ravines was between 150 to 200 feet in depth, the work presented more than the usual structural difficulties encountered in railway work of this kind. Under the conditions, it was practically impossible to use false work for the centre span. Consequently, practically the whole work was put in with one of the company's large steel erection cars. (See illustration No. 1).

Each bridge has a total length of 410 feet and consists of two 40-foot deck plate girder spans, two 100-foot deck lattice spans, and one 130-foot deck lattice span in the centre of the structure. The two 40-foot girders and the two 100-foot deck lattice spans were erected on falsework in the usual manner, all the steel and falsework being placed in position by means of the erection car. The 130-foot span, however, was erected as a cantilever, working out from each side—shown in

illustration No. 2. This photo also shows one end of the 100-foot span and one end of the 130-foot span resting on a steel bent, 90 feet high. At this time practically one-half of the 130-foot span was assembled and the erection was also proceeding from the opposite side of the ravine. Illustration No. 3 shows the final connection in the bottom chords of the cantilever span being made. The top chord members were then immediately filled in. It is interesting to note that calculations were made for this span to come together in correct position under certain temperatures, and when the connecting members in the centre were made ready to place in position, it was necessary to make only very slight adjustment from the anchorages at each end. The fourth picture shows one of the structures completed ready for traffic.

As may readily be understood, one of the difficulties of handling work of this nature is in carrying it on so as not to interfere with traffic or existing structures. The erection car facilitated this greatly, and the contract was completed with no hindrances of this kind. Another feature of the work is that the structures were erected on a curve and provision also had to be made for grade. The total tonnage of steel in each of these bridges is about 500 tons.

The first picture gives a fair illustration of the large



No. 2. The 130 ft. Span in Course of Erection



No. 3. Making the final connection in the bottom chords of the cantilever span

steel derrick erection car used on the work. This car is one of four owned by the company. The first was designed by and built under the supervision of the late chief engineer of the Hamilton Bridge Works Company, Mr. Charles G. Milne, and all are practically duplicates. The frames or bodies of the cars are heavy steel girders, 60 feet in length and 38 inches deep. The width of the deck is 10 feet. The whole structure is mounted on special trucks of 150 tons capacity. This car is self-propelled by a special sprocket and chain device which has given great satisfaction. The power is furnished by a four-drum Beatty hoisting engine, having spools or nigger heads on either end of each shaft, developing 40 h.p. The booms are skeleton steel frames with heavy



No. 4. Completed Structure, ready for traffic

sheaves at the outer ends and heavy steel blocks using $\frac{7}{8}$ -inch diameter cable. These cars have been tested to lift a load of 50 tons.

Friction in Water Pipes

When water flows through any channel, or through pipes under pressure, it meets with resistances which retard its motion, and reduce its pressure. These resistances are called, technically, "friction." Particles of water move with great freedom among themselves, and, if observed when in rapid motion, they will be seen striking the pipe, rebounding and striking other particles of water, which, in time, rub against and obstruct other particles. The further away from the sides of the channel, which is the cause of this commotion, the less the disturbance, and the more rapid the flow of the water.

The greater the head, therefore, the faster the flow, the greater the commotion caused, and the greater the resistance created by friction. The larger the channel, or pipe, the less will this commotion penetrate the central part of the stream. It is to the fact that the channel is confined, and to the forward motion of the whole stream, that this movement of the particles of water among themselves, and the consequent resistance, is due, and so long as there is forward motion, this resistance must continue.

Areas of circles are, to each other, as the square of their diameters. It is usually considered that the doubling of the size of the pipe decreases the loss by friction at the same velocity of motion in the pipe, one-half. In other words, the loss by friction at equal velocities in different sized pipes, varies practically in the ratio of pipe surface or circumference, to cross section. Practically, when delivering the same number of gallons per minute the friction loss in two pipes of equal length, the diameter of one of which is twice that of the other, will be in the larger pipe one-thirtieth of that in the smaller, or the loss in the smaller will be thirty times as great as that in the larger.

This relation of volume, or number of gallons to be delivered per minute, should never be disregarded by the plumber who is ambitious to do effective work. Friction developed in different sized pipes should never be overlooked when calculating water supplies. In laying the pipes all bends and elbows should be avoided, where that is possible. The pipes should be as large as possible to use for the purpose, and the trend of their direction should be changed gradually. Sudden changes in direction destroy the velocity of the flow very rapidly, and as a result, reduce the volume of the discharge. A reduction, or an increase, in the size of the pipe, caused by the screwing on of branch pipes, smaller or larger, also reduces the velocity, and makes the work of the plumber less effective.

At a recent meeting of the Winnipeg Board of Control, the Engineer of Construction, Mr. J. W. Astley, laid before the members a sample piece of pavement used in Buffalo, N.Y. The distinctive characteristic of this block is that there are broken stones mixed in the asphalt. It was decided to make a trial of this pavement on one or two portions of streets where the traffic is heavy. The Engineer of Construction submitted important suggestions in regard to pavement construction. It was recommended that the concrete foundation be increased from six to seven inches on all streets in the business part of the city. The deeper foundation would ensure greater efficiency in the patching of cuts. Mr. Astley pointed out that the deeper foundation would not mean much extra cost.

Concrete Road Construction

By Frank R. Charles, City Engineer, Richmond, Ind.

The city of Richmond, Ind., cannot claim to have a large amount of concrete roadways, but it laid some of the earliest street pavements of this construction. Our first roadway was laid in 1896, and now has nearly 14 years of life and usefulness to its credit, and is still continuing its service without having cost one cent for repairs. In truth this was a small beginning, and owing to the excellent character of its macadam streets, our city has been backward in constructing permanent pavements, but nevertheless this first concrete roadway has abundantly justified its existence, so that for the last eight or ten years the amount has been added to by a small amount annually. There was nothing especially remarkable about the construction of this first pavement, except that extreme care was used in all the processes, particularly the minor ones. The natural soil under the first pavement is gravel, so that no sub-base was required. The concrete was proportioned 1:2:5, deposited five inches thick after ramming with a top surface one inch thick, proportioned 1 to 2. It was cut into blocks about five feet square and the surface pitted with an ordinary lug roller.

In the subsequent work, various plans have been used. The principal variations consist in the material for aggregate, thickness of concrete, with and without a top surface, thickness of the latter, size of blocks, thickness of joints and material used therefor. One roadway was cut in blocks eight to ten feet square; another, 30 or 40 feet square; all joints between the blocks, both cross and longitudinally, are one inch wide and filled with paving pitch. The defect of this method consists in the chipping of the concrete edges at these joints, principally the longitudinal ones. Our experience seems to show the blocks should be as large as possible in order to reduce the number of joints, and that the joints should be as thin as can be made. On the other hand, we find that blocks ten to fifteen feet square are about as large as can be made without developing temperature cracks in our climate. These latter, however, apparently do not injure the pavement, beyond detracting from its appearance, as cracks that have existed for years show no enlarging, and the pavement up to and over the cracks is as solid as elsewhere. Possibly there have been such experiments, but I have no knowledge of them to ascertain what size of blocks are safe in different climates or places with range of temperature. Corrugating or grooving the surface is also objectionable for the same reasons as are the joints; the edges of the grooves afford an opportunity for the concrete to chip and spawl off by the action of horses' hoofs, etc. Also the grooves catch and collect the dirt, interfering with the cleanliness of the pavement and rendering it more difficult to sweep. Possibly the corrugations afford slightly better foothold for horses, but I think even here the advantage is exaggerated. We obtain a very good surface by using 1 part cement to 2 parts hard-grained coarse sand, screened through a No. 4 screen; trowel down to remove all holes, air spaces, etc., and "raise" with a cork or wood float, giving a rough gritty surface, on which horses can maintain their footing as securely as on a cement-filled brick, an asphalt, or wooden block pavement when damp.

For ordinary traffic pavement we find excellent results are secured by the use of five inches of 1:2:5 concrete, and a top surface 1½ inches thick, mixed 1 to 2. For automobile travel nothing could be more satisfactory. Of course, it is trite and unnecessary to say that care must be used in selecting good aggregate material, proportioning properly to

reduce voids to a minimum, and securing good workmanship in all the operations of mixing, placing and finishing the work. I am a firm believer in "wet mix," for this, as well as for most other concrete work. Place this concrete on a well prepared foundation, using suitable straight edges and templates cut to the required crown of the street; tamp or jostle to make a compact mass, leaving the surface rough to provide attachment for the top layer; cut joints through the concrete every ten to fifteen feet, and fill with sand. Before the concrete begins to set, place thereon the top surface, composed of 1 part cement to 2 parts hard, coarse sand, trowel and float, cutting joints directly over those in the concrete, using a small radius "jointer" to leave as thin a joint as possible, and finally finish by means of a "float," leaving the surface as rough as possible. This gives a roadway very suitable for our use. For heavier traffic, six inches of concrete and 2-inch top surface is advantageous. We also have good results by making the pavement homogeneous—that is, without the top surface. Make the concrete somewhat richer in cement and quite wet. Tamp until free mortar flushes to the top, then finish with trowel and float. For this purpose the concrete should be free from large stones, as with a large stone at the surface, if one end becomes worn loose, a large leverage is afforded to tear the remainder of the stone from the concrete. As remarked before, the disadvantage of concrete is its lack of toughness, whereby exposed edges of joints and corrugations are prone to chip and wear off. For this reason joints ought to be reduced to a minimum, and especially longitudinal joints should be eliminated wherever possible. Another defect urged against concrete is its lack of elasticity. This contention does not seem to be well founded, as concrete is not the only non-elastic pavement. Brick on a concrete foundation and with a cement filler seems to be about as unyielding and non-elastic as any roadway could be. Of course, for horses some elasticity is desirable, but in view of the increasing numbers of motor vehicles, this quality is not so essential to so many users as formerly.

The present laws of our State, while passed avowedly in the interests of the asphalt paving industry, ought to bring about the increased use of concrete roadways. For example, plans must be made for a foundation suitable for any kind of "a modern city pavement," which foundation naturally will be concrete. Then the specifications must include, and bids be received for four different paving materials to go on top of this concrete foundation. After receipt of bids the property owners have the right to determine which one of the four shall be adopted, and since cheapness usually appeals to the average property owner, asphalt often wins the day, because with the same foundation specified for each pavement, the top surface of asphalt can be put on at less cost than brick. Here is the chance for concrete paving. Put down a foundation suitable for any kind of pavement, viz., five or six inches in depth of concrete, mixed, placed and jointed as above suggested; then before this concrete begins to set, place thereon the "paving material," consisting of the wearing surface 1½ or 2 inches thick, mixed one part cement and two parts sand, as before stated, and you will have a pavement that can compete with any other in price, will cost less in maintenance, and will give a cleanly, sanitary effect.

One of the most remarkable increases in building permits was that of Regina for last month. The report for February, 1910, showed a gain of no less than 930 per cent. over that of the corresponding month of 1909. The first two months of the current year also showed a large gain—800 per cent. in excess of January and February of 1909. At such a rate Regina bids fair to establish during the coming year a record unique even in the history of western Canada.

* Paper read before the convention of the National Association of Cement Users.

Concrete Fireplaces and Chimneys

In the past few years concrete has been used for fireplaces and chimneys with varied success, the dry-tamped chimney block proving the last practical owing to its scaling off on the inside from the heat until the upper blocks were but a frail shell and the lower half of the chimney was filled with a solid mass of rubbish consisting of worthless cement. The many failures of concrete as a substitute for fire clay brick, are due to the fact that too much was expected of this one material.

Concrete varies according to the material from which it is made, and while concrete made of ordinary raw materials will crumble at a few hundred degrees of heat, other concrete made of other, yet ordinary materials, will resist four or five times as much heat without injury. We must learn, therefore, to make concrete according to its uses, which will necessitate classifying accordingly the same as wood. For example, we would not think of making furniture, such as chairs, of hemlock, nor do we think of making drawing boards of oak, yet both are wood. A cement and sand composition may be such as to admit a polish like marble, or it may be as gritty as a grindstone, and both be known as concrete.

A concrete to withstand continual heat of a high temperature, must be made to meet the requirements. With the object of discovering the best concrete for high temperature, I built a fireplace several years ago, using cement brick of various raw materials and recently made a careful examination of the work.

Brick made of one part (high burned Portland cement to four parts crushed furnace slag sand, and after seasoning dipped into a weak solution of soft soap, remained uninjured or discolored; in fact, after being washed they were as perfect as when the fireplace was built. The brick made as above but not dipped, were sound, but somewhat discolored, indicating that the soap dip prevented discoloration. Brick made of same cement and clear sand which had been previously heated to about 1,500 degrees, also remained intact when containing one part cement to five parts sand, but those made of one cement to three parts sand were badly cracked, all were discolored; those having been soap dipped were found in best condition.

All brick made of crushed sandstone, or limestone screenings were more or less injured, those with sand made of crushed gravel or granite held better than those of unheated sand, but when sprinkled with cold water they soon broke into many particles, the gravel and the granite quartz being affected about equally, as the soap dip did not protect either materials from discoloration.

The results indicated plainly that a porous concrete (containing less cement) was more fireproof than a rich dense composition, while discoloration was less on the more dense (richer) composition. It also indicated that a wet mix was much superior to the dry tamp brick for all materials.

Summing up the materials, I derive the following points to be used in making concrete for a fireplace or chimney lining:

Never use gravel or crushed granite or marble; while hard, blue limestone may be used for only moderate heating places, after same has been subjected to a high temperature before mixing with the cement.

If possible, use only crushed furnace slag for sand, and if same is unobtainable then use a sharp silica sand first heated either in a furnace or large outdoor fire. Always allow the heated material to become cold before mixing for concrete.

Always make the concrete sufficiently wet to make a stiff mortar, while thin enough to pour does not add to the quality

The concrete may be dipped or coated with a solution of one part soap dissolved in 20 parts water; while this does not add to the fireproof qualities it does much to prevent discoloration.

Never make the concrete too rich with cement, as a mixture of one cement to four or five parts sand is superior to a richer mixture in resisting heat.

Always use a high-burned Portland cement, preferably one made from by-products of furnaces. All high-burned Portland cements are acceptable.

Vancouver's Building By-law.

The new civic building by-law at Vancouver, B.C., has raised the standard of construction for apartment houses. According to the revised regulations, all three storey apartment houses or tenements having more than three suites of five rooms each on a floor must be constructed of brick or other incombustible material. All two storey apartment houses having more than four suites of five rooms on a floor must also be of this type of construction. All apartment houses not of fireproof construction and having more than six suites on each floor shall be provided with interior brick fire walls.

The flooring of apartment houses coming under the above classifications must be of double construction and lined with asbestos paper, and all the partitions between the apartments, corridors, etc., must be of heavy construction. No suites except those occupied by the janitor will be allowed in the basement. In blocks where the ground floor is used for stores and the upper flat for apartments, provision is demanded even in two storey buildings for double flooring.

Other clauses of the amended by-law cover the question of ventilation, prohibiting the use of inside light wells, as well as the plan of ventilating one room through another. All light courts must represent at least 10 per cent. of the area of the building except on corner properties, where the court must have five per cent. of the area on the side not abutting on the street or lane.

Canada Cement Company Doing Well.

The balance sheet which has just been issued by the Canada Cement Company, Limited, furnishes convincing evidence of the company's strong financial position. Several features of the statement are especially striking and significant. The accounts receivable, bills receivable and deposits on tenders are in excess of accounts payable and bills payable by over \$90,000. The company has cash in hand of \$552,265, and the liquid assets amount to \$2,512,667, or more than half the issued bonds. This is a particularly striking feature of the report. Another feature that cannot fail to evoke favorable comment is that despite the fact that during the broken period which the report covers, the company was in its organization period, without a general manager and with everything in a transition stage, the bond interest for the quarter ended December 31, was earned more than twice over. That in such a short time and under exceptional difficulties the company has been able to accomplish what it has, can only be accepted as a promising augury. Up to date the properties of the following companies have been acquired: Vulcan Cement Company, Montreal, Que.; Lehigh Cement Company, Belleville, Ont.; Canadian Cement Company, Marlbank, Ont.; Canadian Cement Company, Port Colborne, Ont.; Belleville Cement Company, Belleville, Ont.; International Portland Cement Company, Hull, Que.; Lakefield Cement Company, Lakefield, Ont.; Lakefield Cement Company, Montreal, Que.; Owen Sound Cement Company, Shallow Lake, Ont.; Alberta Cement Company, Calgary, Alta.

Trade News from Montreal

Building Statistics Piling up—Supply Dealers Helped by Early Opening of Navigation

Montreal Office of the "Contract Record."

March 28th, 1910.

Excellent building weather prevails now in the Montreal district and the building season is opening up in earnest. Building Inspector Chausse's office is being kept busy and the March building statistics should show a marked increase over the same month in the previous year.

A notable feature are the permits taken out for construction of medium sized residences in the outlying districts; and from present indications this work will constitute an important field for the general contractor.

The anticipated early opening of navigation is having a stimulating effect upon the various building supply trades at the present time. Navigation is partly open now between Quebec City and the Lower Gulf ports, and dealers are making preparation for the reception of their supplies at an earlier date than usual.

Sewer work should open up earlier than is customary, since iron pipe reaches Montreal chiefly by water shipments, and these are usually held up until well on in May. The early departure of the snow from Montreal also allows for the commencement of sewer and waterworks contracts from this time forward, and the city's engineers, it is understood, have extensive work planned for the coming year. Among other projects, a large portion of the big Sherbrooke street intercepting sewer remains to be completed.

The work of constructing the foundation piers for the new seven storey fireproof building which the St. Lawrence Sugar Refining Company, Limited, will erect this season, is being proceeded with by the general contractor, Mr. E. G. M. Cape.

In excavating for the foundation piers the contractor encountered a steam pipe installed some years ago for the purpose of thawing ice formations in the rivers, in front of the company's works. This was never made use of and its presence was never figured on in laying out the site. It extends the entire length of the site and then drops to a depth of forty feet. At this latter point the pipe is boxed in and the contractor had to provide a method of filling in this hole, since its position was identical with that of one of the piers. To do this, bagged concrete was placed in position until above water and then ordinary methods were adopted. For the remaining piers, concrete reinforced with steel bars is being used. This method is employed to distribute the strain over the three columns, placed in a row; the centre pillar comes directly over the old steam pipe and the ground in this vicinity is not considered firm enough to stand an individual strain. The new building will have seven storeys and basement, and is of skeleton steel type, with reinforced concrete flooring. It is expected that this building will be finished about the middle of the summer.

New St. Catherine Street Bridge

Satisfactory progress is being made with the construction of the new St. Catherine street bridge, over the C.P.R. tracks in the eastern part of the city. The contract for the removal of the old bridge and masonry piers was let some time ago to Mr. E. G. M. Cape, general contractor, 40 Hospital street. The plans for the new bridge provide for the erection of new steel girders; while the Canadian Pacific Railway Company are allowed a larger space for their tracks. The floor of the bridge is being finished with reinforced concrete construction and will provide accommodation for the double tracks of the Montreal Street Railway Company, a roadway, and a granolithic sidewalk on either side. The contractor

expects to have the bridge completed and ready for traffic in the early part of the season.

Structural Steel Company Busy at Longue Point

The Structural Steel Company, Limited, of Montreal, have recently moved into new and commodious offices adjoining their Longue Point plant. Mr. Brower, manager, states that they are finding the present season far ahead of the same period last year. Enquiries are more numerous and the outlook for new business is very encouraging. The Structural Steel Company is one of the newest of the large structural companies, but since organization they have completed numerous important contracts, and, in spite of the dull season in the building trade during the winter months, they have had sufficient work on hand to enable them to operate their plant for practically full time. The structural steel work for the Legislative Buildings at Regina, Sask., was recently completed and final shipments are now being made of the steel required for the Parliament Buildings at Edmonton, Alta. The steel frame work for the Murphy building and Ogilvy departmental store were also fabricated by the Structural Steel Company.

Among the contracts which the company have under way at present are the Beardmore building, the National Breweries extension, the General Hospital and the construction of three large dump scows for the Canadian General Development Company. The main buildings for the Mines Power Company, Limited, at Cobalt, Ont., were recently finished by the Structural Steel Company, and they have now under way the erection of several new buildings for the Canadian Iron & Foundry Company, Limited, at Three Rivers, Que. They are also fabricating pulp conveyors of a new design, for the Brontton Pulp & Paper Company, of East Angus, Que.

New Firm of Concrete Engineers

Under the firm name of Messrs. Jago & Harris, a partnership has just been formed between Mr. J. F. Jago, a member of the firm of Messrs. J. F. Jago & Company, reinforced concrete contractors, Coristine Building, and Mr. R. R. Carr-Harris, C.E., of Toronto.

The new firm have opened offices in the Confederation Life Building, Toronto, and will carry on the business of reinforced concrete contractors and engineers.

Mr. J. F. Jago is well known in Montreal, where his firm has been identified with several of the largest reinforced concrete constructions in the city, notably the new Wilder Building. The other member of the new firm is Mr. R. R. Carr-Harris, C.E., a graduate of the Royal Military College, Kingston, and also of Queen's University in civil engineering. For several years he was engaged in the west with the construction department of the C.P.R. Latterly he has been in charge of railway construction work for the Chinese Government.

Montreal Contractors at Three Rivers

The Canadian Iron & Foundry Company, Limited, Three Rivers, Que., have under construction four new shop buildings. These are respectively, 160 feet by 60 feet, 240 feet by 50 feet; 160 feet by 50 feet, and 60 feet by 50 feet. Mr. E. G. M. Cape is the general contractor and has already completed a portion of the work. The foundation of these buildings are reinforced concrete and the buildings themselves are being finished with steel and corrugated iron. Several crane runners are also being installed. It is anticipated that these buildings will be finished in the early part of the summer. The Structural Steel Company, of Longue Point, Que., have the contract for the steel fabrication and erection.

During the past week the general contractor, Mr. E. G. M. Cape, made a start on the foundation work for the new "Earl Grey" fireproof school building for the Board of Protestant School Commissioners, of Montreal. The plans for this building were drawn by Mr. A. F. Dunlop.

From the Federal Capital

Correspondence of the Contract Record

Ottawa, Ont., March 28, 1910.

Owing to the building boom in this city, the local brick yards are unable to meet the demand for this class of material, and, as a consequence, building operations in the city are suffering just now from the shortage, very few of the large builders having more than a limited supply of brick on hand. Reserve stocks have all been used up and several of the big yards are running day and night in a futile endeavor to keep up with the abnormal demand. The shortage of brick is felt most in the outlying districts of the city, where the erection of brick residences is going ahead at a tremendous rate. A great deal of brick is being brought into the city from outside points, notably Casselman, where there is an extensive plant. Brick manufacturers state that they have never before seen anything like the present boom in the whole of their experience. Apart from brick, there is little change to report in building materials. Crushed stone has gone up 15 cents a ton, and cement is selling from \$1.70 to \$1.90, according to quantity.

A great number of building permits have been taken out at the City Hall during the last three weeks, and the outlook for the building and allied trades is for an exceedingly busy season.

New Building By-law

The Board of Control will hold a special meeting next week to deal with the new building by-law. The recommendations of the medical committee, which has been considering what provisions should be made to assure sanitary conditions in houses, will bring in its report, and the board hopes finally to dispose of the measure, which has been before various civic bodies on and off for over two years.

A Word from Regina, Sask.

2,500 additional Mechanics and Laborers Required in the Western Capital—Trade Activity Typical of Entire Section of Country

Regina, Sask., March 24th, 1910.

That Regina, in common with other cities in the West, will shortly be face to face with a labor famine is a fact that admits of no argument. It is estimated by contractors here that 2,500 additional men will be required by the middle of April. Of these, 1,000 will be mechanics, principally carpenters, also bricklayers, stone masons and plasterers. The balance will be unskilled labor. That there is reasonable ground for the estimate submitted by the contractors is verified by the following figures of buildings which have already been definitely arranged for, or tenders for the erection of which have been called at the present time:

Stratheona school, \$75,000; Shaw apartment block, \$25,000; International Harvester warehouse, \$50,000; Campbell Bros. & Wilson warehouse, \$30,000; City Hospital, \$150,000; Grey Nun's Hospital, \$125,000; McAr & Mowat block, \$35,000; Woods' building, \$35,000; Glasgow House, departmental store, \$100,000; Crapper building, \$20,000; Convent "Our Lady of Missions," \$30,000; J. I. Case warehouse, \$75,000; City Market, \$18,000; Parliament Buildings (progress estimates), \$750,000; 150 residences (average \$3,000), \$450,000; Exhibition buildings, \$39,000; Armstrong, Smyth & Dowswell, \$17,000; Total, \$2,018,000.

This list, though large in itself, does not by any means cover the whole of the work that will be undertaken this spring. The city has approved of estimates and is submitting a by-law for the laying of additional pavements and side-

walks to the amount of \$125,300. A subway will be built at Albert street at an estimated cost, to be divided between the city and the Canadian Pacific Railway Company, of \$128,000. A by-law will be submitted to the people asking for the approval of a charter for a street railway company, and the charter calls for seven miles of this being built this year. The Canadian Pacific Railway Company are calling for tenders for new freight sheds. The city is considering the installation of a municipal gas plant.

In addition to the above, other buildings for which arrangements are now being made might be mentioned in the following: Imperial Bank, bank building; Ottawa Bank, bank building; Isolation Hospital; addition to power house; Ackerman warehouse, Catholic school, Whitmore Bros., building block, and many others. It is safe to say that \$4,000,000 will be expended in building operations in this city this year, should the labor to carry it out be forthcoming.

The following is the estimated scale of wages that will be paid in Regina this year: Bricklayers and masons, 55 to 65 cents per hour for a day of 9 hours; plasterers, 55 to 65 cents per day for a day of 10 hours; carpenters, 35 to 40 cents per hour for a day of 10 hours; painters, 30 to 40 cents per hour for a day of 10 hours; steamfitters and plumbers, 50 to 60 cents per hour; laborers, 20 to 30 cents per hour for a day of 10 hours.

Clean Cement from Walls or Floors

Cement is a silicate of lime, and as such is far too hard to remove by ordinary scouring with sharp sand or other gritty material. Consequently after a tiled floor or wall has been grouted and it is necessary to remove the superfluous cement from the surface, the wall or floor is washed with muriatic acid. This acid is a volatile gas dissolved in water. It attacks the cement and forms a soluble lime salt which can be readily removed by washing with ordinary water. Muriatic acid, however, casts off fumes which in physical laboratories, fine dynamo rooms or other places containing delicate metal instruments such as galvanometers, ohmmeters, etc., injures the metal by corrosion.

In these places dilute sulphuric acid may be used. It is not volatile and consequently does not injure metal work. However, it does not form with the cement a soluble lime salt, but a phosphate of lime, which is the same as plaster of paris. This is much softer than the original Portland cement, so that by using dilute sulphuric acid and scouring hard with sand it is in most cases possible to clean the tile floor or wall.

The best medium for dissolving cement is citric acid. This is a clear solid substance which can be bought from any drug-gist. It dissolves readily in water and will attack set Portland cement quite as well as will muriatic acid, because it forms with the cement a perfectly soluble nitrate of lime. Its only objectionable feature is its cost, which is several times greater than that of muriatic acid. Ordinary lemon juice is a solution of citric acid, but as the latter is made in a wholesale way in the tropics, it is cheaper than lemon juice.

A cheaper substitute for citric acid is tartaric acid, much used in making lemonade. This also can be obtained at any drug store. It forms with the cement a tartrate of lime. It is not as soluble as citrate of lime, and consequently its use in cleaning tiled floors has disadvantages similar to those met with in using sulphuric acid. The tartrate of lime is however, somewhat easier to remove than sulphate of lime. Consequently, although a tile surface which has been treated with tartaric acid requires considerable sand scouring to remove the cement, the operation is nevertheless easier than when sulphuric acid has been used.

Muriatic acid is the most usual and most feasible medium for cleaning cement from tile floors. When, however, its fumes are likely to corrode delicate metal instruments, either sulphuric, citric or tartaric acid must be used in its place.

The Builders' Exchanges and Their Work

Progressiveness at Windsor, Ont.—The History, Personnel and Aims of the Builders and Contractors' Association of Essex

The Builders and Contractors' Association of Essex, located at Windsor, Ont., is probably the youngest organization of its kind in Canada, it having been formed only in January, 1908. Previous to that time there was no association for master builders in the city except for the master house painters and master carpenters. These two branches of the trade, being alive to the benefits of organization, got together and succeeded in forming a combined association, starting with a membership of 38. At present the Association includes within its ranks nine-tenths of the local contracting fraternity. Nobody is eligible for membership in this Association unless actually engaged in active building work. Rightly or wrongly, the Association takes a strong stand against admitting supply men to membership, and adduces this as one of the chief reasons for not affiliating with the builders' exchanges.

The first president of this Association was Mr. M. A. Bryan, of the plumbing firm of Penington & Bryan. Mr. Geo. H. Thompson, of Thompson Bros., masonry contractors, was the first vice-president. When the Association was formed Mr. G. W. Freeman was elected secretary and Mr. E. Jacques, treasurer. In the second year Messrs. Geo. H. Thompson and L. Burton West

served. During the summer, the members meet on Saturday afternoon and engage at quoits, the losing side afterwards standing a dinner. Mr. Geo. W. Freeman is also chairman of the entertainment committee, which is



Vice-President U. F. Dumouchelle.



Mr. L. Burton West,
President Builders and Contractors' Association of Essex.

(of the Barton Netting Company), were elected president and vice-president respectively.

The officers serving for the current year are as follows: President, L. Burton West; Vice-President, U. F. Dumouchelle; Recording Secretary, Geo. W. Freeman; Financial Secretary, G. C. Haugh; Treasurer, Robt. Parker. The executive board is made up of the above officers with the addition of Messrs. Robt. Paddon and A. A. Little. Regular meetings of the Association are held on the first and third Tuesdays of the month. The last regular meeting witnessed the close of a series of competitions in card games, for which three prizes were given. At these entertainments light refreshments were

doing splendid work in maintaining the interest of the members.

The yearly or monthly membership dues are fixed by the Board of Trustees at the annual meeting and are payable monthly in advance. The admission fee is \$10.

A commendable work has been started by the Dennis Wire & Iron Company, Limited, of London, Ont., who have inaugurated evening classes under expert direction with a view to improving the technical attainments of their employees. The Dennis Company employ about 100 men. Of these, about 30 have already enrolled themselves for the work. Mr. E. R. Dennis, the manager of the concern, makes a special hobby of technical education, and has worked hard in the past with the object of interesting the authorities in the establishment of trade schools. Mr. Dennis, however, apparently tired of these slow moving, slow thinking gentlemen, and determined to act on his own account. The example that he has set is one well worthy of emulation. The Dennis school will probably be the first of its kind in Canada.

The rumor that Senator Edwards, of Ottawa, will be the new president of the big cement merger is practically confirmed. The officers elected immediately after the incorporation of the company held office only during the period of organization. It is presumed that Sir Sanford Fleming will be re-elected honorary president.

Mr. John Duncan, a well known contractor, of Windsor, Ont., died suddenly from heart failure last week. The deceased gentleman was 57 years of age and had lived in Windsor all his life.

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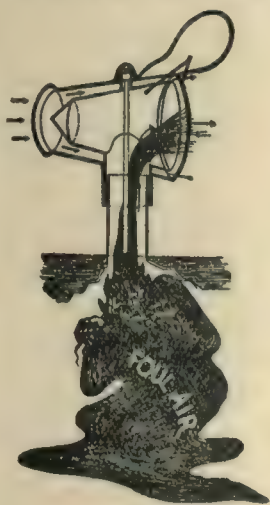
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Canadian City Engineers

James Hutcheon, Guelph, Ont.

Mr. James Hutcheon, City Engineer of Guelph, Ont., is a native of Nassagaweya, Halton County, Ont. He graduated from the School of Practical Science, Toronto, in 1890. Subsequently he qualified for the duties of an Ontario land surveyor, and took up survey work in New Ontario. For some time he practised under the direction of the late Mr. W. R. Burke, of Ingersoll. Later on he joined the staff of Mr. C. H. Keefer, and obtained much useful engineering experience, notably in bridge work. In 1893 he accepted the position of city engineer of Guelph, retaining the post until May, 1906, when he resigned in order to take up private work. For the better part of three years Mr. Hutcheon was engaged upon government surveys in New Ontario, along the line of the National Transcontinental Railway. In the spring of 1909, much to the satisfaction of the people of Guelph, he resumed his former connection



James Hutcheon, City Engineer of Guelph, Ont.

with the city and again took up the duties of city engineer.

While there is some little tendency on the part of the larger cities to regard Guelph as being remote from the excitement and progressiveness of other places, considerable strides have been made at the Royal City during the last decade. Under Mr. Hutcheon's regime many miles of cement walks have been laid, several fine bridges erected and a sewerage system installed. Many serious difficulties were involved in the last-named undertaking; nevertheless the work was carried out successfully, and it is generally admitted that Mr. Hutcheon has given to Guelph an admirable system of sewers.

Mr. Hutcheon is loyal to Guelph and enthusiastic over his work in that city. He is still a comparatively young man and doubtless will have an opportunity of continuing his faithful and efficient service at Guelph for many years. Perhaps this is not exactly what Mr. Hutcheon would wish for. But one never knows. Certainly he is very enthusiastic about Guelph.

Personal News and Notes

Mr. Angus Smith, city engineer of Regina, Sask., has been appointed city engineer of Victoria, B.C.

At Winnipeg, Man., the total for building permits stands at over \$2,000,000, placing the present season one month in advance of the record year of 1907.

One of Montreal's oldest architects passed away last week in the person of Mr. F. N. Boxer. Mr. Boxer was in his 88th year and came to Canada from England when 20 years of age.

At a meeting of the Manitoba Good Roads Association held in Winnipeg last week, officers were elected as follows: President, S. R. Henderson, reeve of Kildonan; Vice-President, Controller Waugh, Winnipeg; Secretary-Treasurer, G. F. Bentley, Winnipeg.

Vancouver, B.C., this year is going ahead by leaps and bounds. By March 14, the building total for the month was already \$50,000 in advance of the figures for March, 1909, the respective amounts standing at \$850,000 and \$800,000.

Mr. R. E. Speakman, city engineer of Brandon, Man., who, it was announced recently, had resigned his position in order to take up similar work at Victoria, B.C., has revoked his decision and will remain at Brandon for a period of at least two years, at an annual salary of \$3,500.

It is with much regret that we have to report the death of Mr. Gillmor Brown, assistant engineer, Public Works Department, Ottawa, who died of heart failure at the Royal Victoria Hospital, Montreal, last week. A photo and biographical sketch of the late Mr. Brown were published in our issue of March 2nd.

Mr. F. J. Wilson, of the city engineer's department at Toronto, Ont., has been appointed city engineer of Moose Jaw, Sask., and left last week to take up his new duties. Mr. Wilson is a graduate of Toronto University and has had considerable experience in his profession. During the past year he has been serving the city of Toronto as assistant on the waterworks tunnel, the trunk sewer and the high pressure fire system.

"The Hardwood Flooring Company," recently organized to carry on an exclusively flooring business in Montreal and vicinity, have taken over the agency for J. R. Eaton & Sons, Orillia, Ont., manufacturers of "Empire" brand hardwood flooring. Mr. C. A. Spencer, who has been acting as J. R. Eaton & Sons' agent at Montreal, is interested in the new company, whose offices are at 55 St. Francois Xavier street, Montreal.

One of the most progressive builders' exchanges in Canada, if not on the continent, is the Winnipeg organization, the membership of which has increased from 40 to 50 a few years ago, to a present enrolment of over 400. During the past month, the entire suite of offices and rooms has been renovated and decorated, and the Exchange now offers all the comforts of club membership. Mr. J. H. Buxton is the energetic secretary.

The Ontario Sewer Pipe Company, Limited, Mimico, Ont., have sent us a copy of their 1910 catalogue in the form of a handsome leather pocketbook, which contains a great deal of useful information concerning the various lines manufactured by the company and providing ample space for figuring. The Ontario Sewer Pipe Company, Limited, have been manufacturing sewer pipe in Mimico for twenty years, and have strong grounds for their claims to excellence in this article owing to the fact that it is their sole line of manufacture.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Burnaby, B.C.

This municipality will shortly call for tenders for waterworks construction.

Belleville, Ont.

Tenders addressed to James G. Lindsay, city engineer, will be received until April 7th for the construction of a trunk sewer on Dundas street.

Tenders will be received until Thursday, April 7th, for the construction of a trunk sewer on Dundas street. James G. Lindsay, city engineer.

Hamilton, Ont.

Tenders have been called for excavation work required in the laying of about 10 miles of water pipes. S. H. Kent, city clerk.

Huntsville, Ont.

On April 11th a bylaw will be voted on to issue \$12,000 5 per cent., 20-year street improvement debentures. T. M. Cullon, clerk.

Montreal, Que.

The Board of Control have approved of Surveyor Barlow's report requesting \$2,477,874 for permanent works. The more important items comprise the following:—Sherbrooke street, relieving sewer, section No. 3, \$57,500; section No. 6, \$65,000. Main sewer for Laurier ward to Back river, \$440,000; outlet for sewer now emptying into Elgin Basin, sewerage pumping plant for Wilham street district, and outlet for sewer at Victoria bridge, \$237,000; replacing old pipes and small sewers with three-inch and two-inch brick, \$100,000; permanent pavements, \$1,000,000; permanent sidewalks, \$251,808; stone and other crossings, \$30,000; installation of street gullies, \$20,000.

Permission is being asked from the Quebec legislature by Messrs. J. A. Prendergast, J. T. Laurendeau and Joseph Versailles to construct the "Montreal East Boulevard." The scheme involves the construction of a driveway 500 feet wide, from Montreal East to Bout de l'Île. It is stated that construction will be started when the authority is granted and the work will be finished within three years.

North Vancouver, B.C.

The two bylaws submitted for the purpose of raising \$20,000 and \$5,000 for clearing and constructing sidewalks respectively, have been passed.

Prince Albert, Sask.

The bylaw providing \$20,000 for the waterworks extensions will be voted upon on April 16th.

St. Lambert, Que.

The town council have ordered the preparation of specifications with a view to ascertain the cost of extending the water and sewer mains to Southwark, the newly

acquired property of the St. Lambert Land Company.

Souris, Man.

Surveys are being made for the proposed sewage disposal and waterworks systems.

Sawyerville, Que.

A bylaw authorizing the town council to buy waterworks from the Sawyererville Water Company was carried on the 30th ulto.

Toronto, Ont.

On April 9th a bylaw will be submitted to the ratepayers to raise \$279,000 for the extension of the water mains.

The time for receiving tenders for the intake pipe has been extended until April 15th. See advertisement in this issue.

Vernon, B.C.

Work has been started by Col. Tracy, of this city, on the construction of the waterworks system of Delta municipality. About forty miles of mains will be laid, the work to cost over \$100,000.

Victoria, B.C.

It has been decided by the provincial minister of public works to proceed shortly with the paving of the roadways about the government buildings in this city, the Hassam pavement having been selected. Estimated expenditure, \$20,000.

Vancouver, B.C.

Tenders were opened as follows for block pavements: Robson street, Homer to Hamilton, Palmer Bros. & Henning, \$5,359; T. R. Nickson & Company, \$4,500; M. P. Cotton, \$4,427. Robson street, Seymour to Hamilton, Palmer Bros. & Henning, 14,457; T. R. Nickson & Company, \$13,400; M. P. Cotton, \$13,342. Robson street, Hamilton to Cambie, Palmer Bros. & Henning, \$6,878; T. R. Nickson & Company, \$6,150; M. P. Cotton, \$6,175. Westminster avenue, Park Lane to bridge, Palmer Bros. & Henning, \$5,481; M. P. Cotton, \$5,128. Stone block paving of lane between Seymour and Granville, one block, Palmer Bros. & Henning, \$5,989; T. R. Nickson & Company, \$4,887; M. P. Cotton, \$4,826; Maurice & Abel, 4,826. For the laying of concrete curbs the only tender was that of Stewart Hull at 66 cents per lineal foot. A single tender was also sent in for the city's supply of cement, Evans, Coleman & Evans offering the product at the same price as last year, \$2.45, delivered at points ordered. A reduction of 15 cents per barrel was made for delivery at the company's wharf. All tenders were referred to the engineer for report.

Yorkton, Sask.

This municipality is calling for tenders for furnishing and constructing of approximately 80,000 square feet of concrete. F. T. McArthur, B.Sc., town engineer. For further information, see advertisement in this issue.

AWARDED.

St. Catharines, Ont.

The Water Commissioners received three tenders for valve and service boxes from

Doherty & Company, Sarnia; Bingham & Taylor, and the Jenckes Machine Company of this city. The latter was accepted.

Tenders were received from Titterton & Company at 23 cents each, and H. Wise for 250 cedar posts for the reservoir fence. The former was accepted.

Several tenders for wire fence were received, that of Robert Cameron at 48 cents per rod, including erection, being accepted.

Vancouver, B.C.

City Council awarded contracts for material for road and sidewalk work as follows: Filling, sand and 20 per cent. of the gravel to the Lineham-Scott Sand & Gravel Company, and the balance of the gravel to the Royal Bay Company. The Lineham Company tender for filling is 88 cents and sand at \$1.08 per yard and gravel at \$1.35. The Royal Bay Company will supply gravel at \$1.15 per yard.

Railroads, Bridges and Wharves

Brantford, Ont.

The bylaw to raise \$50,000 to construct new South Market bridge was carried.

Calgary, Alta.

Mr. J. S. Denis, assistant second vice-president of the C. P. R., has been appointed superintendent of the new \$12,000,000 irrigation scheme which will be carried out in the Bow river district.

County of Hastings, Ont.

On the 22nd June the county council will consider a bylaw to issue \$20,000 20-year bridge debentures. A. M. Chapman, county clerk.

Edmonton, Alta.

Location and surveying work on the Great Waterways Railway has practically ceased, and all plans for the construction of all but the first fifty miles from Edmonton has been abandoned pending the investigation by the Royal Commission.

Fort William, Ont.

Tenders are being called until April 11th by the C. P. R. for construction of machine shop here, also for ditching along the line between this place and Winnipeg, Man. Plans, etc., at office of resident engineer, this city. F. Lee, division engineer, Winnipeg.

Merritt, B.C.

Messrs. Jones and Morrissey, Spokane, Wash., are among the tenderers for the Kettle Valley line, on which construction is reported to start about the first of May. Tenders are to be in by the 15th inst.

Quebec, Que.

Hon. Mr. Taschereau, minister of public works, has announced that another \$100,000 would be voted this year for iron bridges.

The Finance Committee have decided that if the Canadian Northern Railway does not begin the construction of its work shops at Blainville, shortly, the subsidy granted by the city must be returned.

Stratford, Ont.

G. T. R. officials, including First Vice-President Fitzhugh, Chief Engineer Kelly and Manager Brownlee, have submitted a proposition concerning a new railway station to the city officials. The company will erect a station of the most modern type, and equip a new foundry and frog and track equipment shops, at a cost of \$200,000 to \$250,000, provided the city will close a portion of Downie street and build a subway on Nile street to carry traffic under the tracks. Mr. Fitzhugh stated that as soon as he received word that the city was prepared to do its part the work would be commenced at once and completed as soon as possible. He would expect the shops to be finished this year and in operation.

St. John, N.B.

It is reported that the G. T. P. have purchased land around the head of Courtenay Bay to be used as a site for their terminals.

Trail, B.C.

The C. P. R. has under consideration the erection of a new six stall roundhouse, to be built of brick, at Smelter Junction during the coming summer.

Whitemouth, Man.

The settlement bridge north of the town was destroyed by the outgoing ice on the 28th ulto.

Winnipeg, Man.

The plans of the McPhillips street subway, submitted by the C. P. R., were approved. The specifications are left to the city engineer and the company's engineer, and in case of disagreement the railway commission will decide. Work on the subway will begin very shortly.

The C. P. R. are calling for tenders until April 11th for station at Stonewall, Man., and machine shop at Yorkton, Sask. Frank Lee, division engineer.

There is a report to the effect that the Chicago, Milwaukee & St. Paul Railroad will run into this city. A survey has been made to Valley City.

AWARDED.**Battleford, Sask.**

J. Daudelin, of Battleford, has been awarded the contract for grading the Biggar-Battleford branch of the G. T. P.

Gaspe, Que.

The contract for the deep water wharves has been secured by Messrs. Dussault, of Levis, at a price of \$275,000. Work will start in April.

Portage la Prairie, Man.

J. G. Hargrave & Company, of Winnipeg, have been awarded the contract for grading the double track on the C. P. R. from Winnipeg to this place. This work will commence at once and the line will be in operation this year.

Regina, Sask.

The contract for the construction of the G. T. P. from Regina south to the boundary near Portal, has been awarded to the J. D. McArthur Company, of Winnipeg.

Victoria, B.C.

Armstrong & Morrison, of Vancouver, have a contract for the construction of twenty-five miles of the Island Valley Railway. The promoters are John Castleman, William T. Corry and William Henderson, of Vancouver. Estimated expenditure, \$500,000.

Winnipeg, Man.

The contract for railway asphalt plant has been awarded to P. D. Cummer & Son

Company, of Cleveland, O., for \$16,500; it will have a capacity of 1,800 yards.

Public Buildings, Churches, Schools, etc.**Brantford, Ont.**

The bylaw to raise \$100,000 to erect buildings for market purposes only was defeated; that to construct two schools at a cost of \$30,000, was carried.

Calgary, Alta.

It is reported that Calgary Odd Fellows will erect a \$100,000 temple.

Crandall, Man.

A vote of the ratepayers taken on a bylaw to enlarge the public school was carried.

Edmonton, Alta.

The ratepayers will vote on the 21st of April on a bylaw to raise by debentures the sum of \$34,500 for the building of two new fire halls and hose tower.

Hamilton, Ont.

A bylaw to authorize the expenditure of \$40,000 for the erection of a House of Refuge will be submitted to the ratepayers on June 6th.

Architect McPhie and Controller Cooper have been given authority to curtail the cost of the new registry office so that it may be built on the present expropriation. Noted in last issue.

Halifax, N.S.

Messrs. Ross & Macfarlane, architects, 1 Belmont street, Montreal, are the architects for the new Y. M. C. A. here. Tenders closed on the 6th inst.

Hull, Que.

It is stated that the Presbyterian church will erect a Protestant school in Wrightville. Purchase of site being negotiated by Mr. D. G. Currell.

Kamloops, B.C.

Perry Bros., the Vancouver contractors, who are to build the new convent, have begun operations, and will push the work to completion as rapidly as possible.

Kildonan, Man.

The bylaw to raise \$11,000 by the sale of debentures for school debentures will be sent by the council to the ratepayers for ratification.

Kingston, Ont.

Tenders will be received at the office of the Registrar, Queen's University, until April 7th, for the erection of the Nicol Building. Power & Son, architects.

Markdale, Ont.

A bylaw has been passed to issue \$5,000 school building debentures.

Montreal, Que.

Tenders will shortly be received for the construction of additions to St. Clement's church, Verdun, Que. Ross & Macfarlane, architects, Belmont street.

Plans for a bane d'œuvre for a Grand Mere, (P. Q.) church are being prepared by Messrs. MacDuff & Lemieux, architects, Merchant's Bank Building.

Tenders will be received until April 7th for the construction of the new wing for the Medical Building at McGill University. Brown & Vallance, architects, Canada Life Building.

Plans and specifications are in course of preparation by Ross & Macfarlane, architects, 1 Belmont street, for the Central

Y. M. C. A. building on Drummond street, and for the Westmount Y. M. C. A. building, corner Arlington avenue and Sherbrooke street.

It is stated that the building committee of the Art Association, Montreal, on the advice of Mr. Edmund Wheelwright, a prominent Boston architect, have decided to ask competitive designs from the following architects: Messrs. Brown & Vallance, E. & W. S. Maxwell and Professor Percy Nobbs, McGill University, for their new building to be erected on the Holton property corner Ontario avenue and Sherbrooke street. It is expected that the plans will be prepared by June and a decision given by the middle of the month.

Moose Jaw, Sask.

The congregation of St. Andrew's Presbyterian church are negotiating for a site for their new church.

D. W. F. Nichols, architect, will prepare plans for the Y. M. C. A. buildings here and at Port Arthur. E. M. Thomasson, local secretary.

North Battleford, Sask.

The skating and curling rink here was destroyed by fire on the 28th ulto. Estimated total loss, \$9,500.

North Vancouver, B.C.

This municipality has carried a bylaw providing \$17,200 for new schools.

Oshawa, Ont.

The Oshawa Golf Club will probably build some additions to their club house shortly.

Portage la Prairie, Man.

The bylaw to borrow \$20,000 to be used in the construction of a new school in the Galician settlement, has been carried. Work will begin at once, and it is understood that H. Mathews, of Winnipeg, is to be the architect.

Revelstoke, B.C.

The Revelstoke School Board having petitioned the city council for \$30,000 bylaw for a new school building on block 50 South East street, the city council has asked the Board to reconsider its proposal, with a view to a plebiscite being taken in respect of the selection of a site.

Rodney, Ont.

Tenders were called on the 5th inst. for the town hall building here. A. E. Hughill, clerk of Aldborough Township, Rodney P.O.

Saskatoon, Sask.

Tenders for the building of the university here have been opened. It was found that the lowest tenders exceeded the estimated cost and consequent government appropriations by about 20 per cent. The matter will be more fully considered.

South Middleton, Ont.

Tenders will be received by Geo. Fisher, secretary treasurer, until April 20th, for the re-construction of the schoolhouse of S. S. No. 7. Plans, etc., at residence of the above mentioned.

Springfield, Man.

The ratepayers will vote on April 15th on a bylaw to issue \$1,500 school debentures. C. Christopherson, secretary-treasurer.

Sudbury, Ont.

The council have decided to erect at once a new municipal building and to accept the design submitted by Jas. Thomson, architect, Aberdeen chambers, Toronto. Estimated expenditure, \$25,000.

Toronto, Ont.

The High Park Methodist Church will proceed at once to erect their Sunday school building. Estimated expenditure, \$20,000.

It is reported that the Bishop Strachan School Board has purchased a site of five acres bounded on the south by Davenport road on the west by Christie street and on the north by the Edwards estate.

The management of Knox College have bought the residence of Mr. W. H. Brouse, 63 St. George street, which adjoins property already in their possession, on which they may start the erection of their new college in the near future.

Tenders addressed to Gordon & Helliwell, architects, Confederation Life Building, will be received until April 2th for the various trades required in the erection of fireproof building on College street for the Upper Canada Bible Society.

Tenders will be received until April 12th for all trades required in the erection and completion of a three storey fireproof museum building for the University of Toronto. Plans, etc., at office of the architects, Darling & Pearson, 2 Leader Lane, Toronto.

A building permit has been granted to the Church of the Epiphany for their church, on the southwest corner of Queen and Beatty, \$40,000.

Vancouver, B.C.

The negotiations with Dominion Government have been successful, and the site for the new isolation hospital will be on the Admiralty Reserve.

It is possible that a school will be erected in South Mount Pleasant. Others to be erected are: Corner of Bismarck and Charles streets, Grandview; Cypress and Maple streets, Kitsilano, and on Fifteenth avenue, Fairview, between, Alder and Spruce streets.

Westboro, Ont.

Tenders are now being let for the new \$15,000 six-room brick school here. It is expected that work will be commenced on the school inside of a week.

Winnipeg, Man.

Permits were granted to Young Methodist Church and to the Fort Rouge Methodist congregation. The cost of the former will be \$72,000, and that of the latter, \$45,000.

J. B. Mitchell, of the school board offices, recently submitted for approval the plans for the new Lord Roberts school, to be erected on the west side of John street, between Beresford and Rathgar; cost \$86,000 with the heating equipment included.

Division of expenditure on hospital is reported as follows: Extension of General hospital, \$300,000; auxiliary hospital to General, \$100,000; isolation hospital, \$100,000; tubercular hospital, \$75,000; and morgue, \$25,000. Noted in last issue.

At a meeting of the parishioners of St. John's, plans for a projected new cathedral came up for discussion. Dimensions—200 feet long, width of transept, 120 feet. Cost, \$250,000. Building committee, A. Code, J. A. Machray and others.

The directors of the St. Charles County Club have decided to rebuild the club house recently destroyed by fire. Tenders for the erection of a temporary club house will be called at once. Plans of the new permanent building will be considered at a meeting of directors to be held in the near future. G. W. Northwood is mentioned as architect.

AWARDED.**Montreal, Que.**

The general contract for the erection of the school for the Reverend Sisters of the Holy Cross, on St. Hubert street, has been awarded to T. Lessard & Sons, Limited. Jos. Sawyer, architect.

The Protestant Board of School Commissioners have awarded the general contract for the erection of the William Dawson School on Christopher Columbus avenue to Messrs. Gray & Wighton. Mr. A. F. Dunlop, architect, Lindsay Building.

St. John, N.B.

At a meeting of the Exhibition Association directors, the following tenders for the erection of the new buildings were recommended for acceptance: A. E. Hamilton, new horticultural building; S. A. Williams, grand stand. In the case of the horticultural building, the masonry must be completed by May 15th, and the whole building be ready by July 1st. Work on the other contracts must be commenced by May 1st, and completed July 1st.

Toronto, Ont.

The contract for the masonry work of the new addition to the House of Industry has been awarded by the Board of Control to Witchall & Son, 163 Havelock street, at \$5,937.

The Board of Education have accepted the following tenders in connection with the enlargement of Balmy Beach School: masonry, R. Chalkley & Sons, \$9,559; concrete floor, A. Gardner & Company, \$1,840; carpentry, M. Hutchinson, \$7,230; roof and tinsmithing, A. B. Ormsby, \$1,304; plastering, Geo. White, \$1,165; painting, Jas. Finnemore, \$620; plumbing, Fiddes & Hogarth, \$1,059; structural steel, Reid & Brown, \$1,048; heating and ventilating, Pease Heating Company, \$795; electric wiring, Hall & Doherty, \$67. Total, \$24,687.

The following tenders for erection of isolation hospital have been accepted:—Masonry, Orr Bros., \$30,796; carpentering, M. Hutchinson, \$18,678; painting and glazing, James Casey, \$1,985; roofing, etc., Douglas Bros., \$2,150; plastering, Beaver & Company, \$4,500; flooring, Terrano Company, \$1,022.20; tiling, Luxor Prism Company, \$1,577.80; electric wiring, Bennett & Wright Company, \$1,223; plumbing, Keith & Fitzsimons Company, \$5,840; steam heating (vacuum system), Purdy, Mansell, Limited, \$6,262; total, \$74,034.

Winnipeg, Man.

The contract for the new Lord Roberts' school, in the Rosedale district of Fort Rouge, was let to J. H. Tremblay & Company, being \$76,000. Work on the contract will begin at once. The plans of the new collegiates were also under consideration.

The contract for the erection of the new Methodist church to be erected on the corner of Broadway and Furby streets by Young church congregation has been let to Clark & Mitchell, contractors. James Chisholm & Son, architects. Probable cost \$70,000. Contracts for finishing work, amounting to \$3,000, will be let later.

Contract for the general construction of the Orpheum theatre on Fort street, has been awarded to Hazelton & Wallin, of Chicago, Ill., at \$150,000. It is also stated that the Manitoba Bridge Company will furnish the steel, and Dunn Bros. the face brick, terra cotta and ornamental iron work. Contracts for plumbing, heating and lighting have not yet been placed. J. D. Atchison is local architect; Kirchoff & Rose, Pittsburg, specialists in the theatre construction, associate.

Residences**London, Ont.**

Mr. F. Lashbrook has taken out a permit for a two storey brick residence on St. James street \$5,000.

Montreal, Que.

MacDuff & Lemieux, architects, Merchants' Bank Building, are preparing plans for a residence for Mr. Fortin to be erected on the corner Mount Royal and Park avenue.

Plans and specifications are being prepared by Messrs. MacDuff & Lemieux, architects, Merchants' Bank Building, for a bungalow to be erected at Rigand, Que., for Mr. Meilleur.

Plans for a country house at Pincoirt, Que., for Mr. J. W. Fontaine, are being prepared by MacDuff & Lemieux, architects.

Plans and specifications are being prepared for a bungalow to be erected at Quinichien, Que., for L. A. Jacques. MacDuff & Lemieux, architects.

Plans for a country house at St. Jeanne, Ile Perrot, Que., for Mr. L. Lemieux, are being prepared by MacDuff & Lemieux, architects, Merchants' Bank Building.

Tenders are now being received for the erection of a residence on Kensington avenue for Mr. John McKergow. Marchand & Haskell, architects, Guardian Building.

Outremont, Que.

Recent building permits include: Mr. Orbin, residence on St. Catherine road, \$20,000; Robt. Neville, four houses on Derippe avenue and four on Bloomfield avenue; residence on St. Louis street, \$15,000; J. Seath Smith, architect, Montreal.

Owen Sound, Ont.

Tenders will be received until April 8th by Forster & Clark, architects, for the several trades required in the erection of a residence on First avenue west. Plans at office of the above.

Ottawa, Ont.

Mr. Alwyn Bate has bought the south-east corner of Somerset and Lyon streets, on which, it is reported, he will erect an apartment house.

Mr. F. L. Campbell will erect an apartment house this summer on Preston street near Somerset.

Sydney, N.S.

A building permit was issued by the city engineer to Harold Miller for the erection of a dwelling on Park street. A. H. Robb, contractor. Cost, \$2,200.

Toronto, Ont.

Two new brick veneer residences, 1079 and 1081 Keele street, owned by the Union Stock Yards Company, were damaged to the extent of about \$2,500.

Waters & Porter have taken out a permit for six pair semi-detached two storey brick dwellings, 332-354 Lansdowne, \$24,000.

Winnipeg, Man.

L. Ripstein, it is reported, has bought the lot on Kennedy street opposite Government House, on which he will erect a large residence.

A. B. Kent has secured a permit for the erection of an apartment block on the southeast corner of Colony and St. Marys. The building will contain twenty-nine suites and will cost \$50,000.

A permit has been granted for the erection of a four storey apartment block to the Rostrevor Apartment building Syndicate; cost \$350,000; dimensions 200 by 145

feet. W. W. Blair is the architect, and the G. H. Walton Company the builders. Construction will begin at once.

W. A. Irish has secured a permit for the erection of an apartment block to cost \$38,000, to be erected on the east side of Vaughan, between St. Mary's and the Court House.

Williamson Bros. have received a permit for the erection of an apartment block on the northwest corner of Notre Dame and Kate; cost, \$14,000.

Permits for houses have been issued as follows: Geo. Market, east side Alverstone, between Notre Dame and Yarwood, \$3,000; R. Ward, south side Matheson, between Main and Norman, \$2,500; Arni Eggertson (two), east side Agnes between Sargent and Wellington, \$6,000; W. Webster, east side Arlington, between Bath and Ida, \$2,700; W. G. Loudon, north side Polson, between Main and Mac, \$2,500; Lance Hall, west side Banning, between Emerson and Livinia, \$2,300.

AWARDED.

Elora, Ont.

Mr. Jerry Wright, near Marden, has awarded contracts for his house as follows: Carpentering, Wm. Sheppard; brick work and plastering to David Ritchie, and the painting, etc., to Wm. Bergin. Cost \$2,500.

Montreal, Que.

MacDuff & Lemieux, architects, Merchants' Bank Building, have awarded contracts as follows for the erection of a flat on Westmount Plateau for W. Beaupre & Sons: Stonework C. Charbonneau; brickwork, J. Legault & Company; carpentry, V. Saurette; plastering, A. Lacroix; plumbing, heating and ventilating, J. Labelle; painting, J. Rodrigue.

The contract for the erection of a residence on Columbia avenue, Westmount has been awarded to S. M. Hartman. R. Montgomery Rodden, 8 Beaver Hall Square, architect.

The contract for the erection of six flats on Mitcheson street for Mr. Bernstein has been awarded to Messrs. Share & Gersovitz. Mr. C. Dufort, architect; La Patrie Building.

Victoria, B.C.

D. H. Bale has been awarded the contract for a modern residence for Mr. Geo. W. Cramer to be built on Third street.

Business Buildings and Industrial Plants

Brandon, Man.

The Codville Company have decided to build a three-storey warehouse on the site of their building on Pacific avenue.

The Hanbury Company in addition to other new structures, will extend and improve their mill and factory.

It is stated that G. and N. J. Beattie, of Fergus, Ont., have concluded arrangements for a building site, 60 by 80 feet, between Fifth and Sixth streets, on which they will erect a large warehouse.

Chatham, Ont.

The buildings occupied by King, hardware merchant, C. Austin Company, and G. Meynell were damaged by fire on the 31st ulto. Estimated total loss, \$40,000.

Edmonton, Alta.

Tenders for the erection of a building for the National Trust Company will be received until April 7th. Plans, etc., at the office of the architect, John D. Atchison, Bank of Toronto Building, Winnipeg.

Fernie, B.C.

Plans have been prepared and tenders invited for the construction of a new two storey bank building for the Home Bank of Canada in this city; frontage, 30 feet on Victoria avenue and 60 feet on Cox street; materials, cut stone and pressed brick.

Hamilton, Ont.

It has been announced that the Ludlan-Ainslie Lumber Company, of Leamington and Sarnia, will locate here. Property in the east end with a frontage of 500 feet, has been purchased, on which they will erect two large buildings. A. F. Hatch, of Canada Steel Goods Company, is director.

London, Ont.

It is reported that Dennis Wire & Iron Works will extend their plant, and that a steel company have bonded sites near the McClary Manufacturing Company.

Moosomin, Sask.

The Dominion Elevator Company's new elevator was destroyed by fire on the 30th ulto.

Moose Jaw, Sask.

The Bank of Montreal have purchased property, 50 by 125 feet, on the corner of Fairford and Main streets, as a building site.

Medicine Hat, Alta.

The Bank of Montreal has purchased a \$10,000 site on Toronto street on which to erect a bank building this year.

Manor, Sask.

The Hotel manor, Hewitt's hardware store and Sharpe & Company's general store were destroyed by fire on the 2nd inst. Losses respectively are, \$18,000; \$8,500 and \$28,000.

Montreal, Que.

Plans and specifications have been completed by Messrs. Ross & Macfarlane architects 1 Belmont street, for the erection of an eight-storey building on St. Catherine street for the Willis Company; tenders will shortly be received for construction of same.

Tenders were received up to April 6th for the erection of four flats and two stores on Cadieux street for Mr. R. Marks. Mr. C. Dufort, architect, La Patrie Building.

Plans and specifications have been prepared and tenders received for the construction of a modern ten storey fireproof office building at the corner of Dollard Lane and St. James street. It is expected that the work of erecting the new building will be commenced on May 1st, when the lease on the present property expires. J. C. Broderick, National Trust Building, architect. (Previously mentioned.)

The premises occupied by J. H. Waldman & Company, St. Paul street, were destroyed by fire on the 2nd inst. Estimated loss, \$100,000.

Messrs. MacDuff & Lemieux, architects, Merchants' Bank Building, are preparing plans and specifications for office fixtures for the Mark Workman Company.

Plans and specifications are being prepared for alterations to two stores and dwellings at the corner of Marie Anne and Breboeuf streets, for Mr. F. L. de Martigny. MacDuff & Lemieux, architects, Merchants' Bank Building.

New Liskeard, Ont.

Mr. Weatherup is negotiating with the council for the location of a flour mill here to cost, exclusive of elevators, \$25,000.

Ottawa, Ont.

Dr. Baird has purchased property on Queen street, east of Bank, where he will erect, it is stated, a four storey building.

Tenders will be received until April 9th, for the installation of plumbing, heating and ventilating systems, electric light, power and telephone wiring, elevators and vacuum cleaning system in the Union Station, Ottawa. Messrs. Ross & Macfarlane, architects, 1 Belmont street, Montreal, Que.

Tenders will be received at an early date for the installation of plumbing, heating and ventilating systems; electric light, power and telephone wiring, elevators and vacuum cleaning system; in the Chateau Laurier, Ottawa. Ross & Macfarlane, architects, 1 Belmont street, Montreal.

Port Arthur, Ont.

George Arthur's garage was burned on the 28th ulto. Total loss about \$5,000.

Portage la Prairie, Man.

Plans have been prepared for a new addition to the Bank of Commerce building in this city and the work will be pushed ahead without delay. Estimated expenditure, \$10,000.

Rosthern, Sask.

The Dominion elevator was destroyed by fire on the 30th ulto. Estimated total loss \$7,200.

Stratford, Ont.

The mills owned by Duftons, Limited, were almost totally destroyed by fire on the 3rd inst. Total estimated loss, \$50,000.

St. Thomas, Ont.

The ratepayers will shortly vote on a bylaw to raise \$15,000 as a loan to A. E. Metcalf, who is considering the erection of a shoe manufactory.

St. Catharines, Ont.

The buildings occupied by the Peerless Cash Register Company was destroyed by fire recently. Estimated total loss, about \$8,000.

Sault Ste. Marie, Ont.

It is reported that the Lake Superior Steel Corporation have plans for the enlargement of the works, which will call for an expenditure of approximately \$6,000,000, while extensions of the Algoma Central Railway, which is owned by the corporation, are being planned, to cost nearly \$5,000,000. The Dominion Tar Company, capitalized at \$100,000, has, according to Mr. Fawcett, member of the local Board of Trade, purchased seven acres of land from the Lake Superior Power Company, and will erect a plant for the manufacture of coal tar from the by-products of the coke ovens.

Three Rivers, Que.

J. A. Tessier, M.L.A., will present a bill to the legislature asking for the authorization to borrow \$200,000 to aid in the rebuilding of this city.

Thessalon, Ont.

It is stated that the C. P. R. will spend \$40,000 on a new station and yard at this point in June.

Toronto, Ont.

A permit for the erection of the new Union Bank, southeast corner of Bay and King streets, has been issued by the city architect. The building will be five storeys in height, and will be of fireproof construction, steel, brick and concrete. Cost, \$150,000.

A building permit has been issued to Canada Veiling Company, for a six storey,

brick and steel warehouse, 84-86 Wellington street west, \$76,000; also to A. Kent & Sons Company for a ten storey brick and steel office building, 156 Yonge street, \$150,000.

Vancouver, B.C.

The Fraser River Lumber Mills announce plans for extending its plant at Millside this summer at a cost of \$250,000.

Victoria, B.C.

W. N. Mitchell, 242 Gorge road, has purchased property east of Douglas street, where he will erect three stores shortly.

J. Valo, 313 Broad street, will build a two storey block at Government and Bay streets, cost, \$10,000; Sweeney & McConnell, Langley street, will build on the lot next the B. C. Electric Company's offices, cost \$15,000.

Architect G. E. Watkins has practically completed plans for the five storey structure on Fort street between Douglas and Blanchard, for J. S. Bowker. It is expected that they will be approved in a few days, when tenders will be invited and the work proceeded with.

Windsor, Ont.

The new industrial bylaw in Windsor, which provided for the setting aside of \$20,000 for the purchase of 40,000 acres of land for factory sites, will be voted on by the citizens on May 2nd.

Winnipeg, Man.

It is the intention of Stobart & Company, King and McDermot streets, to erect a three storey addition, occupying the entire property, during the present season. The foundations will be put in to carry at least seven storeys, to which height it will be carried next year. Estimated expenditure, \$60,000. Plans will be definitely arranged on Mr. Stobart's return from England in June.

Tenders will be received until April 9th by Wm. Fingland, architect, 334 Portage avenue, for branch building for the Bank of Hamilton, at Swan Lake and Roland, Man. Plans, etc., at the above mentioned branches and at the office of the above.

Yorkton, Sask.

At a special meeting of the board of trade, the Yorkton, Forwarding & Storage Company, capitalized at \$10,000, was organized, and work of erecting a large, wholesale storage warehouse for wholesalers will be begun immediately.

AWARDED.

Montreal, Que.

The contract for electric lighting fixtures for the Bank of Montreal Building in St. Johns, Newfoundland, has been awarded to the Garth Company, 26 Craig street west, Montreal. Messrs. Peden & McLaren, architects, 20 St. Alexis street.

The contract for wood finishing in connection with alterations to new offices for Messrs. Hanson Bros. in the Liverpool, London & Globe Building, has been awarded to Thos. Ford. Mr. C. Dufort, architect, La Patrie Building.

The contract for the construction of the new Windsor street station viaduct has been awarded to the Bishop Construction Company. W. S. Painter, C. P. R. architect.

Orillia, Ont.

The Expanded Metal & Fireproofing Company of Toronto, have the contract to supply materials for reinforcing concrete work and steel "Finestra" sashes for the factory being erected by the E. Long Manufacturing Company. Estimated cost, \$7,000.

Stratford, Ont.

Messrs. Swift & Company have awarded the contract for the construction of their storage plant to John L. Youngs.

Winnipeg, Man.

Jas. McDiarmid & Company have been awarded the contract to construct the planing mill at the C. P. R. shops here.

Power Plants, Electricity and Telephones

Berlin, Ont.

Property owners to-day carried two by-laws one to take \$60,000 worth of stock in the People's Railway Company, and the other to grant certain franchises to the company along the public streets.

Brandon, Man.

City Engineer Speakman has prepared plans for the establishment of a steam generating plant, capable of furnishing sufficient power to operate a street railway, the pumping station and street lighting, and save about 300 horse power in reserve. A public steam heating system would also be served. Estimated cost \$125,000.

Brockville, Ont.

It has been decided to submit a bylaw to the ratepayers on April 25th, providing for an expenditure of \$50,000 to amalgamate light and water plants.

Calgary, Alta.

The commissioners have recommended that a bylaw to raise \$125,000 for the proposed municipal electric power plant, be submitted to the ratepayers. City Engineer Childs has completed plans.

An estimate of the amount that will be required for electric light extensions has just been prepared by Commissioner Graves, and includes: 86,074 pounds weatherproof wire at 18 and 20 cents, \$15,593.32; 550 poles, various sizes, \$2,169; 2,600 cross arms, various sizes, \$920; machine and carriage bolts, washers, wood screws, nails, guy wire and clamps, cross arm braces, fuse wire and plugs, rubber-covered wire, porcelain tubes, top pins, D. P. insulator, lamp sockets, pole steps, sundries, \$5,621.27; meters, various sizes, \$12,000; transformers, various sizes, \$10,280; 100 arc lamps and station transformers and equipment, \$7,000. Total \$70,000.

Edmonton, Alta.

The citizens will vote on April 21st on a bylaw to issue \$30,000 debentures for the purpose of extending and improving the municipal electric system; also on the same date on a bylaw to issue \$60,000 debentures for the purpose of erecting, etc., car barns for the municipal street railway system; also on the same date a bylaw to issue \$260,500 debentures to extend and further equip the municipal street railway system.

London, Ont.

Mr. M. A. Soper, representing Smith, Kerry & Chace, consulting engineers, Toronto, has been looking over the proposed line of the London & North Western Railway, with which it is planned to connect London with Sarnia, through Parkhill. The firm has already handed in a report to the promoters.

Montreal, Que.

McCaig Bros. & Company have purchased the Sherbrooke Street Railway; also water powers in the vicinity. It is the intention to extend the road considerably. A large amount of money will also be expended in developing the power plants. Ross & Holgate, consulting engineers.

Moose Jaw, Sask.

The ratepayers will vote on April 19th on the question of street railway franchise. W. F. Head city clerk. Noted in last issue.

It is reported that a syndicate consisting of A. A. Dion, Ottawa; Jas. T. Cashman, Moose Jaw, and others, came to an agreement with the corporation on the 26th ulto., whereby the syndicate undertakes to build three miles of street railway this summer and three miles next summer, receiving an exclusive franchise for twenty years. It is estimated that the initial cost will be \$175,000. Noted in last issue.

New Westminster, B.C.

Extensive improvements are contemplated to the plant of the Mission Telephone Company.

Report has it that the B. C. E. R. Company has purchased fifty acres adjoining the Fraser river bridge at New Westminster for tram freight yards purposes.

Port Renfrew, B.C.

Peterborough, Ont.

The Canadian General Electric Company, through General Manager Mr. F. Nicholls, has submitted to the Mayor, the following offer for the surplus power at the new waterworks dam: To build and equip a power house, operate and maintain the same, and pay the sum of \$2,000 annually to the city, on the understanding that not less than 1,000 horse power will be available; at the expiration of the 20-year term the power house and equipment to revert to the city without cost; the company to spend not less than \$250,000 on improvements and extensions.

Renfrew, Ont.

In order to raise money for the development of the water powers, a bylaw will be submitted to the ratepayers for \$77,000.

Stratford, Ont.

The Bell Telephone Company proposes to erect a new office building at a cost of \$50,000.

On April 14th, the ratepayers will vote on a bylaw to provide \$95,000 for a distribution plant for Niagara power.

St. Thomas, Ont.

City Engineer Bell advises the ratepayers to vote on the improvement to city railway on the date they vote on park improvements.

Victoria, B.C.

The West Coast Power Company, Limited, is making application for a water record of 3,500 feet per second on Gordon river, Vancouver Island, just below the Big Canyon. It is calculated that 110,000 horse power can be developed with this amount of flow and with a 300-foot head. It is stated the works will occupy an area of 100 acres.

Vancouver, B.C.

The construction of the new wing of the British Columbia Telephone Company's building in Seymour street, will be begun at once by Messrs. Smith & Sherbourne, from designs prepared by Mr. Cox.

Tenders will be received until April 15th for the supplying and erecting of poles for the B. C. Telephone Company, Limited. Plans, etc., at telephone offices at Victoria and this city.

Winnipeg, Man.

A permit has been issued for the city power terminal station to be erected by Clayton Bros., on Rover street, between Rachel and McFarlane; cost \$87,000.

The Board of Control has been instructed to call for tenders for two 6.6 ampere

(Continued on page 31)

Tenders and For Sale Department

The City of Calgary

Tenders will be received by the City Commissioners up to and including APRIL 22ND, 1910, at 4 o'clock p.m., for supplying the City of Calgary with the following material:

Salt Glazed, Vitrified Clay Sewer Pipe, according to specifications to be furnished by the City Engineer. Tender to state price, f.o.b. Calgary.

A marked cheque for \$100 to accompany each tender.

The lowest or any tender not necessarily accepted,

H. E. GILLIS,
City Clerk.

Dated at Calgary March 17th, 1910. 16

TOWN OF DUNNVILLE

Province of Ontario

Notice to Contractors

Sealed tenders will be received by the Town Clerk until 8 p.m. on TUESDAY, APRIL 19TH, 1910, for the following works:

(a) For constructing Sewage Pumping Station.

(b) 3,000 feet of wrought iron pipe, and brass valves.

(c) Laying of the above for Compressed Air Line.

(d) Air Compressors.

(e) 400 manhole steps.

No tender necessarily accepted.

ROBT. BENNET, ESQ., J. W. HOLMES, ESQ.,
Mayor, Dunnville, Ont. Town Clerk,
Dunnville, Ont.

WILLIS CHIPMAN,
Chief Engineer, Toronto, Ont. 14

County of Victoria

Tenders for

Steel Bridge Spans

Tenders, so marked, will be received by the undersigned until WEDNESDAY, APRIL 13TH, 1910, for the supply and erection of two (2) Steel Bridge Spans of sixty (60) feet each over all for a bridge in two parts separated by a fill of about 100 feet, across Little Bob River, near the Village of Bobcaygeon.

The spans are to be of sufficient width to provide a clear fourteen (14) feet roadway, unobstructed, to be constructed for the reception of a concrete floor and in all respects to conform to the Ontario Government specifications, 1909.

The tenders are to include the supply of wire bonding for the concrete floor, of corrugated steel and of approved strength.

Tenderers are to furnish with their tenders plans of the spans, with all requisite details, and certified by the Department of Public Works of Ontario.

Further particulars on application.

No tender necessarily accepted.

J. R. McNEILLIE,
County Clerk.

Lindsay, March 26th, 1910. 14

YORKTON, SASK.

Tenders for Concrete Sidewalk

Tenders will be received by the Secretary-Treasurer of the Town of Yorkton, Sask., until MONDAY, APRIL 25TH, 1910, for the furnishing of all material and the construction of approximately 80,000 square feet of concrete sidewalk. Particulars may be had on application to the Town Engineer. A marked cheque for \$300 to accompany each tender. Lowest or any tender not necessarily accepted.

F. T. McARTHUR, B.Sc.,
Town Engineer.

The City of Calgary

Tenders will be received by the Commissioners of the City of Calgary up to and including the 22ND DAY OF APRIL, 1910, at 4 o'clock p.m., for the construction of the following works, according to plans and specifications to be furnished by the City Engineer:

Five miles of sewer, including pipe,
Three miles of water mains, city supplying pipe.

A marked cheque for \$500 to accompany each tender.

A bond of maintenance for one year signed by a satisfactory surety company to be delivered when work is completed.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,
City Clerk.

Dated at Calgary, 17th March, 1910. 16

Township of East Zorra

Tenders Wanted

Tenders will be received by the undersigned up to 8 o'clock p.m., of MONDAY, APRIL 11TH, 1910, for the erection of a Steel Bridge and Concrete Abutments therefor, in the Township of East Zorra, Oxford County, Ont., bridge to be 70 feet long over all and 14 feet clear width, with concrete reinforced floor, and guaranteed to carry a moving load of 15 tons. Tenderers to furnish plan and short specification of proposed work and may offer for the whole work, or for erected bridge, or for abutments, or for floor only. For further particulars apply to

JAMES ANDERSON,
Clerk, East Zorra,
Hickson P.O., Ont.

14

Plant for Sale

For Sale:—The following Second-Hand Plant, located at Durham, Ont., or portion thereof. The whole lot at a reduced price,

25 No. 8 American, square pan, wooden hub, Wheel Scrapers.

28 No. 8 K. & J., round pan, iron hub, Wheel Scrapers.

6 No. 3 Western, square pan, with doors, Wheel Scrapers.

7 No. 2, K & J, round pan, iron hub improved, Wheel Scrapers.

55 Doors and Gates, for No. 3 Wheel Scrapers.

27 Slush Scrapers.

15 Light and Heavy Plows.

Located at Three Rivers, Que.
One Large Travelling Clam Shell Derrick.

One Steam Pile Hammer (Cram Patent), with Steam Hose.

One Thomas Automobile (Model 31), 60 h.p., thoroughly overhauled and painted; location, Toronto.

THE RANDOLPH MACDONALD CO., LIMITED,
14 Crown Life Building, Toronto, Ont.

EXTENSION OF TIME

Tenders for Gas Franchise

Bids, sealed and endorsed "Gas Franchise," will be received by the City Clerk of the Corporation of the City of Fort William, up to APRIL 11TH, 1910, for the letting of a Gas Franchise, including construction of Plant, Mains, etc., and operation.

Conditions, specifications and form of tender, on which bids must be submitted, can be obtained from the undersigned. Lowest or any tender not necessarily accepted.

JOHN WILSON,
Assistant City Engineer,
Fort William, Ont.

14.

Town of Weston

Province of Ontario

Water Works

Sealed tenders will be received by the Village Clerk until 8 p.m. on MONDAY, APRIL 18TH, 1910, for the following works:—

Contract "B"—Pump House.

Contract "F"—Mechanical Water Filters.

Contract "G"—Electrically Operated Pumping Machinery.

Plans and specifications may be seen at the office of the Chief Engineer, Mail Building, Toronto, or at the Town Hall, Weston.

R. J. BULL, Esq., J. H. TAYLOR, Esq.,
Mayor Clerk,
Weston, Ont. Weston, Ont.

WILLIS CHIPMAN Chief Engineer,
204 Mail Building, Toronto, Ont.

14

Positions Vacant

WANTED.—ARCHITECTURAL DRAFTSMAN, good all-round man. Steady employment if services prove satisfactory. Send references, state experience and salary wanted. Address Box 953, Contract Record, Toronto. 15

Positions Wanted

CONCRETE WORK.—A good man, well up in the business, thoroughly understands plans, handling men and getting results, and a hustler, is open for a change, or would take contract, any town. Box 949, Contract Record, Toronto. 14

Miscellaneous

WANTED TO FORM PARTNERSHIP with a practical contractor, or one who wishes to enlarge and needs more financial assistance. Apply Box 952 Contract Record, Toronto. 14

GOOD SECOND HAND HYDRAULIC HOIST complete, capacity 2½ tons. For sale, very cheap. Apply to R. J. Dodds, 16 King street east, Toronto, Ont. 15

PLANT FOR SALE

One No. 3 Gates crusher, complete.
Three revolving stone screens.
110 elevator buckets.
One 70 h.p. Loco fire box boiler.
One 30 h.p. Loco fire box boiler, on wheels.
One 25 h.p. Loco fire box boiler, on skids.
One 12 h.p. "Champion" boiler and engine.
One single drum Buffalo horse power.
One double drum horse power.
26 pairs 18-inch ear wheels with axles, 3-foot 6-inch gauge, with boxings.
A lot of derrick castings and irons.
Wire guys.
One piece of shaft, 3 7-16 inch by 13 feet 9 inches.
One piece of shaft, 2 15-16 inch by 12 feet.
Some belt pulleys.

J. C. INGLES,
Hagersville, Ont.

16.



Tenders for 72 INCH STEEL PIPE

Public notice is hereby given that the time for receiving tenders for a supply of 72-inch Rivetted Steel Pipe, in connection with the proposed extension to the waterworks intake for the City of Toronto is extended from Tuesday, April 5th, 1910, to Friday, April 15th, 1910.

Tenders are to be sent by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, and must be mailed not later than 12 o'clock noon on the said FRIDAY, APRIL 15TH, 1910.

G. R. GEARY, (Mayor),
Chairman, Board of Control.

City Hall, Toronto, April 1st, 1910, 14

Power Plants, Electricity and Telephones

(Continued from page 29)

luminous arc lamps, also regulators and switchboards, at a cost of \$17,000.

We are informed that the report concerning the tender of the Manitoba Bridge & Iron Works for wire fencing is incorrect. The firm in question do not tender on the erection of wire fences.

AWARDED.

St. Thomas, Ont.

Contract for installing a booster and additional cells in the present storage battery, as well as overhauling the battery for the Niagara power system, has been awarded to the Lancashire Dynamo Company, of Manchester, England, and Toronto, Canada, at \$3,499. The next lowest tenderer was the Canadian Westinghouse Company at \$3,780. Contracts for cross arms and pins were awarded to F. Bissell & Company, Toledo, and for braces to the Canadian General Electric Company. The tenders for poles were not complete and the chairman and engineer were given power to accept the lowest or best tender.

Miscellaneous

Cornwall, Ont.

Tenders will be received until April 11th for improvement to Lock No. 17, Cornwall canal. A. W. Campbell, chief engineer, Department of Railways and Canals, Otta-

wa; C. D. Sargent, resident engineer, Ontario St. Lawrence Canals, Cornwall.

Hull, Que.

The council has decided to call for tenders for house numbers and street names.

Montreal, Que.

Recent building permits include: Wall Bros., 224 Forsyth street, residence, \$2,000; D. Chapleau, 2445 Waverley street, house containing four dwellings, \$4,000; Tabernacla Baptist Church, building, \$8,000; J. R. Gardiner, architect; G. Barham, Notre Dame street, dwelling, \$3,000; Louis Lachaine, St. Phillip street, house containing three dwellings, \$2,000; L. Dalbec, 287 Garnier street, house containing four dwellings \$3,000; A. White, 220 Liverpool street, house containing two dwellings, \$3,500; Mrs. Rochon, Esplanade avenue, house containing three dwellings, \$5,000; Mrs. L. Fortine, 974 Catherine street east, four houses containing twelve dwellings, \$10,000; F. Jubenville, 2200 Waverley street, house containing three dwellings, \$4,000; L. Beaubien, 1703 Labelle street, house containing three dwellings, \$2,000; Charles Casey, 103 City Council street, six dwellings, \$11,000; E. St. Pierre, 965 St. Antoine street, house containing six dwellings, \$4,000; E. Giasson 13 Langevin street, two houses, \$11,000; Jos. Savage, 211 St. Ferdinand street, house containing two dwellings, \$5,000; A. Gobier, 6 Parc Lafontaine, two houses, \$5,000; D. Piuoffe, 12 Boucher street, three dwellings, \$3,000; C. Rosenberg, 3 Ontario street east, store, \$50,000; A. Brillion, 1185 St. Denis street, house containing three dwellings, \$9,000; O. Lafrance, 206 Berri street, house containing two dwellings, cost \$2,000; M. Leclair, 2649 St. Hubert, two houses containing six dwellings, \$5,000; R. Abraham, 83 Laval avenue, alterations to store, \$4,700; Daouze & Lalonde, 42 Victoria Square, alterations to building, \$2,000; Z. Gras, 532 Beaudry street, two dwellings, \$2,000; J. Boucher, 305 Sanguinet street, house, \$3,000; G. Drinkwater, 333 Peel, alterations to dwelling, \$2,000; J. Wiliski, 6 Montgomery street, two stores and four dwellings, \$65,000; C. Perrault, 152 Sanguinet street, two stores and four dwellings, \$8,000; L. Clement, 1290 St. Hubert, house containing nine dwellings, \$10,000.

Ottawa, Ont.

The Department of Public Works at Ottawa is asking for tenders, to be received until Tuesday, April 19th, for dredging at various places in the province of Quebec.

Tenders for the construction of a steel steamer for the quarantine service will be received until May 31st. Plans, etc., upon application to Department of Agriculture. A. L. Jarvis, assistant deputy minister.

The building permits issued recently include an iron-clad factory, 200 by 60 feet, at the end of MacKay street, to be erected by Mr. R. A. Sproule, \$7,000; J. H. Ashfield, brick veneer dwelling, Oakland avenue, \$2,500; S. J. Willoughby, brick veneer dwelling, James street, \$3,500; J. E. Meister, brick veneer dwelling, Concord street, 2,000; A. Loreque, double brick veneer dwelling, McLeod street, \$2,800; W. H. Craig and T. M. Mulligan, two solid brick dwellings, Woodlawn avenue, \$3,000 each; V. S. Bartram, brick veneer dwellings, four in row, Salisbury avenue, \$8,000; Edward Ahearn, brick veneer dwelling and shop, Arthur street, \$3,500; E. R. McNeil, double brick veneer dwelling, Centre street, \$4,400; E. Ginn, brick veneer dwelling, Dolly Varden street, \$2,500; F. Labreche, brick veneer dwelling, Spruce street, \$2,000; Jas. Hopewell, brick veneer dwelling, Spruce street, \$2,000; J. Clothier and Chas. Smith, double dwelling, brick veneer, Percy street,

\$3,500; F. W. Mahon, brick veneer dwellings, five in row, Sterling avenue, \$5,000; A. Gauthier, brick veneer dwelling, Clarence street, \$2,500; M. Parent and P. Aubry, brick veneer dwelling, Bolton street, \$2,500; Mrs. T. O'Connor, brick veneer dwelling, Water street, \$2,900; Jas. Morrison, brick veneer dwelling, Arlington avenue, \$2,500; Noe Gauthier, brick veneer shop and dwelling, Somerset street, \$2,500. Arcado, alterations and two additional storeys, on Queen street, to be used as shops, estimated cost 16,500; Fred Hunt, brick veneer dwelling Pine street, \$3,600; J. R. McLennan, brick warehouse and shop Lisgar street, \$2,500; Chas. Rupert, brick veneer dwellings, six in row, Percy street, \$9,000; A. A. Fournier, brick addition to apartments on Lyon street \$2,000; Norman Mulligan, three brick veneer dwellings on Concord avenue, \$3,000; F. W. Wilson, two brick veneer dwellings, Gordon street, 3,500; Thos. Guthrie, brick veneer dwelling, Second avenue, \$2,500; Rev. Father Conrad, brick veneer meeting hall, Melrose avenue, \$3,500; C. G. Horwood, two brick veneer dwellings, Rosedale avenue, 3,000 each; A. Tracy, double brick veneer dwelling, Preston street, \$3,500; D. O'Connor, Sr., alterations to store, Sparks street, \$4,500; F. H. Cuff, row of four brick veneer dwellings, Gladstone avenue, \$5,000; Emerie Gauvreau, row of six brick veneer dwellings, St. Andrew street, \$5,300; Mrs. Ruggles Wright, solid brick dwelling, Carter street, \$6,000; R. Lunt and C. Nash, brick veneer dwelling, Sunnyside avenue, \$2,500; R. McGregor, ironclad machine shop, Queen west, \$2,000; J. W. Nimmo, two brick veneer dwellings, Carling avenue, \$3,500 each; J. W. Nimmo, brick veneer dwelling, Carling avenue, \$3,800; Miss Laura Hickey, row of four brick veneer dwellings, Stratacona avenue, \$5,000; J. R. Irvin and Mrs. E. Irvin, three dwellings, Bell street, \$2,000; J. Alexander, brick veneer dwelling, McLeod street, 2,500. St. Germain & Fraas, brick veneer dwelling, Carling avenue, \$4,000; F. L. Campbell, double brick veneer dwelling, Nelson street, \$4,000; T. J. Somerville, double brick veneer dwelling, Harvey street, \$2,000; G. Tomlinson, brick veneer dwelling, Carling avenue, \$4,200; Oblate fathers, finishing interior of church, Laurier avenue east, \$23,000; Seybold & Gibson, alterations to Central chambers, \$10,000; Henry Allan, brick veneer dwelling, Greenfield avenue, \$1,800; Chas. Crab, brick veneer dwelling, Center street, \$3,000; J. P. Ferguson, brick veneer dwelling, Powell avenue, \$5,000; John E. Wilson brick veneer dwelling, Spadina avenue, \$2,000; James Davidson, brick veneer apartment house, Albert street, \$6,000; Davir Bigg, brick veneer dwelling, Florence street, \$2,500; H. A. Leach, brick veneer dwelling, Thornton street, \$2,200; S. Miller and D. E. Epstein, addition and alterations to shop and dwelling, Elgin street, \$5,000; W. Shenkman, brick veneer and iron-clad dwellings, three in a row, Rideau street, \$3,500; shop, Murray street, \$2,200; Louis F. Trudbuks, brick veneer dwellings, five in row, Co-bourg street, \$4,500; Ottawa Car Company Limited, iron clad car shop, Albert street, \$3,000; James Davidson, brick veneer dwellings, fourteen in row, Goulbourn avenue, \$25,000; D. Fraser, three frame dwellings, Carruthers avenue, \$1,500; T. Lavigne, brick veneer dwellings, three in row, Armstrong street \$4,000; R. A. Kemp, brick veneer dwelling, Thornton street, \$2,200; Bryson, Graham, Limited, addition to warehouse, Queen street, \$2,500.

Sudbury, Ont.

Tenders will be received until April 11th for the purchase of the following debentures:

tures: Local improvement debentures, \$4,502.68, 10 years, 5 per cent.; local improvement debentures, \$3,795.48, 10 years, 5 per cent. Geo. Elliott, town clerk.

Toronto, Ont.

Recent building permits include: James Russell, 3 att. 2-sty. brick dwellings, Ossington avenue, \$5,500; R. P. Allen, 2 det. 2-sty. brick dwelling, McLean, \$6,000; R. L. Defries, pr. semi-det. 2-sty. brick stores & dwellings, \$7,000; W. F. McCutcheon, pr. semi-det. and 1 det. 2-sty. brick dwellings, Fernbank, \$6,200; W. H. Price, 2-sty and attic brick dwelling, Palmerston Blvd., \$9,000; E. P. Atkinson, pr. semi-det. 2-sty. brick dwellings, Roncesvalles, \$5,500; A. R. Williamson, 3-sty. brick addition to apartments, Grange avenue, \$10,000; Dundas Building Co., 3 att. 2-sty. brick dwellings, Fairview, \$5,500; Lankin Bros., 2 pr. semi-det. 2-sty. roughcast dwellings, brick fronts, Frizzell, \$6,000; A. Dyce, 2 det. 2½ storey brick dwellings, near Sunnyside, on Geoffrey, \$7,000; W. G. Cox, 2-sty. brick dwelling, Fernbank, \$5,000; D. Tugendhaft, 2½-sty. brick dwellings, 4 det., corner Indian road and Geoffrey, \$13,500; R. Ewing, 2 det. 2½-sty. brick dwellings, Thorold, \$6,000; R. M. Mackey, 2 det. 2-sty. and attic brick dwelling, Conduit, \$7,000; W. W. Wilson, 2 det. 2-sty. and attic brick dwellings, Wineva, \$6,000; J. H. Young, 2 pr. semi-det. 2-sty. 2-sty. brick dwellings, corner St. Vincent and St. Albans, \$8,000; Watkinson & Marr, 3 att. 2-sty. brick dwellings, O'Hara, \$8,000; A. R. Thompson, 2 det. 2½-sty. brick dwellings, Algonquin, \$6,000; J. W. Devitt, 2 pr. semi-det. 2-sty. and attic brick dwellings, corner Barton and Markham, \$10,000; A. B. Brown, 3 pr. semi-det. 2½-sty. brick dwelling, Woodlawn, \$21,000; A. B. Brown, 2 pr. semi-det. 2½-sty. brick dwellings, Woodlawn, \$14,000; J. H. Stanford, 2 pr. semi-detached brick dwellings, Bathurst, \$11,000; J. J. McCarthy, alt. and add. to hotel, corner Richmond and Church, \$15,000; A. T. Stewart, 6 det. 2½-sty. brick dwellings, corner Sunnyside and Constance, \$14,500; A. Stephens, 2 det. 2½-storey brick dwellings, Geoffrey, \$7,000; H. H. Love, 2½-sty. brick dwelling, Wyckwood Park, \$13,000; H. Greensides, 3 att. 2-sty. brick dwellings, 982-4-6 Ossington avenue, \$6,000; Mrs. M. Kent, 2½-sty. brick dwelling, Walmer road hill, \$6,000; Allen Bros., 3 att. 2-sty. brick dwellings, Delaware avenue, \$6,000; F. J. Cumings, 2 pr. semi-det. 2-sty. brick dwellings, Western avenue, \$9,000; W. E. Groves, pr. semi-det. 2½-sty. brick dwellings, North Major, \$8,000; City Dairy Co., 3-sty. brick and steel factory, Spadina Crescent, \$25,000; Mrs. M. L. Kent, 2½-sty. brick dwelling, Dunvegan road, \$7,000; Jas. Burford, 2 pr. 2½-sty. brick dwellings, Wells street, \$14,000; A. W. Pike, 2 pr. semi-det. 2-sty. brick dwellings, Gladstone, \$8,000; J. J. Downey, 3 att. 2-sty. brick dwellings, Lansdowne, \$6,000; H. B. Clark, 4 att. 2-sty. brick stores and dwellings, Bloor west, \$10,000; W. A. Hart, Jr., 3-sty. brick apartments, King, west, \$25,000; H. E. Simpson Co., pr. semi-det. 2½-sty. brick dwellings, corner Virtue and Sorauren, \$5,800; H. Gramblett, 2 pr. semi-det. 2-sty. brick dwellings, North Keele street, \$8,000; B. H. Fraser, 3 pr. semi-det. 2-sty. brick dwellings, Logan avenue, \$12,000; J. T. & H. Hutson, pr. semi-det. 2-sty. and attic brick dwellings, corner De Lisle and Deer Park crescent, \$8,000; Wm. Hodgkinson, 4 pr. semi-det. 2-sty. R. C. dwelling, brick fronts, Booth, \$14,000; Geo. Birdsall, 3 detached 2½-sty. brick dwellings, corner Walter and Indian road, \$10,000; Harris & Lee, pr. semi-det. 2½-sty. brick dwellings, Marmaduke, \$6,000; Jos. Lavvie, pr. semi-

det. 2-sty. brick dwellings, Howard Park avenue, \$5,000.

Vancouver, B.C.

Recent building permits are as follows: Vancouver Ice & Cold Storage Company, Gore avenue, \$65,000; J. B. Mathers, Eighth and Westminster avenue, \$30,000; British Columbia Telephone Company, Seymour street, \$20,00; Vancouver Breweries, Seventh avenue, \$10,000; H. D. Crawford, 1702 Park drive, \$13,000; Timberly & Huxtable, Seventh avenue west, two houses, \$5,000; E. Bellhouse, 1912 Seventh avenue west, \$2,000; J. C. Halswell, 1857 Gravely street, \$2,350; A. Knight, 2845 Spruce street, \$4,000.

Victoria, B.C.

Permits were issued recently by the building inspector to the Michigan-Puget Sound Lumber Company for a dry kiln on Constance street to cost \$2,000, and for a store house on Store street, to cost \$3,000; G. W. Cramer, for a dwelling on Work street, to cost \$3,300.

Winnipeg, Man.

Property to the extent of 10,000 feet frontage in Trancona, near G. T. P. shops, has been sold through W. J. Christie & Company to two contractors of Rivers, Man., who will erect buildings in accordance with the demand.

Among the permits issued recently are the following: J. Isenberg, five houses, on south side of Fleet street, between Hugo and Helen, \$12,500; A. Simmons, dwelling, north side of Grosvenor, between Guelph and Wilton, \$5,500; D. G. Kenny, dwelling on Rosedale, between Pembina and Nassau, \$2,800; A. H. Alinger, house, north side Ruskin Row, between Park road and Kingsway, \$7,000; M. Simon, house, south side of Bannerman, between Andrews and Powers, \$2,000; J. C. Hocks, two houses, north side McMillan, between Aynsley and Helen, \$4,000 each; Cooper and Whitlaw, two dwellings, north side of Cathedral, between Charles and Aikins, \$2,000 each; D. Blove, house, east side Newman, between Portage and Ida, \$2,000; S. Henkel, two dwellings, east side Alverstone, between Yarwood and Wellington, \$4,400; J. B. Duncan, dwelling, Grosvenor, between Stafford and Harrow, \$3,800; H. Smith, dwelling, Pritchard, between McKenzie and Parr, \$2,800; D. Neilson, dwelling, Arlington, between Bath and Ida, \$2,800; Arni Eggerston, dwelling, Agnes, between Sargent and Wellington, \$6,000; W. Webster, dwelling, Arlington, between Ida and Bath, \$2,700; George Maskel, dwelling, Alverstone street, between Notre Dame and Yarwood, \$3,000; R. Ward, dwelling, Matheson avenue, between Main and Norman, \$2,500; W. J. Lowden, dwelling, Polson, between Main and Mac, \$2,500; Lance Hall, dwelling, Banning street, between Einarsen and Livia, \$2,300.

AWARDED.

Moose Jaw, Sask.

The contract for the supply of two 2-horse street sprinklers has been awarded to Moose Jaw Machine Works, Limited, for \$139.40, for the two.

The B. C. Gazette gives notice of the incorporation of the following companies:—The T. L. Peek Company, Limited, capital \$70,000, incorporated to construct and operate electric works; West Coast Power Company, Limited, capital \$10,000; Slocan Lake Lumber Company, Limited, capital \$100,000; the Port Haney Water Works Company, Limited, capital \$10,000; Ward Electric Company, Limited, capital \$10,000.

New Companies

Manitoba Land and Timber Company, Limited, Montreal, Que., incorporated, capital 400,000. Incorporators, Geo. Vipond Cousins, accountant, and Patrick Francis Brown, clerk, Montreal, Que.

The Crossen Car Company, Cobourg, Ont., incorporated, capital \$1,000,000, incorporated to carry on business as contractors, also lumber manufacturing. Incorporators, Alexander Falconer, advocate, Westmount, Que., and Benjamin Ginsberg, Montreal, Que.

The Canadian Boving Company, Ottawa, Ont., incorporated to carry on a general contracting and construction business. Capital, \$20,000. Incorporators, Jens Orten-Boving, London, Eng., hydraulic engineer, and James Goodwin Gibson, barrister.

The Canadian Domestic Engineering Company, Limited, Montreal, Que., incorporated, capital \$45,000. Incorporators, R. Taschereau, K.C., and Jos. Emile Billette, both of Montreal, Que.

Northern Construction Company, Limited, Winnipeg, Man., incorporated, capital \$200,000.

Modern Railway Device Manufacturing Company, Montreal, Que., incorporated, capital, \$1,500,000. Incorporators, Wm. Elliott Hamilton, dealer in railway and contractor's supplies, and Henry Reid Emerson, mechanical engineer, both of Montreal, Que.

Gas and Electric Appliances, Limited, Ottawa, Ont., incorporated, capital \$50,000. Incorporators, Herman Henry Pitts, manufacturer, and Gordon McLeod Pitts, civil engineer, both of Montreal, Que.

The Talbot-Allard Lumber Company, Limited, incorporated, capital \$300,000. Incorporators, Wilfrid Talbot and Uldoric Allard, of Courcelle, Que.

The Western Electric & Supply Company, Limited, Fort William, Ont., capital \$40,000. Incorporators, H. James, C. D. Milner, accountants; Sterling Jaffray, electrician, all of Fort William, Ont.

Bell & Rochester Hardware Company, Limited, Haileybury, Ont., incorporated, capital \$50,000. Incorporators, E. A. Wright and E. W. Kearney, barristers, both of Haileybury, Ont.

The Home Builders, Limited, Toronto, Ont., incorporated, capital \$40,000. Incorporators, W. H. Price, C. M. Garvey, solicitors, and J. A. Mitchell, contractor, all of Toronto, Ont.

The John Carew Lumber Company, Limited, Lindsay, Ont., capital, \$200,000. Incorporators, John Carew, and F. J. Carew, lumbermen, both of Lindsay, Ont.

National Timber and Pulp Company, Limited, Toronto, Ont., capital \$500,000. Incorporators, William Percy Gillespie, broker, Toronto, Ont.; Hubert C. French, contractor, Winnipeg, Man., and Ivers P. Lawrence, wholesale lumberman, Fitchburg, Mass., U. S. A.

Western Lumber Company, Limited, Toronto, Ont. Incorporators, Gerard Godfrey Ruel and Geo. Frederick Macdonnell, barristers-at-law, Toronto, Ont.

Owen Sound Lumber Company, Limited, Owen Sound, Ont., capital \$50,000. Incorporators, Harry Edgar Rowland and John Morris Rowland, lumber merchants, Owen Sound, Ont.

National Glass, Limited, Montreal, Que., capital, \$45,000, incorporated to manufacture, import, etc., glass, paints, varnishes, etc. Incorporators, J. O. Dubois, St. Chrysotome; L. A. Cadieux, Montreal, Que.

Contract Record

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The Cement Convention at London, Ont.

There can be no doubt that the existence of the Canadian Cement and Concrete Association is amply justified. At the second annual convention at London, Ont., last week, it was shown plainly that the Association is supported by the strongest and best of the cement interests, not only in Canada but in the United States, and the ultimate success of the body is assured. The comparatively meagre attendance at the convention, after all, is only what must have been anticipated. While the Association was temporarily the loser of many of its supporters through its decision to hold this meeting, at London, it is probable that many advantages will accrue subsequently from the course adopted.

The strongest enemy of the cement industry could only criticize this convention in one particular, i.e., the attendance, and this is more than half explained by the fact that the convention was only the second in the history of the Association; and, even at that, all the arrangements for the event were completed within a couple of months. Several papers of a very high order are reprinted elsewhere in this issue. Others of special interest to our readers will appear in a later number. One of the most important works that was accomplished was the formulation of standard specifications for the use of reinforced concrete. These specifications appear to cover all points of the work in a most complete and satisfactory manner and will doubtless be of great assistance to the industry.

The exhibition at the Princess Rink attracted a good following and most of those who either attended the Show as visitors or put in their time as exhibitors, were

fully satisfied. Most of the exhibitors reported numerous sales and inquiries. Some of the most interesting of the exhibits are discussed elsewhere in this issue. Every cement worker should keep in touch with progress made in these lines, for if he is in any way to anticipate the demands of his customers he must be well posted on the latest improvements in appliances for construction purposes. The live man will always be found at places where there is an opportunity to extend his business into new fields and improve his knowledge. And it pays to be with the live man, for one is judged by the company he keeps.

The Canadian Cement and Concrete Association is exerting every effort to create one of the foremost professional and industrial organizations on the continent. The information accumulated at the convention last week is valuable not only as an addition to the scientific literature available on this continent, but as giving greater prestige to the Canadian cement industry.

Selection of Materials

While the production of a sane and scholarly design is perhaps of paramount importance in the construction of an work great or small, the selection of the best possible materials for its execution is certainly not less than second in the list of essentials. Instances of failures due to the use of unwisely chosen materials are not rare, while more than a few buildings of most ordinary design have assumed considerable interest in the finished structure due to a happy choice of materials. It is a subject the young architect would do well to study carefully. If, with a thorough knowledge of design is combined an ability to select the materials best suited to the execution of each conception and also a general fund of information concerning the strength, character and general adaptability and availability of building materials, the greatest heights will be reached. No one of these qualifications is lacking in a successful architect.

Open or Closed Shop?

It is obvious that the question of closed shop or open will again become a prominent and in many instances an acute one to the building trades interests. The decision must ultimately rest with the proprietors, but it will be well for all contractors who are in any measure likely to encounter the question, to be well prepared for it in the way of having given it full and due consideration. Sometimes the demands are made with relatively little time for consideration, and it is well to have all the facts in hand against such a contingency, and not have to beg for time in which to consider such a request. Organizing has been going on steadily, and already several demands have been made along this line to employing contractors. It is for them to handle the question, and if they can see it to their advantage to accept the closed shop, that will settle it for that individual concern.



Perspective View of Building as it will Appear on Completion

Showing Exquisite Interior of Main Banking Room

Architects: MCKIM, MEAD and WHITE, New York City.

Winnipeg's Proposed New Bank Building

Features of the Design for the Classical Structure to be Erected in the Western Metropolis by the Bank of Montreal

The proposed new building for the Winnipeg branch of the Bank of Montreal is derived from purely classical models, handed down to us from the days of ancient Greece and Rome. The building is rectangular in plan. The exterior is to be built of a very white granite, closely resembling marble, from the quarries at Bethel, Vt., and its design consists of a Corinthian portico of six columns on the front, and a treatment of Corinthian pilasters, with windows between them, at the sides, the whole surmounted by an attic. Above and behind the attic rises a rectangular roof house, in which the quarters of the staff are located, and which forms a crown or roof to the structure when seen from a distance, taking the place of the domical form so frequently adopted on buildings which are square in plan.

The property on which the building is to be placed is triangular in shape in front, and a study of the ground floor plan will show that the portico and steps have been designed for the maximum amount of projection permissible within the property lines. By this treatment, the building is given the greatest possible prominence as to location, and the throwing of the triangular portion of the front part of the property into sidewalk and street practically creates a public space, or square, at this point of the city, so that the bank building becomes not merely an incident in a long street, but one of the distinguishing features, or landmarks which help to divide a city into familiar districts.

The interior of the building is in the form of a basilica, based on the colonnaded halls of ancient Greek times, which were used as meeting places, for business and social purposes. The design consists of superimposed Ionic colonnades, the central, or main portion of the room going through two storeys, with a gallery, for the use of the Royal Trust Company, on all four sides. The entire banking room is to be treated in practically a

monotone, with columns and side walls of light buff Botticino marble imported from northern Italy, with a simple ceiling painted with light colors in the Greek manner. The use of one material will give the largest possible expression to the room, and the neutral buff tone of the marble chosen is well adapted to obtain a warm, cheerful sunny effect.

In the basement are located extensive vaults, safe deposit, coupon and storage rooms, clerks' lavatories, boiler room, etc. Above the main banking room are two floors of quarters for the staff and janitor, with sitting rooms, bed and bath rooms, and kitchen, lunch and dining rooms conveniently arranged for serving all those connected with the bank.

The general contract for the erection of the building has been awarded to the Norcross Brothers Company, of Worcester, Mass. A list of the sub-contractors is not yet available as a considerable portion of the work has not been contracted for.

Personal News and Notes

We regret to report the death of Mr. Robt. Fortune, a well known builder and contractor of Parkdale, Toronto.

Mr. T. S. Scott, assistant city engineer of Toronto, has resigned. He is thinking of going into the contracting business at Vancouver, B.C.

City Engineer Macallum, of Hamilton, Ont., was one of a deputation that visited New York recently with a view to obtaining information on asphalt roads.

W. K. Greenwood has been appointed town engineer of Orillia, Ont., at a salary of \$1,800 per annum. He is a graduate of the S. P. S. and was associated with Mr. Willis Chipman in the construction of various waterworks systems.

The Cement Convention and Exhibition

Report of the 2nd Annual Meeting of the Canadian Cement and Concrete Association Held Last Week at London, Ont.—Features of the Show

The Canadian Cement and Concrete Association have many reasons for self-congratulation over the success which attended their second annual convention and exhibition held at London, Ont., March 29—April 1st. The attendance was not all that could have been desired, but in the case of this particular convention this was not the sole consideration. Prior to the meeting some adverse criticism was heard relative to the wisdom of holding the convention in London, but the situation in which the Association now finds itself and the favorable conditions, financially and otherwise, under which it commences the work of another season, vindicates the judgment of the executive. The attendance, though comparatively small, was representative of the best interests of the industry in Canada and the United States. Among those who signed the register, and others in attendance, were the following:

Peter Gillespie	Toronto.
R. E. W. Hagarty	Toronto.
Percy H. Wilson	Philadelphia, Pa.
A. W. Connor	Toronto.
C. R. Young	Toronto.
Chas. Talbot	London, Ont.
James Pearson	Toronto.
R. L. Humphrey	Philadelphia, Pa.
Alfred Rogers	Toronto.
W. H. Day	Guelph, Ont.
Gustave Kahn	Toronto.
W. H. Essery	Toronto.
R. J. Lucas	Watford, Ont.
Jno. S. Gray	Woodstock, Ont.
I. S. Macdonald	Toronto.
J. H. Parke	Toronto.
Chas. Wonever	Montreal, Que.
Wm. Crellin	Kintore, Ont.
F. J. Ure	Woodstock, Ont.
Jno. A. Watson	Laskay, Ont.
H. U. Bedell	Picton, Ont.
Robt. Oliver	Listowel, Ont.
A. Grosch	Listowel, Ont.
J. G. Wilson	Burlington, Ont.
A. G. Larsson	Owen Sound, Ont.
R. E. Holliday	Toronto.
W. F. Scott	Toronto.
Wm. Tytler	London, Ont.
A. J. Cromar	Brantford, Ont.
A. A. Gillies	Glencoe, Ont.
O. W. Jersey	Forest, Ont.
Harry Boyd	Osgoode, Ont.
A. E. Nutter	London, Ont.
G. G. Kinsey	Port Elgin, Ont.
A. F. Wells	Toronto.
R. K. Beecraft	Nixon, Ont.
C. Crowley	Stratford, Ont.
J. H. Chubb	Chicago, Ill.
J. A. Douglass	Alliance, Ohio.
Jno. Stewart	Blyth, Ont.
Dr. S. Woolverton	London, Ont.
R. E. Waltham	Kerrwood, Ont.
H. A. MacLean	Sarnia, Ont.
W. M. Gray	London, Ont.
Jno. Dunbar	St. Marys, Ont.
Harold B. Watson	Laskay, Ont.
R. A. Plumb	Detroit, Mich.
G. W. N. Day	"Contract Record."
F. W. Scherbarth	"Contract Record."

The first event of the meeting took place on the evening of March 28th, when the exhibition at the Princess Rink was formally opened by his Worship, Mayor Beattie. The evening was especially reserved for the recep-

tion of the citizens of London by the officers and members of the Association.

The convention proper was opened at 2.30 p.m., Tuesday, March 29th, by the president of the Association, Professor Gillespie, the text of whose address will be found in another column. The secretary, Mr. R. E. W. Hagarty, then read a paper entitled, "The Use of Concrete in Dwelling House Architecture," prepared by Mr. Ernest Wilby, architect, Detroit, Mich. This was followed by an interesting paper from Mr. R. A. Plumb, of Detroit, Mich.

An extract from Mr. Baker's address, on the "Use of Cement in Architecture," read at the evening meeting, will be found elsewhere. After the reading of this paper, some discussion ensued as to the necessity for having packages of cement labelled with the date of their manufacture. Mr. Larsson, of Owen Sound, contended that the storage of cement does not harm the article, provided the storage is effected in a satisfactory and careful manner. One speaker held that while cement in bulk improves, cement in packages deteriorates, and expressed the opinion that 30 days should be the limit for storing the latter. The only protection, from Mr. Kahn's point of view, are public testing plants. Mr. Kahn thought that no cement should be used until first tested. Mr. Wilson claimed that the tests carried out by every cement mill are more reliable than those undertaken by outside laboratories, for the reputation of the mill depends solely upon the test. Mr. C. R. Young said that cement should be tested at the time used on the work. Architects and engineers should insist on this being done. Mr. Kahn concurred with Mr. Young. Mr. Wilson said that the question resolved itself into that of buying cement of approved brand.

The morning of Wednesday, March 30th, was devoted to the framing of standard specifications for reinforced concrete. This work was undertaken by a special committee composed of Messrs. Peter Gillespie, Gustave Kahn, C. R. Young and R. E. W. Hagarty. The proposed regulations, as drawn up by this committee and finally adopted by the Association, will be printed in our issue of April 13th. These specifications will be issued under the authority of the Association and will be such as may be adopted by towns and cities throughout the country. They will doubtless do much to ensure safe and economic construction in concrete. The Association has practically adopted the specifications of the Canadian Society of Civil Engineers for Portland cement.

On Wednesday afternoon, Mr. A. W. Connor, of Messrs. Bowman & Connor, consulting engineers, Toronto, gave an interesting paper, entitled, "Concrete Bridges." This was followed by a paper, entitled "An Analysis of Concrete Bridge Failures," by Mr. C. R. Young, of Barber & Young, bridge and structural engineers, Toronto. Mr. C. W. Boynton and Jas. Bell were unavoidably prevented from attending to read the papers that had been assigned to them.

On Wednesday evening, the delegates listened to an interesting address, entitled "The Engineer and the Finished Work," prepared by Mr. A. W. Campbell, Deputy Minister of Railways and Canals, Ottawa. Papers were afterwards read by Messrs. Chas. Talbot, county engi-

neer for Middlesex, and Jas. Pearson, president of the Constructing & Paving Company, Toronto.

An Informal "Social" at the London Club

After the evening session on Wednesday, a select party of the delegates, numbering about 25, repaired to the London Club at the invitation of Mr. Gustave Kahn, and by the courtesy of the members of the club. Of the latter in attendance may be mentioned ex-Alderman Ferguson, who seems to make the care of convention delegates a special hobby. An impromptu concert was held, the whole being under the direction of Mr. Kahn. Several excellent speeches were made. Professor Gillespie made some appropriate remarks concerning the work of the Association. Ex-Ald. Ferguson, in a humorous address, extended to the members the privileges of membership in the London Club. Mr. Alfred Rogers, who was called upon for a few remarks, assured those present that he had never before made a speech in his life. His maiden effort was well received, as was also an excellent recitation by Mr. Jas. Pearson, Toronto. Mr. L. V. Thayer, president of the Peerless Brick Machine Company, Minneapolis, and others from across the border, spoke for the United States.

Election of Officers

At the election of officers, which took place on Thursday, March 31st, Professor Gillespie was re-elected president and R. E. W. Hagarty, Toronto, secretary. Mr. W. Fry Scott, Toronto, was chosen vice-president. The other members of the new executive are: Gustave Kahn, Toronto; T. L. Dates, Owen Sound; W. H. Ford, Canada Cement Company; C. R. Young, Toronto; D. C. Raymond, Toronto; Jas. Pearson, Toronto; W. Scott, Roman Stone Company, Toronto; C. F. Pulfer, London; Kennedy Stinson, Montreal; A. E. Uren, Toronto, and I. S. MacDonald, Toronto.

The committee brought in the following recommendations, which were adopted:

"That the convention consider the advisability of limiting the number of councillors to twelve, eleven being nominated in accompanying report, the twelfth to be an architect of first-class standing, to be appointed by the executive.

"In the opinion of this committee the permanent secretary, Mr. Hagarty, should be appointed to the position of treasurer of the association, and the office of chairman of finance be eliminated.

"This committee further recommends that the appointment or election of an honorary president be considered by the convention, and that the executive be instructed to appoint an honorary president to act for the coming year."

Thursday afternoon was devoted to the reading of the following papers: "Concrete in Europe," Mr. R. L. Humphrey, president National Association of Cement Users, Pittsburg, Pa.; "Some Experiments with Cement Tile," Prof. W. H. Day, Ontario Agricultural College, Guelph; "Uses of Concrete on the Farm," Mr. P. L. Wormeley, testing engineer, Washington, D.C.; "The Hardening of Portland Cement," Mr. A. G. Larsson, chemist, Grey & Bruce Portland Cement Company, Owen Sound, Ont.

The annual dinner of the Association, which gave place to an informal luncheon, was held at the Tecumseh Hotel on Thursday evening, and proved a most enjoyable affair.

At the closing session of Friday, April 1st, the papers contributed included: "The Commercial Aspect of Reinforced Concrete in Canada," by Mr. Gustave Kahn, general sales manager, Trussed Concrete Steel Company

of Canada, and "Concrete from the Contractors' Standpoint," by Mr. D. C. Raymond, vice-president, Bishop Construction Company, Montreal and Toronto. These and other interesting matter will be printed in later issues of the "Contract Record."

PRESIDENT'S ADDRESS

The Canadian Cement and Concrete Association has completed the second year of its history with an outlook for usefulness which is undoubtedly brighter than it was a year ago. Its membership is larger; its name and aims are more widely known; its financial status is more comfortable, and, in a few particulars, it has learned wisdom through the mistakes of the past. As anticipated in my opening remarks to you last March, a permanent secretary has been appointed to whom has been delegated the clerical work connected with the Association. The new regime is proving very satisfactory and I think that this will be a means to extending its influence and work. A committee on standard specifications has been at work, and will report to you during the week on the results of its labors. It is felt that by issuing standard specifications which are up to date, but also sufficiently conservative to meet the approval of moderate people, the Association will be doing something to endorse safe and economical construction in concrete.

Regarding the attitude of the Canadian Cement and Concrete Association toward other building materials, I have only a word to say. While it stands for the dissemination of authentic information regarding the uses of a comparatively new material; for the encouragement of whatever in cement construction is safe, economical and artistic, and for the elimination of whatever is unsafe, wasteful and unsightly, it does not deny nor condemn any other legitimate building material. It recognizes that others have claims and advantages of their own and does not advocate cement construction where another material is manifestly superior for the special situation under consideration. It recognizes also that steel and concrete and clay products, and wood make, on occasions, most excellent structural combinations, and feels no enmity nor jealousy towards any of them.

Stages of Pioneer Progress

It has been pointed out that human progress from pioneer conditions always divides itself into three noteworthy stages. These are, first, the period of individual enterprise involving the conquest of the wilderness and making for the benefit of the man; second, the period of collective enterprise making for the benefit of communities, or of the individuals constituting them; third, the period of co-operative enterprise, largely altruistic, for the advantage of the nation, and for succeeding generations as well as those of the present. This last is the era upon which we are now entering, an era when an endeavor to use wisely, to avoid unnecessary waste and to look to the requirements of the future is being made. As a sign of the times, we have commissions on the conservation of natural resources. It is to a recognition by the present generation of its responsibility to posterity, that these important commissions of inquiry in the United States and Canada owe their beginning. "The duty of man to man, on which the integrity of nations must rest, is no higher than the duty of each generation to the next; and the obligation of the nation to each actual citizen is no more sacred than the obligation of the citizen to be, who, in turn, must bear the nation's duties and responsibilities."

It is only of recent years that the attention of people in the New World has been drawn to the fact that the natural resources of this continent are not inexhaustible, and that if the duty of the present to succeeding generations is to be faithfully discharged, some method of conserving these assets must be devised. The most reprehensible of all waste is

destruction, and the most destructive of all agencies is fire, and to the extent of its ravages in this country at the present time, to a comparison of our own country's fire loss with that of other lands, and to means for minimizing this appalling waste, I invite your attention for a few minutes to-day.

Fire Losses in the United States

A report of the United States Geological Survey, recently to hand, affirms that during the year 1907 the per capita loss in the United States due to the destruction of buildings and their contents by fire was \$2.51, while the average corresponding per capita loss in Austria, Denmark, France, Germany, Italy and Switzerland during various periods from 1898 to 1904 was only .33, an amount only one-eighth that quoted for the United States of America. It must also be remembered that to the actual per capita loss as given above, viz., \$2.51, must be added a number of items indirectly if not directly chargeable to the fire fiend. Premiums are paid to fire insurance companies obviously very much in excess of the compensation for fire losses returned to the insured; fire fighting equipment and a water distributing system must be installed and maintained at an expense very much in excess of what would be required for purely industrial and domestic necessities. These, the statistician has estimated annually as follows:

Excess of premiums paid over amount of losses returned, per capita	\$1.71
Maintenance of waterworks, chargeable to fire service exclusively, per capita	.33
Maintenance of public fire departments, per capita....	.57
Maintenance of private fire protection, per capita....	.21

This makes a total annual per capita tax of \$5.33, and represents an aggregate cost to the people of the United States of \$456,000,000, an amount the magnitude of which it is exceedingly difficult to comprehend. If through any cause, it were possible to reduce the actual fire loss in the United States to a figure comparable with what prevails in the countries of continental Europe, there would be a proportionate reduction in the related and accessory items as well, which, it is estimated, would reduce the aggregate loss through fire to \$90,000,000, which would mean a saving to the Republic of \$366,000,000. In consequence, it would appear that the United States is paying annually a preventable tax sufficient to construct a Panama Canal. For the year 1907, the total value of buildings erected in the Republic was conservatively estimated at \$1,000,000,000, and from what has been said above, it is seen that a loss by fire equal to practically half the value of the buildings constructed, was suffered by the American people. This is a loss that no system of account keeping or no method of clever logic can conceal. Destruction by fire is absolute and irreparable, and insurance when paid to the owner, serves only to distribute the loss among the whole body of the insured. This state of affairs is truly appalling and it is a striking wonder that economists have given so little attention to the evil and its remedy.

Fire Losses in Canada

The "Monetary Times" of Jan. 8, 1910, reports the aggregate loss in Canada due to fire, during the year 1909, as \$18,905,000, with a total loss of life of 219. The daily press report of a fire was first accepted by this journal and then enquiries were addressed personally to the owner and occupant of the property destroyed. In this way fairly authentic information regarding the magnitude of the loss was obtained. An actual fire loss of one and three-quarters millions of dollars per month in Canada must make us pause. This is equivalent to a per capital loss of \$2.70, seven per cent. greater than that reported by the United States, 23 times as large as that reported for Italy, 6 times as large as that

reported for Germany, and 9 times as large as that reported for France.

Assuming that for Canada, the accessory and related losses due to insurance, fire protection, etc., are of the same order as in the neighboring Republic, Canada's sacrifice to the fire monster, directly and indirectly, will approximate the enormous total of \$40,000,000 per year. This amount is four times the yearly interest on Canada's national debt, is nearly equal to the total annual revenue from duties on imports into Canada, is seven times as large as the entire annual expenditure for postal facilities in this country, is twice as great as the entire expenditure by the people of the country for the maintenance of churches and clergy of all denominations, and is sufficient to construct four Dreadnoughts annually. In addition to this, there were sacrificed last year, four lives per week for every week of the year, a number almost large enough to place a victim's skull on every milepost between Buffalo and Detroit.

On this side of the water we view with alarm, the manner in which the European powers are breaking the backs of their taxpayers in order to render their armaments on land and sea more and more formidable, and we are sometimes in consequence led to doubt the real progress of civilization, not thinking perhaps that our own prodigality in the matter of destruction by fire must arouse in them a feeling of wonderment at the folly of the so-called progressive American people.

The cause of such destruction is not far to seek. Our buildings, many of them, are constructed of most inflammable materials, and although they may be protected by the most perfect fire-fighting appliances that ingenuity can devise, conflagrations are inevitable. The disastrous Toronto and Baltimore fires of 1904, the San Francisco calamity of 1906, the Collinwood schoolhouse tragedy, and the conflagration in Chelsea, Mass., in 1908, are still fresh in people's minds, and it is safe to say that had fireproof construction as to-day understood, prevailed generally, these unfortunate disasters would either never have occurred or the evils attending them would have been very much less than they actually were. The alarming feature of the entire situation is that similar calamities may occur any day in any city in Canada or the United States.

In America, combustible building materials are employed to an extent that would not be tolerated in Europe. Older in the world's history than America, these nations have developed a wisdom in construction in comparison with which America suffers greatly. In many European cities, the erection of wooden buildings is prohibited and the use of inflammable materials in construction is so rigidly regulated and overseen that fires are practically confined in every instance to the building in which they originated. It is manifest from the results that the consequences of European paternal government are not all disadvantages.

Timber Supply Giving Out

A report from a branch of the Government service at Washington, D.C., has this to say: "The timber supply of the United States is rapidly approaching exhaustion, and unless means are taken to limit the waste (a great deal of it through fire) and to replenish the supply through reforestation, the timber resources of the country will be exhausted within the next quarter of a century. The known supplies of high-grade iron ore in this country, estimated at more than 4,788,000,000 tons, cannot be expected to last beyond the middle of this century unless the present increasing rate of consumption is curtailed. There are in addition about 75,000,000,000 tons of low-grade iron ore which will undoubtedly be used to some extent as the price of iron advances. The supplies of stone, sand, gravel, clay, cement, lime and slate are practically inexhaustible, and as the supplies of timber and iron are depleted and the prices of these are increased, it is evident

that the United States must turn to concrete-making materials, clay products, and building stone as substitutes for wood and iron." Continuing, the same reports asserts that "the mineral materials available for structural purposes may be divided into two classes: (1) iron, steel, copper, nickel, and their manufactures, the supplies of which are limited and which are themselves subject to destruction through weathering, fire and other causes; (2) stone, clay products, and cement and concrete manufactures, which are less subject to destructive agencies and the supplies of which are practically inexhaustible."

Substitutory Materials the Solution to the Problem

In building and construction work the substitution of the materials of the second group for the more commonly used wood and metal manufactures should be encouraged as having an important influence on the preservation of the supplies of the more perishable and scarcer materials. The use of building stone and clay and cement products in this country has been restricted by competition with the much cheaper wood products and the more easily fabricated and more available metal products. Improved methods of preparing the raw materials for use in building construction are, however, rapidly diminishing the difference in cost, and careful investigation as

to their structural qualities and the more suitable structural forms would have an important influence in further reducing this difference in cost and in enlarging the use of the more permanent materials." It is manifest from the above that these materials, which occur in almost inexhaustible quantities, and which, when fabricated into structural forms, are least susceptible to destructive agencies, must be looked to to save the situation. They constitute the really fireproof building materials, as has been attested by numerous severe trials. Building regulations on this continent, however, have been very much to blame in their failure to compel, or at least encourage, their use. They have permitted the erection of structures either of inflammable materials; or of combustible materials in such a way that when a fire occurs in the contents of a building it is not usually confined to that building. Our fire protection appliances are probably as modern on this continent as elsewhere, so that it seems conclusive that to insist on the use of fireproof building materials in the first place, and in the second, to scrutinize carefully the method of using them so that fires, when they do occur, will be properly confined, will be the remedy. It is exceedingly poor economy to sacrifice to-morrow the accumulated wealth of years of labor for the immediate convenience and needs of to-day.

Training and Work of Skilled Inspectors

The Connecting Link between Designing Engineer and Contractor—Inspection by S. P. S. Graduates—"The Engineer and the Finished Work"*

BY A. W. CAMPBELL, Deputy Minister of Public Works

Technical education is a subject receiving much attention in all progressive countries to-day. Germany has set the pace. She has shown what science and skilled workmen can accomplish. Her representatives are met throughout the world, gathering scientific information regarding raw materials, regarding systems of manufacture, regarding details of workmanship, in order that these may be available in producing an improved quality of goods at a decreased cost. This is one of the great secrets of Germany's extending commerce—technical education. England has grasped this fact, and with the foresight and business instinct, characteristic of the British people, we may confidently affirm that its usefulness will be tested to the full extent. Canada, in spite of the many demands upon our resources, is making progress in this regard, and governments and educational bodies are making substantial progress in the matter of manual training and the higher technical education.

This is a subject in which the engineer is keenly interested from a direct and personal standpoint. The result of his own education, of the labour, skill and care that he puts into his plans and specifications, are dependent upon the grade of workmanship available in securing ultimate results. His own skill and foresight are not sufficient, good material is not sufficient, if these are to be utilized wholly in a rough and haphazard way by untrained workmen and inferior inspectors. The situation is one which every engineer in Canada must have at times keenly appreciated, when he has looked upon the defective work presumably carried out in conformity with his plans and specifications.

The designing engineer cannot be always on the ground to give the necessary directions which even skilled artisans require, and between the engineer and the artisan lies the office of the inspector. The training of the engineer is necessarily made up of what we may roughly term "the practical"

and "the theoretical." Both are essential. With the engineer, on the one hand, the theoretical should predominate. With the inspector, the practical is necessarily the most essential feature. The inspector has need of both the theoretical and the practical if he is to properly interpret the engineer's intention and at the same time apply them in such a way that the contractor can accept in full his directions.

There is a great need in Canada to-day for skilled inspectors who will act as the connecting link between the designing engineer and the contractor. The inspector is not simply a watchdog on the work. He is there to fill a place which the contractor is not, cannot be, expected to fill. I would not separate wholly the work of the inspector from the profession of the engineer. I know of no better training for a young engineer than that experience, when, call him what you will—inspector, resident engineer, assistant engineer—he has the opportunity of remaining on the ground and studying all the details of practical workmanship. There is need, however, that young engineers prepare themselves for the inspector's duties in a proper manner, by a period of, let us say, apprenticeship.

Connecting Link Between Engineer and Contractor

Theory alone will not make a good inspector. As I have pointed out, the predominating qualification of an inspector should be the practical. He should know the different grades and qualities of material. He should know the different grades and qualities of workmanship. He should know how much work a man or men do in a day, and he should know as far as possible all those details of machinery and methods of doing work which tend to good and bad results.

This information is necessary to him as inspector, but doubly essential, it seems to me, for him to have a full grasp of, when, more closely following the duties of a professional civil engineer, his work will consist of the preparation of plans and specifications, in which he will be controlled and

* Delivered at the Second Annual Convention of the Canadian Cement and Concrete Association.

guided by the limitations imposed upon him by the grade of workmanship, material and cost that are the tools with which he must ultimately get results. In Canada to-day we have splendid institutions of scientific education connected with our universities. We establish technical and manual training for artisans, but I would commend to you a more difficult school perhaps, but one in which the rewards are exceedingly satisfactory and gratifying, and which are absolutely essential to the highest grade of engineer. In this school he could start at the lowest rung and work his way up, as he has done in the School of Practical Science. The school to which I refer is the School of Experience, in which, as with all other human endeavors, the way is hard and difficult in proportion to the goal to be attained.

The inspector requires technical training, combined with experience, to interpret not so much the letter, as the spirit of the plans and specifications. The inexperienced technical student is, on the one hand, apt to be too particular over unimportant details; but the layman is careless and pliable in the hands of a determined contractor. A couple of seasons in a minor capacity, with two or three years technical study is a training such as will enable an ambitious young man to become a thoroughly efficient inspector.

Inspection by S. P. S. Graduates

The Department of Public Works has frequent occasion to employ inspectors on works under contract. During the past season Mr. Arthur Sedgwick, a graduate of the School of Practical Science, was resident engineer or inspector in charge of regulating dams at the outlet of Dog lake, the head waters of the Kaministiquia river. These dams were in three sections, of concrete with considerable rip-rap, and when completed it will be possible to develop 40,000 h.p. within a mile of the lake.

A work at Dryden on the Wabigoon river, comprising a steel bridge of 80 feet span, concrete abutments $13\frac{1}{2}$ feet high, and a filling 160 feet in length, rip-rapped, was supervised for the Department of Public Works by Mr. W. H. Manning, of the School of Practical Science. Mr. J. W. Hackner, a graduate, supervised steel and concrete bridges at Nairn, Severn and Vermillion river. The Vermillion bridge is in two steel spans of 150 feet each, with concrete substructure and a 300-foot timber trestle. The Nairn bridge is of steel, 200 feet long, on concrete abutments; and the Severn work was a concrete arch of $58\frac{1}{2}$ feet span, built by Messrs. Gagne and Jennings. Mr. Geo. Hogarth, of the School of Practical Science, was inspector for the tunnel bridge on the Mississauga river, north of Thessalon, a steel arch of 93 feet span, with a 60-foot steel trestle approach on concrete foundations. Mr. F. W. Robertson, of the School of Science, has made laboratory tests of cement for a number of works.

Technical men are not always available, so that we are compelled frequently to employ men of more or less practical experience, but without the theoretical training. Too often we find that these are men who do not value the work of the engineer or architect. To the layman, the architect or engineer is apt to be a man of fanciful ideas, who can write long specifications, and draw more or less intricate pictures, but who has no idea of how the work is to be carried out. The untrained man, lacking the basic information as to why the specifications require certain results, is wholly unable to determine how it should be done, if he has not actually seen it performed in his past experience. In concrete, for instance, he has no conception of why the stone and sand should be clean, why they should be mixed in certain set proportions, why the mixing should be thorough. He blunders and stumbles along, hoping the results will be satisfactory, but he can give no positive assurance that they will be.

It is the unexpected that happens. No plans or specifications can be so prepared as to meet all emergencies. When

something not contemplated by the plans and specifications occurs, the laymen's training is seldom equal to the occasion. His opinion of engineers and architects very frequently causes him to find a solution of his own. Lacking the knowledge as to why a thing should be done, he is incapable of determining how the emergency should be faced. When the engineer goes on the ground, it is too often to look with horror on the blundering work that has been carried out.

In making these statements, I am reminded that it is difficult to generalize. There are some competent laymen inspectors. But they are men who have grown up on practical work, who are shrewd observers, and have a native capacity that carries them beyond the ability of the average man. Inspectors of this class are rare, however, as they are usually employed as contractors' foremen, or graduate to the ranks of the contractor.

Towns and cities, all municipalities, are frequent offenders in the matter of inspection. Much municipal work has no inspection whatever. Inspectors, when employed, are apt to be local men with a little influence, who have been failures in their own line of work or business. They have great respect for the opinion of the contractor who is doing the work, and very little for the engineer who merely designed it. The inferior results and failures throughout the province in municipal improvements are the unfortunate verification of this situation. When failure occurs, the public look to the engineer as the responsible official, and the reputation of the engineering profession has suffered much in consequence.

Men without technical training but with experience as contractors in carrying out works under an engineer's plans and specifications, are often looked upon as being highly capable of supervising work under other contractors. These men as contractors may have been eminently successful, the result probably being that they were obliged to follow carefully prepared plans and specifications, and were assisted in the execution of the work by skilled and competent inspectors. They, not being technically trained men, must not be assumed to be capable inspectors because of the absence of that necessary technical knowledge without which the inspector cannot possibly interpret the intention of the designer or understand the reasons for the details of the design or the carrying of these into practical execution. Inspectors, as with engineers, mechanics and other skilled workmen, are competent and capable as the result of their genius, knowledge and training, and anything short of this is liable to result in the condemnation of the design, to reflect upon the materials used in the construction, and entail loss to the investors.

These are some of the difficulties which we have to face in carrying on public work. The situation is possibly one which can never be wholly overcome, but we are looking to the technical schools and colleges to supply us with men who will have the necessary practical and theoretical training, and we are at the same time educating public opinion as to the necessity of spending more upon the expert supervision of these works. The public are slow to grasp the value of expert services, and it is only with costly experience through mistakes and blunders of untrained inspectors, that these matters will ultimately adjust themselves.

At a recent meeting of the Winnipeg Board of Control, the claims of the Lutz Surface Heater for asphaltting purposes were brought before the members by the Equitable Asphalt Maintenance Company, of Kansas City, Mo. It is claimed by the makers of this machine that it has the advantage of heating the surface on which the asphalt is to be laid to the same heat as the asphalt itself, thus ensuring perfect vulcanization. The new invention is said to do its work much more rapidly than has been possible hitherto, much more durably, and at half the cost.

An Architect's Views on the Use of Cement

Increasing Popularity of the Canadian Product—Suggested Improvements in its manufacture—Cement Plaster for Exterior and Interior Finish*

BY F. S. BAKER, F. R. I. B. A., President Royal Arch. Inst. of Canada.

I can easily recall the days when the only Portland cement came from England in very small quantities and at a prohibitive price. The production of the Canadian article saw the emancipation of the architects from the anxieties of masonry work in lime mortar, and to-day I doubt if there is a building material which the architect regards with more affection than Portland cement.

It is very gratifying to know that no matter how enormous the quantity of Portland cement required in the operations incidental to the development of this vast country of ours, the raw material is available to ensure the use of the Canadian product and protect us against the necessity of importing foreign material.

I think that so delicate a material as Portland cement should be shipped in better packages than jute sacks, and claiming an architect's prerogative, I would ask your consideration of the possibility of improvement in this direction.

There is a source of considerable anxiety and annoyance to the architects which I think your chemical experts might overcome with great benefit to everyone concerned. I refer to that ingredient in Portland cement (and all seem to be alike in this respect) which so badly stains any limestone or sandstone with which it comes in contact.

Owing to the kindness of the management of the International Cement Company at Hull, Que., I was given an opportunity, with several other architects, to visit their works and see the whole process of manufacture from the quarry from which the shale was mined to the jute sacks already referred to.

Part of the process was, of course, this crushed shale and clay in the large cylinders at a very high temperature, and it occurred to me then that the qualities which caused the staining of the stone might be some form of carbon which might be eliminated by a further burning or by some chemical process which would not injure the usefulness of the product. Of course we use various methods of overcoming this staining, such as painting the back of the stone and using some non-staining cement in making the mortar used next the stone, etc., but even with these precautions the stains sometimes get through. I have in my mind a very fine public building now being erected of Bedford stone, and large areas of the external walls of the building are ruined by this staining.

The subject of concrete will be well covered by various speakers at this meeting, but there is one feature which occurs to me. I refer to the injury which concrete in course of setting receives from any sudden jar. To obviate this where concrete is used for floors in steel frame buildings, I think the architect should provide additional steel sufficient to ensure a stiffness in the frames which would prevent injury to the concrete by the vibration incidental to the erection of any steel frame building. I have observed that concrete placed in moderate freezing weather, say 20 degrees and above, which is allowed to set fully without any vibration, seems to be as good as that set in non-freezing weather.

Portland cement has proved very useful in forming surfaces to resist water or tanks to contain fluid, such as cisterns, swimming baths, egg tanks, etc., but the success of this depends largely on the mixture. In a case like egg tanks,

it is exceedingly important that the walls should be absolutely tight, as the slightest subsidence of the fluid causes the eggs at the bottom of the tank to be crushed.

For this reason concrete seems to be the ideal thing for floors which lie upon the earth, such as basement floors, or verandah floors, or sidewalks. As a finished floor for a building, however, I do not think a cement and sand or marble dust composition is satisfactory, and the same applies to staircases.

Advantages of Portland Cement

Portland cement shows its greatest usefulness to the architect in the mortar which is now almost universally used in the laying up of brick walls. I mean cement mortar, one to three. A brick wall laid in such mortar and grouted with liquid cement grout every few courses, becomes as hard as solid stone, and as compared with concrete, the builder has the assurance of strength, from his knowledge of the soundness of the bricks and of their resistance to crushing. I have watched men cutting an opening through such a brick wall, and the hard bricks generally yield before the mortar. Such masonry is a great comfort to the architect. In it there is no danger of a weak spot, such as might occur in a concrete wall through the carelessness of the workmen. No matter what precautions he takes, the architect of a reinforced concrete building, must have some anxiety on this score until the building has been thoroughly tested, and while I say this I am a great admirer of the wonderful feats which have been performed in the erection of immense reinforced concrete structures, and I am satisfied that it is a practical building process. The use of cement mortar in the building of rubble stone walls is also a great boon to the architect, no rubble stone work should be attempted in anything but cement mortar, where cement is obtainable. The failures which I have seen in rubble stone work would in every case have been avoided if cement mortar had been used.

While the concrete block is a desirable article for a certain class of building, I have not yet seen any which could be satisfactorily used in a building which was to stand as an architectural effort in a conspicuous place. In saying this I do not include so-called artificial stone, which is a very admirable building material, and thanks to the cement in its construction, is now obtainable of the highest quality in any quantity. And you get it without delay. In this material, anything which the architect can design of a masonry character can be rapidly constructed and reproduced to an endless number. He is hypercritical who condemns this material because it is an imitation. I contend that it is a sound building material, which can be quite properly used where it is obviously artificial stone.

Of the several kinds of artificial stone, I prefer that which is formed of the same material all through, and not formed, in the main, of one kind of concrete and faced with another. There is apt to be a difference in the expansion and contraction of two materials and a difference in the retention of moisture, which might reduce the strength of the latter article, as compared with that which is formed of the same material all through. It is clear, however, that an architect must not be drawn into the repetition of a feature so easily obtained in artificial stone in an effort to economize. On the whole, I like artificial stone very much and wish it every success.

*Extract from paper read at the second annual convention of the Canadian Cement and Concrete Association.

Cement Plaster for Exterior and Interior Finish

A delightful material for use on the interior wall surfaces of buildings has developed recently, in plaster formed of white cement mixed with ground stones of different colors.

Of these, the most used is perhaps what is known as Caen stone cement. This is now used to finish the interiors of the public parts of hotels, hospitals, theatres, banks, stores, and even churches. It is applied much as plaster would be, and is laid off in courses jointed horizontally and vertically, just as real stone work would be. The result is almost a perfect imitation of real Caen stone work and is, as I said before, a delightful interior finish. On account of its plastic nature the most difficult ornamental work can easily be produced cast from a carved model, which, of course, can be reproduced as often as desired. The color obtained is splendid, and while it is undoubtedly an imitation and more to be condemned on that score than artificial stone, an architect

obtains in its use a most satisfactory result for his client. All the large cities in Canada, and I think I may safely say all the large cities in the United States, have prominent examples of the use of this material for interior finish. In most of these cases all of the interior trim, including the mouldings and ornament, are also formed in the Caen stone cement.

The use of cement has also made possible many embellishments for the exterior of the building, which could otherwise only be obtained at great expense. A whole wall surface may now be safely covered with cement plaster, either on masonry work or metal lath, and the craftsman feel assured that it will stay in position, while at the same time it may be enriched with scrafito ornament by the skilful carver. On the other hand, friezes protected by roofs or other protections, can be modelled in relief on the building quite as successfully as a frieze carved in stone and at much less expense.

Waterproofing Methods and Materials

Specific Application of Various Products to Different Conditions—The "Integral" System and the "Membrane" or Bituminous Shield Method*

BY R. A. PLUMB, DETROIT, MICH.

There is a tendency for many of us to live on from day to day entirely unconscious that we are living in a world of wonderful changes. We are truly living in Nature's great laboratory, where physical and chemical changes are incessantly taking place and continually transforming our world.

Foremost among nature's agencies is water, and we have but to look around us to realize its activity, both as a constructive and destructive element of nature. The waves lashing our shores and continually changing our coast lines; the glaciers with their heavy mass, planing the rocks on which they rest; or our rivers, which are continually eroding their shores and changing their channels—are but suggestive of the different forms in which water is manifesting its activity.

The quantity of water resting on the earth's mass is estimated at thirteen hundred quadrillion tons, which would be equivalent to a universal ocean with a depth of nearly two miles, if the surface of the earth was a perfect spheroid. The great part of all animal bodies and of all plant life is water. It is not only a large composite part of all nature, but it continues to maintain life by supplying food, as the blood in the higher animals and as the sap in the trees. A living world without water would be impossible, as our earth would be nothing more in its activity than a metallic crust with no ability to give birth to organic life. We can truly agree with Pindar, who, back in the early days of Hellenic civilization, exclaimed "Water is the chief of all."

Realizing the destructive influence of water, we should, as concrete workers, be keenly interested in the methods and means of rendering our structures immune to its degenerating effects. Building materials in general, especially concrete, are decidedly porous and absorbent. Water is drawn into foundations from the surrounding soil, and due to the capillary nature of constructive materials, it ascends gradually and finally permeates the entire structure, producing damp, clammy walls which constantly foster and spread disease. It is apparent, therefore, that proper waterproofing not only prevents the gradual decay and disintegration of structural materials, but goes further to establish more hygienic conditions for the benefit of humanity in general. We are all willing to grant that if we can add permeability to the

strength, durability and fire-resisting properties of concrete, we have at last produced a perfect building material.

Classification and Application of Materials

Due to the fact that the subject of waterproofing is at the present time in somewhat of a confused condition, and practically every manufacturer of a waterproofing product is zealously pushing his materials as the "only perfect waterproofing," and the consumer has no general literature on the subject otherwise than what is applied by the manufacturer, I will endeavor in the following to outline and classify the different waterproofing materials and indicate their specific application to different waterproofing conditions.

In recognition of the distinct differences between damp-proofing and waterproofing in its literal interpretation, it is advisable to consider these subjects as two separate divisions of the general subject of protecting structures against the disintegrating action of water. Damp-proofing should be confined to the consideration of the methods and processes of keeping water and dampness out of the superstructure of buildings, while waterproofing should deal particularly with methods of treating and insulating substructural work subject to hydrostatic pressure, and also to those types of construction designed for retaining water. Damp-proofing products have absolutely no application to waterproofing conditions, and manufacturers of strictly damp-proofing products, who are pushing their materials for waterproofing conditions, are only bringing discredit and encouraging scepticism on the whole subject of waterproofing.

The almost innumerable number of materials on the market for damp-proofing purposes may be simply included in three distinct classes, viz.:

- (1) Transparent coatings;
- (2) Opaque cement coatings;
- (3) Special bituminous coatings.

Transparent Coatings—In this class should correctly be included the products and processes, the application of which does not change the original physical appearance of the surface treated.

The old Sylvester process, although now practically obsolete, should be given some mention as an original effort in this line of damp-proofing. This process involves alternate treatments of the surface with solutions of soap and alum, and depends for its efficiency upon the formation of a greater

* Read at the Second Annual Convention of the Canadian Cement and Concrete Association

or less amount of the aluminum salts of the fatty acid contained in the soap, which possesses physically, a very distinct but temporary water repellent action. This is not economical, as it is necessary to repeat the operations a number of times to produce sufficient insoluble soap to show any efficient repellent action.

The treatment of the porous surface by means of hot paraffine should also be included in this class. This is the process that was used for treating the obelisk which was brought over from Egypt and set up in Central Park, New York City, and which soon began to show very evident signs of disintegration when subjected to our climatic conditions. In this process the exposed surfaces are first very carefully heated by means of artificial heat, and coated with melted paraffine applied with a brush. By this means the paraffine penetrates to a considerable depth before it chills and leaves the paraffine deposited in the pores. Comparatively successful results can be obtained by this method, yet the expense makes its use quite prohibitory in the majority of cases.

Most interesting of this class are the great number of transparent liquid coatings that are applied to the surface with a brush, like paint. These products appeared on the market very shortly after the absorbent nature of a concrete block was recognized, and were offered as infallible remedies for this detrimental feature of concrete. It is very unfortunate that a greater number of the manufacturers did not deem it necessary to test their materials to determine their efficiency, but chose rather to advertise them broadcast, as perfect waterproofings, and reap the benefit of the early business in this line. Analyses made in the writer's laboratory have shown that in the greater number of cases, these products contained nothing more than a low melting point paraffine or wax, fluxed back in a light volatile oil, and depending for their efficiency upon the deposition of the wax or paraffine in the pores of the concrete. We have found so-called waterproofings that contained within themselves over 95 per cent. of volatile constituents, that acted purely as temporary solvents and carriers of the very small amount of solid base. It is quite unfortunate that the word waterproofing has been associated with these products, as it has naturally resulted in establishing doubt and scepticism on the entire subject.

The theory involved in these products is entirely correct, viz., the deposition in the pores of the concrete of a permanent water repellent base which will overcome the characteristic positive absorbent nature of the material and impart a negative repellent nature. The trouble has been that insufficient investigation has been given to the character of the material to be used for such a product, and it is only within the last year or two that a very limited few progressive manufacturers have given the necessary technical and careful scientific investigation to the subject and have been able to produce by synthetic means, water repellent bases which show the maximum solution in volatile vehicles, and in two coat work, do overcome the detrimental nature of porous surfaces. It is therefore encouraging to note that this small, but yet important part of damp-proofing, is being solved and satisfactory products are available.

There is a very distinct field for such coatings, as they are the only products which we have for treating the exterior surfaces of porous stone, to preserve them from decay, due to the absorption of water and other atmospheric impurities which result, not only in the unsightly staining of the sensitive stone, but a general surface disintegration due to the disruptive force manifest by the expansion of the water in the pores on freezing.

Opaque Cement Coatings—Nearly every cement user has practiced coating his cement work with a plain cement grout, and has experienced the difficulty of obtaining a perfect bond, and also has observed the tendency of the coating to absorb water. A few of the progressive manufacturers, who have made a special study of the exact requirements of a concrete

surface, have produced coatings which are made up from a Portland cement base and which show a perfect bond on the surface coated and are perfectly repellent and damp-proof. These products contain no oil and possess none of the characteristic qualities of oil paints. It is well known that an oil paint has no application to a concrete surface, as the vegetable oils used react with the alkali in the cement, forming a soap and desulting in the disintegration of the coating. Oil paints also dry with a distinct gloss, which is very objectionable on a concrete surface where the coating should retain the integrity and characteristic texture of the surface coated.

The cement coatings have a very general application for uniforming cement surfaces, such as stucco, cement blocks, etc., and replace the somewhat cheerless and unattractive surfaces with a soft-toned surface which is thoroughly damp-proof.

Special Bitumens—The special bitumens differ from the products of the preceding classes in that they are not applied to the exposed surface, but to the interior of the exposed wall. Such products are black in appearance and are made up from the various selected waterproof gums. They are applied to the interior of a wall, with a brush, and besides providing a continuous membrane in the wall which will act as an insulator against the ingress of water, they provide a solid bond for a coat of plaster applied directly on the coating. There are a great number of black paints on the market which are recommended for this purpose but which have shown very unsatisfactory results, in that they do not possess the durability, the elasticity and "tackiness" which are necessary essentials of such a material.

These products very obviously serve an economical purpose in eliminating the necessity of furring and lathing. By this construction the cubic area of available space is increased and all the disagreeable features of the air space are eliminated. Although the film is a fairly good non-conductor, it has not the same insulating efficiency as an air space, and is not recommended where the results would be unsatisfactory due to serious condensation on the inner surface.

It is the present day engineering practice to waterproof substructural masonry or structures designed to retain water by one of the two following methods, viz.:

- (1) "Integral" or rigid method.
- (2) "Membrane" or bituminous shield method.

Both of these processes have very distinct characteristic features and should receive very careful individual consideration.

According to the "integral" method, a waterproofing compound is incorporated in the concrete mass, rendering same waterproof within itself. By the "membrane" system, the concrete work is insulated from contact with the water by interposing a continuous, waterproof, bituminous shield.

Preliminary to a brief discussion of the merits of these two methods, it is well to indicate briefly why concrete requires waterproofing. The penetration of water into concrete is permitted by the existence of minute, capillary pores throughout the mass. That such porous structure cannot be avoided, arises from the elementary nature of concrete itself. In the composition of concrete, water fulfils two distinct functions. It is required chemically, for the processes of solution and crystallization, and physically, to act as a medium both for depositing and densifying the concrete. The cement not being able to assimilate all the water, the excess is removed by evaporation, and, as the water is incompressible, its removal would naturally leave an unoccupied volume or characteristic porous structure.

Integral Method

The "integral" method, as stated above, involves the addition of a compound to the composition of the concrete as it is placed, and thus becomes a unit or integral part of the mass. The greater number of waterproofing compounds can be most simply divided into two classes, characterized by the

physical condition in which they are added to the concrete, viz.:

(1) The finely powdered dry compounds that are added to the dry cement.

(2) The compounds, either in liquid or paste form, that are added directly to the water that is used to temper the dry mixture of cement and aggregate.

The compounds of the first class are usually homogenous mixed with dry cement, in the proportions of two per cent. These compounds are chemically, hydrated lime with a greater or less amount of the lime salts of fatty acids. These lime soaps were undoubtedly originally chosen as waterproofing compounds, due to their characteristic water repellent property. A careful study of the subject of "integral" waterproofings will emphasize that the very first essential for successful results, lies in obtaining an even, homogenous distribution of the waterproofing compound. It is a chemical axiom that in any process endeavoring to produce a perfect mixture, it is fundamentally essential that the body to be distributed must be of such a nature that it will be readily mixable with the distributing medium. On the basis of this fact, it is quite evident that the repellent properties, possessed by these dry compounds, are a considerable disadvantage in obtaining an even distribution. It makes very little difference how careful an original effort be made to dry mix a repellent compound with the dry cement and then with the dampened sand, as soon as the water is added the repellent property of the compound will manifest itself and as the fluidity of the concrete increases, the resistance to flow throughout the mass will decrease and there will be a tendency for the repellent compound to expel itself from portions of the mass and be concentrated in other sections, thereby making an even, homogeneous deposition impossible. Although the repellent feature is an excellent property for a compound to possess when in place in the mass of concrete, its very nature makes the even distribution difficult and thereby defeats its intended purpose.

In the case of compounds that are added directly to the water, there is no difficulty in obtaining an even distribution, as they have had the advantages of the water as a vehicle or carrier to evenly distribute them. As far as the homogeneous deposition is concerned, it should be quite evident that the compounds of the second class that are originally mixable with water, have a decided advantage over the dry compounds of a repellent nature. An acceptable compound for this class of work should also contain no organic constituents or other materials that will in any way interfere with the strength of the concrete, as it should not be necessary to sacrifice strength to obtain waterproofing efficiency. A recent report of one of our universities gave results which indicated a loss of over 50 per cent. in the strength of the concrete, due entirely to the presence of the emulsified oils contained in the compound.

The "integral" method of waterproofing had a very general application to waterproofing conditions. It is only limited in particular cases where there is a liability for the continual development of cracks in the work, which would, of course, destroy the waterproofing efficiency. The "integral" method is very universally employed for substructural work of various natures and to cisterns, reservoirs, etc., which are designed for containing water. The waterproofing compounds can be used throughout the mass of the concrete, or in cases where this procedure would be impractical, due to the cost of the waterproofing, it can be concentrated in a plaster coat on the surface of the structure. Rather than discussing fully the essentials necessary to be considered in applying the "integral" method, I have briefly outlined in the following a typical specification showing the application of the "integral" method of waterproofing in the form of a waterproof coat, as it should be used to correct the percolation of water into the basement of a completed building. I have chosen this speci-

fication as it emphasizes particularly the application of the "integral" method of remedying leaky conditions in substructures already erected, where re-excavation would be entirely too costly and, in some cases, impossible.

Typical Specification for "Integral" Method

1. Intent—It is the intent of these specifications to correct dampness due to percolation of water through walls and floors in basements in buildings not properly waterproofed during construction.

2. Method of Procedure—Water-tightness shall be secured by plastering the inner surface of damp walls and floor with an unbroken continuous coat of cement mortar to which as manufactured by has been added.

3. Preparation of the Coating—The waterproofed cement mortar shall be prepared by thoroughly tempering, to required consistency, a dry mixture of one (1) part of cement to two (2) parts of sand with water to which has been added in the proportion directed by the manufacturer. The sand shall be clean and spherical and well graded from coarse to fine.

4. Preparing the Surface to be Coated—Before plastering cement mortar on old concrete, the surface of same shall be treated as indicated in the following:

(a) The old surface shall be cleaned thoroughly with a heavy wire broom so as to remove all dust and dirt. A jet of steam shall be employed to clean the wall, if available.

(b) To the mechanically cleaned surface, apply with a large brush a liberal coat of 1:10 solution of hydrochloric acid. Allow the acid to remain until it has exhausted itself, which will require at least ten minutes. A second liberal coat of acid solution shall be applied before removing the first. A third coat shall be applied if the two applications have not satisfactorily exposed the aggregate and entirely removed the skin of hardened cement.

(c) With a hose under good pressure, slush the surface in one direction so as to remove the salts resulting from the action of the acid. Continue the slushing until the salts and all loose particles are removed and the old concrete is thoroughly soaked to its full hygrometric capacity.

(d) To the cleaned and saturated surface, apply with a strong fibre brush a coating of pure cement, mixed to the constituency of thick cream, with water to which has been added in the proportion directed by the manufacturer. Rub in vigorously so as to fill all the crevices and cavities produced by the action of the acid.

5. Application of Coating of Walls—Immediately after applying the above slush coat, the first coating of waterproof cement mortar shall be applied (thickness, $\frac{3}{8}$ -inch) directly upon the slush coating and well trowelled into every void or crevice of the surface. Before this first coat has reached its final set, a second and final coat shall be applied to an equal thickness, so as to make the full average thickness three-quarters of an inch. The finish coat shall be floated to an even surface and subsequently trowelled free from any porous imperfections. If the conditions of the work make it impracticable to apply finishing coat before scratch coat has set, the latter must be dampened and slush coated before finishing coat is applied.

6. Basement Floors—The floors shall be treated and prepared exactly as indicated above and finished with the waterproofed mortar to a thickness of two (2) inches. Special care shall be exercised to bond the wall coating to the floor coating, so as to make the waterproof coat absolutely continuous.

The "Membrane" or Bituminous Shield Method

The "membrane" system of waterproofing differs distinctly from the "integral" in that it does not attempt to treat the concrete, but rather to insulate it from contact with water by enveloping the structure in a continuous bituminous shield. The fact that the "membrane" is not a unit or rigid part of the structure, permits a certain freedom of movement and action in the structure, without impairing the efficiency of the waterproofing. This feature of the "membrane" system makes it most suitable for waterproofing work not fully reinforced and liable to settlement or subject to vibration or shock, such as railway bridges, culverts, etc.

It was early practice to simply coat the surface to be waterproofed with hot tar or asphalt, but it was soon evident that this was not sufficient, as the coating would crack with any movement in the wall. It was therefore necessary to employ some material in addition to the bitumens to con-

tribute the necessary toughness and tensile strength. Burlap and coal tar felts have been extensively used for this purpose, and some very satisfactory waterproofing operations have been carried out with such materials. For the last few years considerably more attention has been given to the nature of the waterproofing felts, and as a result there are now on the market specially manufactured felts which are both saturated and coated with bitumen and possess greater pliability and strength. By means of these felts more perfect membranes can be constructed as the strength and toughness of the felt permits greater distortion and twisting to accommodate it to the design of the work.

The bitumens most generally used for cementing the felt together in constructing the membrane are coal tar pitch, commercial asphalts and special asphalt compositions. Although coal tar pitch, on account of its cheapness, has been and is still being very extensively employed for waterproofing, there is considerable controversy among engineers regarding the relative value of the coal tar pitch as supplied to-day by the more modern methods of gas production and the older

process in vogue when pitch was first used for waterproofing.

The asphalts are more suitable for waterproofing, as they possess greater elasticity and permanence. In selecting an asphalt for waterproofing purposes special care should be taken to obtain a material of as low a melting point as the nature of the work will permit, as it not only ensures greater elasticity when subjected to cold temperature, but works much more freely and easily in applying. The special asphalts are usually manufactured from a hard hydrocarbon, such as gilsonite, tempered with petroleum residuums to impart the necessary elasticity. The residuums used in the preparation of these asphalts should preferably be strictly asphalt bases and contain the minimum percentage paraffine, which, being of a lubricating nature, impairs the necessary binding properties of the asphalt.

The application of a bituminous membrane to any structure should have the same careful attention as any other important point of engineering design. Every job has its particular requirements, which should be carefully interpreted and the design fully suited to meet the individual conditions.

Considerations in Highway Bridge Work

Concrete no longer an experiment—Experience of the County of Middlesex, Ont.—Importance of Skilled Design and Construction*

By CHAS. TALBOT, County Engineer of Middlesex

In Ontario, previous to 1874, the bridges on highways were almost all constructed of wood. From 1874 to 1895 many of the larger bridges were replaced with what were then considered permanent bridges. They consisted of quarry stone abutments, and piers, costing from \$9 to \$12 per cubic yard, and iron and steel superstructures with wooden joists, floors and hand rails. In Western Ontario a large number of these were built, mostly well designed and well erected. They were built to carry an equally distributed load of 80 pounds per square foot floor surface, and a concentrated load of five tons on two axles at ten-foot centres.

Between 1874 and 1891, eighteen of such bridges were erected in Middlesex county, sixteen over the River Thames and two over the Aux Sauble river, at a total cost of \$227,000. They were designed with a large factor of safety, consequently they withstood the heavier traffic they are now subjected to, but they are too light to be floored with concrete. About 1896 the first concrete abutments and piers were built. At this time concrete was looked upon as an experiment, and stone work, even at an advanced price, was preferred. Soon, however, concrete was adopted generally, and in 1899, highway bridges were built with steel superstructures, designed to carry concentrated loads of 10 to 15 tons; supported on concrete abutments and covered with concrete floors. At this time, they considered these structures permanent, and they are splendid works.

In 1903, short span concrete arches were built extensively. Then followed in quick succession: reinforced arches, reinforced beam bridges, reinforced abutments—until at present reinforced concrete is claimed to be the only permanent job, and whether permanent or not, one thing is sure, that the remaining wooden bridges must be renewed in the very near future, and in their renewal, reinforced concrete is going to be used to a very great extent.

Skilled Design and Construction

Such being the case, and knowing that even the poorer classes of work hang together and will remain with us, it behoves us to look well at the details of the work to be undertaken, to see that the work is well done and that the struc-

tures erected are attractive in appearance, and substantially built in every particular.

A municipality should employ an experienced man to design their work. If the work is done by day labor, employ an experienced foreman, who will follow in every respect the design decided upon and carry out the plan and specifications. In no case should a foreman, inspector or contractor alter the engineer's plans. If they discover something incomplete or that they consider wrong, they should notify those in charge and the engineer should be consulted. If he is a man you should employ, he will welcome the criticism and will admit his mistake if he has made one, and will know how to rectify it, so as not to interfere with other parts of the work.

If you do your work by contract, employ a reasonably efficient contractor and an experienced inspector, if you can get one; if not, at least get a man who will understand perfectly the plans and specifications and who will follow instructions given.

With an engineer and an inspector that understand their work, and a good contractor, success of your undertaking is assured. There is absolutely no doubt as to the effectiveness of reinforced concrete when properly handled. Notwithstanding this, there are few jobs erected from plans prepared by me that are the success I would like; their strength is all that could be desired, the finish is rough and uneven in color, giving the whole work an objectionable appearance. Out of the large number of structures I have designed, few indeed are finished in accordance with the plan they were supposed to comply with. Only in two or three instances has the details of the finished work corresponded to the plan. The difficulty is the lack of inspectors who understand the plan, and of contractors who understand the work. However, we need not be surprised at these results when we know few contractors have erected more than two or three bridges, and the great majority of them, but one. Our men are improving, and this year I hope for much better results.

I have said little or nothing about the advantages of concrete. At this stage of its development its usefulness is universally admitted. I do not consider it as being in opposition to steel structural work, each is incomplete without the other, and an experienced engineer on highway work can

*Extracted from paper read at the second annual convention of the Canada Cement and Concrete Association.

readily determine whether a steel superstructure, an arch, or a reinforced concrete superstructure, could be most advantageously used.

Under exceptional conditions, long span arches can be used within reasonable cost. In my practice I have used reinforced concrete slabs up to 16 feet span; reinforced concrete beam bridges up to 36 feet span; reinforced concrete arches up to 75 feet span; steel superstructures with concrete floors and concrete substructures in spans from 20 feet to 240 feet.

Since 1901, Middlesex county has spent \$189,400 on bridge work alone; an average of \$23,000 per year. In every structure erected concrete has been used, and has given complete satisfaction. The first concrete floor laid, 1902, is as perfect as when the maker left it.

I believe it is not in the interests of cement manufacturers or concrete workers to attempt to compete in price with steel highway work. The properly designed, well erected and artistically finished reinforced concrete structure is so much superior to the ordinary steel bridge that there should be no comparison in first cost. In my opinion it is this unequal competition that is causing the failure in concrete structures in that on spans of any considerable length the designer cannot compete with steel under present conditions and allow a sufficient factor of safety.

A superior article commands a superior price. Just as the old wooden bridge was not abandoned because timber became scarce and expensive, but because the people demanded a superior article at an advanced cost, so steel bridges, to a certain extent, are being superseded by reinforced concrete, not because it is less expensive, but because its durability is established.

It is well known that both steel and concrete bridges are being designed and erected by men who have neither scientific or practical knowledge of the subject. Taking this into account, and also the fact that reinforced concrete has been in use but a short time, the wonder is that more structures, especially of concrete, have not failed. The public should be protected from this danger, and the least the Legislature could do, and what there is great necessity for their doing, is to establish some central supervision of all highway designs, before they are permitted to be used.

I have referred to the fact that the work done on reinforced concrete was not as good as it might be. However, in every case, the structures built are strong and substantial looking, so much so that the municipalities that have erected them want more of them. Wherever possible, I have no hesitation in complying with their wishes.

Among the Exhibitors at the Cement Show

Features of interesting exhibits at London—Noteworthy Indications of Steady Progress in various lines of constructional materials and appliances

London Foundry Co., London, Ont.—Showed an attractive line, including several kinds of contractors' wheelbarrows. The company manufacture wheelbarrows, hydrants, valves, etc.

U. S. Gypsum Company, Chicago, Ill.—The company showed samples of their products and a number of interesting photos of notable work in connection with which they had been specified.

London Engine Supplies, Limited—This exhibit comprised gas engines, pulleys, hangers, shafting, fittings, valves and other lines for which the company report an excellent and growing demand.

Roman Stone Company, Limited, Toronto, Ont.—This exhibit was in charge of Mr. A. J. Aldington, who showed samples of the product and a number of excellent photographs of important buildings in which Roman stone was the principal material of construction.

Alfred Rogers, Toronto—The representative of the independent cement companies had an attractive booth and samples of cement on hand, with several representatives looking after his interests. Mr. Rogers, who spent a good deal of time at the Show, is particularly optimistic concerning the future of the cement industry in general and the prospects of the independent concerns in particular.

C. S. Wert, Kendallville, Ind.—The "Perfect" brick machine, which was demonstrated by Mr. Wert, the inventor and manufacturer, is worthy of more than passing mention. The machine can be operated either by the hands or the feet, and the brick is produced by one operation of the lever. The outstanding merits of this machine, according to the manufacturer, are its rapidity, simplicity and durability. Mr. Wert contends that it is the fastest machine on the market.

Peerless Brick Machine Company, Minneapolis, Minn.—The merits of the Peerless one-man cement brick machine were demonstrated by Mr. L. V. Thayer, president of the company, who was in charge of the exhibit. The machine has a ca-

capacity of 12,000 brick a day. The company claim the "Peerless" to be "a complete brick factory in itself." The cement brick made on this machine are always of a uniform size, being cast in accurate steel moulds and delivered face up.

John T. Hepburn, Toronto, Ont.—The "Little Wonder" cement block machine, which came in for a good deal of favorable comment at the Show, can make any size, shape, square or angle block required for a building. It is built on an adjustable, sectional plan. The blocks can be made to face on the four sides if required. Two veneering blocks can be made at one operation, as this is a side face machine. Another feature of this exhibit was the new State concrete mixer, for which Mr. Hepburn is the manufacturer and sales agent for Canada.

Wettlaufer Bros., Toronto and Mitchell, Ont.—This was an interesting exhibit which well repaid a visit. Among the machinery shown were the company's No. 1 mixer with stationary hopper; a traction mixer with automatic lift hopper; sidewalk mixer; new improved all-steel mixer; all-steel hand mixer; new six-brick machine, and various types of block machines. No better argument could be adduced in favor of the Wettlaufer mixer than the fact that in the city of Toronto alone, during the past year, the company has sold 30 of these machines. And what is more, the names of the buyers are on hand to prove it.

Trussed Concrete Steel Company—An exhibit of special interest was the united steel sash shown by this company. This sash is about the latest thing in this kind of construction we have seen. It is made of high grade rolled steel sections and is designed to give the greatest strength and maximum lighting area. The frame is built so that the full section of the steel is developed at all points. The special ventilator frame has two continuous contact surfaces for keeping out draughts and rain. A special improved locking device ensures absolute tightness all around openings. The advantages claimed by the company are rigidity, maximum lighting area,

weatherproofness, workmanship and economy—a hard combination to beat.

The Scott Machine Company, Limited, London, Ont.—The "London" friction clutch hoist was the feature of this exhibit. This appliance was designed by the company to meet the demand for a cheap, simple and durable hoist to be used in connection with gas, gasoline and oil engines. Among the many uses for which this hoist is specially adapted may be mentioned contractors' work, bridge building, pile driving and sewer construction. Another line which the Scott Machine Company exhibited were their excellent engines, the simple and substantial construction of which are worthy of special commendation.

Merillat Culvert Core Company, Winfield, Iowa—An exhibit of great interest to many of our readers was the Merillat adjustable core, exhibited by the Merillat Culvert Core Company, of Winfield, Iowa. This core is adjustable to any size of culvert between 20 and 48 inches and, according to the company, the only form for building concrete culverts that is adjustable, expandable, collapsible and portable. To facilitate handling, the machine is equipped with wheels which are tucked inside when not in use. They are brought out, automatically, without a pound of weight on the core. The form is always round, locked and braced at any size. It is claimed that contractors can save half the usual time taken in making, putting in and taking out forms. Perhaps the strongest argument in favor of this invention is its simplicity. The Merillat machine has the Edison stamp about it, and appeals to us as an excellent proposition.

Down Draft Furnace Company, Limited, Galt, Ont.—This concern showed the "Majestic" and "Model" coal chutes and sectional metal window frames for cellar windows. The "Majestic" coal chute is a new device to take the place of a basement cellar window, through which coal, wood, etc., are put into the basement. It is made with a heavy cast iron frame and door, and the chute portion is made of heavy steel. When the door is opened it locks, and holds itself in position, and protects that portion of the basement or wall above the chute. When closed, it locks itself, and is positively burglar proof. The "Model" chute is similar in design to the "Majestic," except that it is fitted with rubber glass, which admits the light to the basement. These coal chutes are made in three different sizes. The sectional metal window frames are made in four sizes and bolt together in the corners. They are designed for basements, and are made of the best quality grey iron, 5/16-inch in thickness and 7 inches wide.

Somers Bros. Manufacturing Company, Urbana, Ill.—An evolution in concrete machinery that is worthy of special mention is the Somers pressure block machine. One of the most noteworthy features of this machine is its ability to handle a very wet mixture. Another advantage is the ingenious combination of levers by which it is possible to obtain a pressure equivalent to 30 tons. The machine makes hollow block, 8, 10, and 12 inches wide, and veneer and two-piece block 2½, 3, 4, 5 and 6 inches wide. The Somers machine also makes a special block for concrete silos having a groove on the top for the accommodation of reinforcing wires. With this block the farmer is able to effect a great saving over monolithic work. The cost of the machine is very moderate, slightly in excess of the hand tamped machine, the difference between the two being saved in one season, according to the manufacturers. It is the intention of this company either to manufacture in this country shortly, or to lease the patents to a Canadian company.

London Concrete Machinery Company—An interesting feature of this exhibit was an entire plant in operation, manufacturing cement drain tile. This included a special type of concrete mixer, gravel crusher and complete machine for manufacturing cement drain tile in all sizes from 3-inch to 16-inch in diameter. Although machines of this type are well

known in the United States, they are practically new to most Canadians. The company had on exhibit two automatic concrete mixers which have been on the market for about one year. These two machines are now well known and need little mention here. In addition to these, there were two new types of Standard batch mixers, one which mixes 7 feet at a batch and another which mixes 12 feet at a batch. The company informed us that they manufacture two larger sizes, one a 20-foot and another a 30-foot. These two batch mixers are very complete in their equipment. Other features of this exhibit were London adjustable silo curbs, face-down adjustable block machines, concrete brick machines, sewer pipe and tile moulds, sill, step and window cap mould, lawn vase moulds and ornamental moulds of every description; cement working tools, hoisting equipment, wheelbarrows, and almost every conceivable device for the working of concrete.

Canada Foundry Company, Limited, Toronto, Ont.—Showed their No. 1 Koehring mixer. This machine has a capacity per batch of 14 feet and a capacity per hour of 120 street yards. One of the advantages of the Koehring mixer is that the services of experts are not required in its operation. There are no complicated parts requiring constant adjustment. Simplicity is embodied wherever practical. The mixer is self-propelling. It is equipped with an automatic charging bucket of sufficient capacity to lift the whole batch at one time. The mixing blades are placed at an angle with the axis of the drum in such a manner that there is a clearance between the end of each blade and the head of the drum so that there is no pocketing of the material. The blades are so arranged that they carry the material alternately from end to end of the drum and break it over against the heavy heads. The lifting and pouring and the unequalled end-to-end motion of the aggregates is not the only mixing the material receives. The inner end of the discharge spout, when not in discharging position, is tilted downward. Material carried up by the mixing scoops falls on this spout and is then deposited in a constant sheet or flow the entire width of the spout, to the bottom. Here it strikes at right angles to that from the lifting and pouring action from the sides, and the flow, of aggregates from the end-to-end mixing. This makes three independent mixings in the Koehring mixer and each one is a known, positive mixing. The traction drive on the No. 1 machine is connected with both rear wheels, which are provided with cleats, and is sufficiently powerful to move the machine up grade. The Canada Foundry Company make all sizes in this machine, from a mixer capable of turning out 3 cubic yards per hour to one of 30 cubic yards per hour.

Concrete Blocks made Without Sand or Gravel

Another striking demonstration of the merits of concrete for building purposes is found in the transformation which is taking place in connection with the industrial village of Mineville, near Port Henry, N.Y. The village is located near some rather extensive mines and is in the heart of what was once a great forest, but the collection of wooden shacks of which it was originally composed is gradually being replaced by buildings of concrete. One of the factors which was influential in leading to this rather extensive use of concrete was the possession by the mining company of a rather superior aggregate in the shape of the "tailings" or residue left after the separation of the ore. An immense heap of these tailings gives a seemingly inexhaustible supply of the aggregate, and tests have demonstrated that cement mixed with the run of tailings in the proportion of one to five produces a superior concrete block without the addition of sand or gravel.

According to 1909 labor statistics for Great Britain, the number of unemployed in the building trade was 11.7 per cent., and in the engineering, 11.6 per cent.

Trade News from Montreal

Building Figures for 1910 Show Large Percentage Increase—Contractor Lyall's Plans for Extensive Boulevard

Montreal Office of the "Contract Record."
April 4th, 1910.

Building figures just received from Inspector Chausse's office evidence a very satisfactory progress in building circles during the month of March. In all, 222 building permits were issued. Sixty-four of these permits were for new building construction, valued at \$587,239, while alterations to existing buildings brought the total to \$676,804. It is interesting to note that a reference to the building records show that for the same period in 1909, 189 permits were issued, aggregating \$376,275. The permits taken out for new buildings at this time were valued at \$283,400, so that the new building figures for March, 1910, show the rather startling advance of 103 per cent. A further comparison of the building statistics extended over the months of January, February and March show that during this period in 1909 the total value of permits issued reached \$731,725. Up to the end of March, 1910, the permits issued totalled \$1,093,244, showing an increase for three months of \$361,519, or 49 per cent.

Wm. Lyall's Plans for Extensive Boulevard

Mr. William Lyall, a member of Peter Lyall & Sons, Limited, has recently submitted to the Montreal Board of Control plans for a suggested method of overcoming the congested condition of the street car line system throughout the city and at the same time providing an extensive and handsome boulevard.

The plans submitted by Mr. Lyall show a boulevard 191 feet 8½ inches wide, and also an alternative scheme 173 feet 6½ inches wide, having a driveway on either side with two or four car lines in the centre, extending from one end of the city to the other, and taking in Ontario, Berthelot, Burnside, St. Luke, Western avenue, Cote St. Luc road, and Sherbrooke street west. Eventually the boulevard could be extended to Bout de l'Île in the east, and Ste. Anne de Bellevue in the west.

The plans further make provision for the establishment of a public park along the route of the boulevard at the junction of Ontario street and St. Lawrence main. Here it is suggested could be found sites for a new City Hall, Court House, Public Library and Art Gallery or Museum.

Mr. Lyall suggests that the new driveway be termed the "Strathcona Boulevard" as a compliment to "Canada's Grand Old Man." In matter of cost, it is figured that the scheme would cost approximately \$11,000,000, out of which \$9,500,000 would go to purchase the land and the balance would be required for treating the surface. Two different scales of width for the boulevard are proposed, the one to be selected depending on the amount of money to be expended. The larger one would afford the advantage of allowing for an extra pair of car lines in the centre, for express traffic.

The details of the project, as submitted to the Board of Control, also point out many improvements that could be adopted in regard to the drainage system, and the water, gas and electric mains.

First Section of New Subway

The Montreal Street Railway Company are at present applying to the Quebec Legislature for subway construction privileges within the city limits. Mr. W. G. Ross states that the first section will be constructed along St. James street, from Craig street to Victoria Square. The estimated cost for this work is \$1,500,000.

A very interesting display of the plans submitted in competition for the new Dominion Express Building, to be erected on St. James street this spring, is at present being made at the rooms of the Architects' Association, Province of

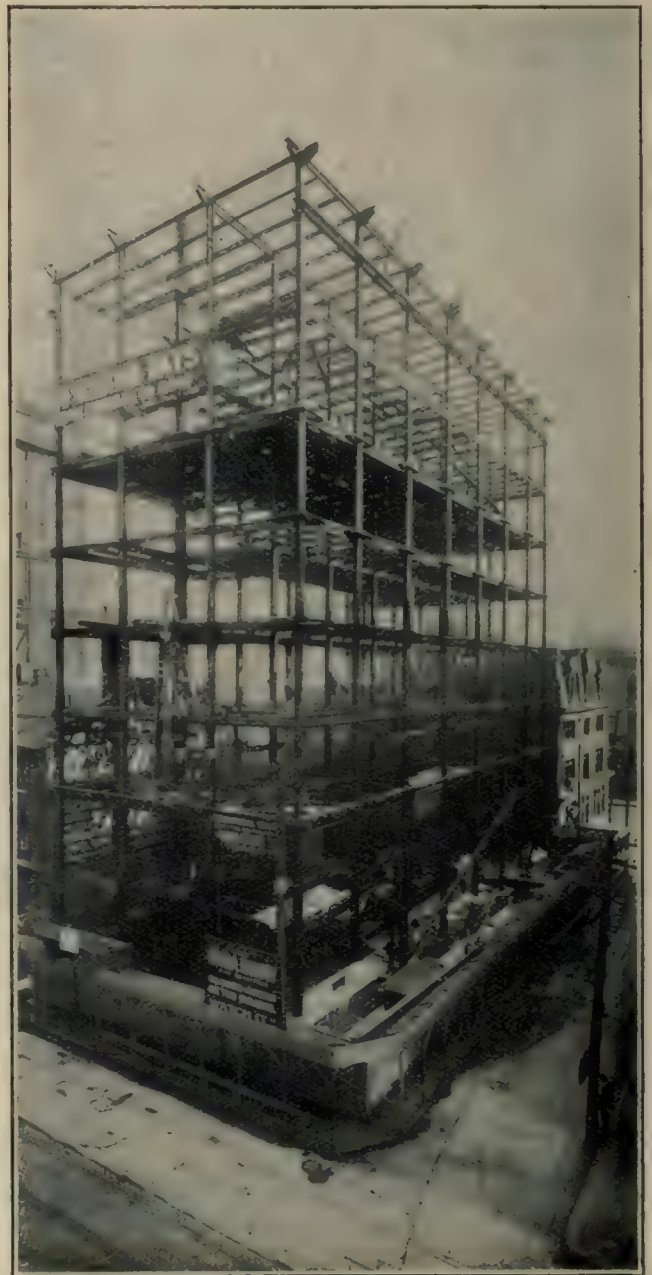
Quebec, 5 Beaver Hall Square. The exhibition includes the elevations and floor plans submitted by the successful architects, E. and W. S. Maxwell.

A Record for Speedy Construction

Two or three weeks ago a large sign was placed on the hoarding surrounding the site of the new Standard Bank at the corner of King and Jordan street, Toronto, which read as follows:

"The Canada Foundry Company have promised quick erection on this building. Watch it grow."

The building in question is an eight-storey steel struc-



Showing Steelwork for New Standard Bank, Toronto.

ture, the steelwork being manufactured and erected by the Canada Foundry Company. The rapidity of its erection was witnessed and commented upon by thousands of people who watched its progress. Only 13 working days were taken, from the start at the ground floor to the completion of the roof on the eighth floor. The Canada Foundry Company claim this to be a Canadian record for quick construction.

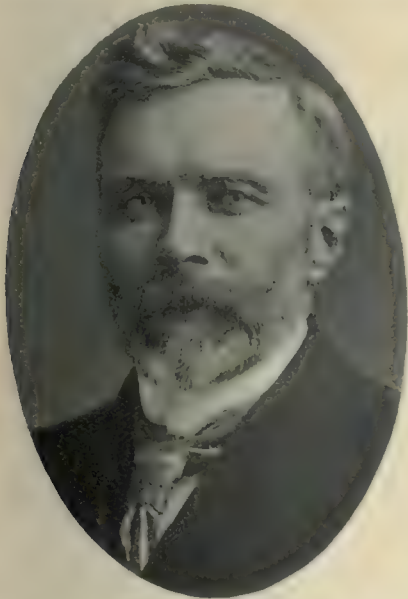
Leading Canadian Contractors

McPhail & Wright Construction Co., Ltd.
Sault Ste. Marie Ont.

The McPhail & Wright Construction Company, Limited, of Sault Ste. Marie, Ont., who are carrying on an extensive business in general contracting, making a specialty of concrete work, were incorporated March 1st, 1909, with a capital of \$50,000, the principal shareholders being Mr. D. P. McPhail and Mr. Kenneth Wright.

Mr. McPhail, the president of the concern, has been a resident of New Ontario for many years, having gone to Sault Ste. Marie from Tiverton in 1876, ever since which date he has been actively engaged in the contracting business. In 1896 Mr. McPhail entered into partnership with Mr. Thos. McCarty, Toronto, and for a period of four years carried on a successful contracting business in Kenora, Ont., under the firm name of McPhail & McCarty. Mr. McPhail returned to the Soo in 1900, and there carried on business until the incorporation of the present company. Mr. McPhail's activities are not confined entirely to the McPhail & Wright Construction Company. Among other things he is also a director of the Sault Builders' Supply & Cartage Company, Limited, and a member of the Council of the Board of Trade. He has a reputation for being well schooled in all the practical phases of his work and is conceded to be an authority on building construction.

Mr. Kenneth Wright, vice-president and secretary-treasurer of the company, is a native of Banffshire, Scot-



Mr. D. P. McPhail,

President McPhail & Wright Construction Company, Limited.

land. He came to Canada in 1885 and settled in Paisley, Bruce county, Ont., where he at once made connections with the building trade. Three years later he took his first contract in Owen Sound, returning the following year to Paisley, after which he carried on a successful contracting business in Bruce county for nine years. Mr. Wright went to Sault Ste. Marie in 1900 and conducted a general contracting and builders' supply business on his own account until the incorporation of the concern with which he is now associated. Like his partner, Mr. Wright finds time to devote to other interests. He is president of the Builders' Supply & Cartage Company, Limited, and a director of both the Sault Ste. Marie

Coal & Wood Company, Limited, and the St. Joseph Island & Soo Line Steamship Company, Limited.

Among the contracts completed by the firm last season are the \$45,000 high school at Sudbury, Ont., the \$20,000 building for the Bell Telephone Company, at Sault Ste. Marie, and about five miles of cement sidewalks at Thessalon Ont. In addition to their general contracting business, they operate a sand pit, gravel pit and one of the largest quartz quarries in Canada, on



Mr. Kenneth Wright,
Vice-President and Secretary-Treasurer.

the line of the Algoma Central & Hudson Bay Railway. The company's offices and warehouses are centrally located on the river front at the foot of Gouin street, Sault Ste. Marie.

Contractor's Useful Invention

There is at present being placed on the Canadian market the Pauly tile and pipe machine, the invention of Mr. A. A. Pauly, of the Concrete Stone & Sand Company, Youngstown, Ohio, an experienced concrete contractor and machinery expert. On this machine is manufactured concrete structural tile for floor spans, partitions, etc., also concrete sewer pipe and fittings of various sizes and shapes. These fireproof tile are made of wet mixture of cement, and aggregate of sand, gravel or crushed stone, and poured into moulds, then steamed and ejected into perfect forms. Recent tests made of these materials in regard to compression, fireproof qualities, etc., show them to be capable of enduring the most severe temperature and possessing a wonderful crushing strength. The following details of manufacture outline the advantages claimed from these products.

The concrete mixture is prepared to the consistency of a paste of Portland cement and a suitable granulated aggregate of crushed stone, furnace slag or gravel and sand, in proportions approximating one cement to four of sand or other aggregate, with sufficient water to give plasticity for pouring. These are thoroughly mixed together in quantities convenient of handling.

The machine consists of a series of moulds for receiving the wet material, which is immediately subjected to a specially provided treatment with steam. Steaming is continued for a period of four to five minutes. Plungers are located at the bottom of each mould, connected with mechanism for ejecting the green tile, which are then removed, and the machine is instantly ready for another casting.

Steam curing of the product for 24 hours in summer and

48 in winter (after which they can be subjected to any climatic condition) is recommended. They may be cured in any kind of enclosure where steam is allowed to escape to immerse the tiles with hot moisture. A much slower method of curing is to thoroughly drench the green tile with water several times during the first day after they are made, and allow them to cure in the air for 30 days (always protected from the direct rays of the sun).

Moulds can be made, it is claimed, in any desired dimensions and in every shape known to good structural usage. The machine is equally adapted to making concrete conduits, sections and sewer pipe with or without bell ends; also fittings and shapes of all kinds.

Tiles have been made using aggregate of crushed limestone, crushed trap rock, granulated slag, graded gravel and coarse sand. These have been thoroughly tested, and in compression have been demonstrated to be fully up to the same test of the clay tiles now in use, while the tiles made from trap rock and slag aggregates far exceeded the tests, it is claimed, of any other known material designed for like purposes. The breakage in manufacturing 10,000 tile amounts to less than one per cent.

The inventor, Mr. A. A. Pauly, has been making practical use of his invention for the last two years in Youngstown, Ohio, where he has a large plant in operation. During this period some 200 houses in Youngstown have been built out of Mr. Pauly's tile; so that the tile in no sense is experimental. The process has been developed by practical men and the product has been thoroughly tried at Youngstown, Ohio. The

Arrangements are practically completed for the territories of Winnipeg and Edmonton, where factories will be erected for the manufacture of the Pauly tile. In the course of a



Method of casting Pauly Hollow Tile. Pouring liquid concrete into moulds.

month or so, the tile will be placed on the Montreal market. The company at Montreal will be known as the Concrete Structural Tile Company. Further information and illustrat-



Finished concrete house, illustrating the possibilities of Pauly Hollow Tile

results have been uniformly successful and the various claims set forth above are the results of practical experience.

The Canadian rights for the Pauly machine have been purchased outright by Mr. Kennedy Stinson, of the Stinson-Reeb Builders' Supply Company, Limited, Eastern Townships Bank Building, Montreal, Que. We understand that Mr. Stinson is now making arrangements for leasing these machines out on a royalty basis, giving exclusive rights for manufacturing concrete product from these machines within a limited territory.

ed, descriptive literature may be obtained from Mr. Kennedy Stinson, Stinson-Reeb Builders' Supply Company, Limited, Montreal.

Col. H. N. Ruttan, city engineer of Winnipeg, was recently presented by his staff with a handsome oil portrait of himself to mark the completion of a quarter of a century in office. A congratulatory address was made by Mr. R. D. Willson, assistant city engineer. A handsome bouquet of roses was presented to Mrs. Ruttan.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aylmer, Ont.

The Water Commissioners have purchased land for a reservoir and work will be commenced at once on a pipe line. It is estimated that this will give the town from three to five hundred thousand gallons more water a day, at an initial cost of \$12,000.

Brantford, Ont.

Tenders addressed to James A. Smith, Township Clerk, Brantford, Ont., will be received until April 16th, 1910, for the construction of the Parkdale drain. Plans and specifications may be seen at the office of W. H. Fairchild, C.E.

Chilliwack, B.C.

Lionel H. Buck, C.E., of Vancouver, will be engaged by the council to submit a specified scheme for a drainage and sewerage proposition.

Fort William, Ont.

Contractors may be given a chance to bid in the sewer construction contemplated by this municipality.

Hamilton, Ont.

Tenders addressed to John McLaren, chairman, Board of Control, will be received until April 19th for constructing sewers on the following streets: Barton street, Trolley street, Main street, Melrose avenue, King street and Lottridge street. Plans, etc., at office of the city engineer; S. H. Kent, city clerk.

The by-law to issue debentures to the amount of \$100,000 for extending and improving waterworks has been passed by the council.

Nanaimo, B.C.

Tenders are being invited until the 23rd inst. by this municipality for the supply of Portland cement, f.o.b. Nanaimo; copies of specification or requirements with Mr. Allan Waters, City Engineer.

A by-law to authorize the borrowing of \$20,000 for the construction of a concrete dam at No. 1 reservoir will be submitted to the ratepayers on April 15.

Oshawa, Ont.

This municipality will construct pavements to the amount of \$15,307.30 this season.

Outremont, Que.

The Town Council are considering a proposal to borrow \$250,000 for municipal public works, to be divided as follows:—Sewers and waterworks, \$136,500; street grading and macadamizing, \$68,500; sidewalks, \$25,000; town hall and fire station, \$20,000.

Pelee Island, Ont.

Tenders will be received for \$25,271 5 per cent. 20 instalments drainage improvement debentures. William Stewart, Township Clerk, Pelee Island, Ont.

Port Arthur, Ont.

Tenders are being called by J. McTeigue, city clerk, until April 30th for

pavement construction. For further information see advertisement in this issue.

Peterborough, Ont.

Ald. Hicks chairman, Board of Works, has been authorized to have an estimate made of the cost of the proposed sewer pumping station, the relaying of Romaines street sewer, the required surface drainage and also of the septic tank. Consulting engineer, Willis Chipman, C.E., Toronto.

St. John, N.B.

The board of works have recommended that tenders be called for paving under the specifications prepared by the engineer.

Toronto, Ont.

The waterworks by-law to authorize the issue of debentures to the amount of \$279,000 was carried.

Tenders will be received until April 19th for supply of cast iron pipe for the past year, ending April 30th. For further information see advertisement in this issue.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until April 19th for asphalt pavements on ten streets; bitulithic pavements on four; vitrified block pavement and grading on one; and concrete curbing on four; also sewers on three. Specifications at office of the City Engineer.

Verdun, Que.

The Town Council have adopted Engineer's estimates, which recommends an expenditure of 25,000 for the construction of roads, sidewalks and waterworks.

Vernon, B.C.

This municipality has decided to lay cement sidewalks immediately, and tenders have been invited for the new water mains.

Victoria B.C.

Tenders will shortly be called for the paving of Linden avenue a section nearly a mile in length; also for five miles more or less on other streets. The city will send in a bid. G. H. Bryson, assistant city engineer.

Woodstock, Ont.

Tenders are being called by this municipality until April 23rd for the construction of concrete sidewalks during season of 1910. F. J. Ure, city engineer. For further information see advertisement in this issue.

Winnipeg, Man.

Tenders will be called shortly for block pavements on Ellice and Livina avenue from Erin street to Wall street, to be in on or before the 20th inst.

The engineer reports that the estimated cost of a sewer in Godfrey avenue, from Cambridge street to the city limits, was \$23,563; that of a main sewer in Ash street, from Assiniboine river to Godfrey street, is \$38,225; and a main sewer in Crescent road, from Ash to Renfrew, will cost \$49,772. The cost of the sewer in Renfrew, from Crescent road to Godfrey, is placed at \$10,263, making a total of \$121,523. An alternative plan provides for a

submain in Godfrey at a cost of \$68,737. The main sewer on Ash street under this plan would cost \$44,495. The engineer recommended the latter plan which does not include a sewer in Wellington crescent, at present. The board recommended a full width asphalt pavement and sidewalks on Pembina, from Stradbroke to Corydon, at an estimated cost of \$32,000. The committee passed the work on the understanding that it would not be done until next year.

AWARDED.

Edmonton, Alta.

The tender for supply of water pipe has been awarded to the Edmonton Concrete Company, \$9,496.

London Ont.

At the meeting of the board of works recently the following tenders for supplies were accepted: Tile 1, 6, 8, 10 and 12 inch, T. Patterson & Company; junctions and 15 and 18 inch tile, Hayman & Mills; 20, 22 and 24 inch tile, W. Heaman & Sons; concrete tile, E. North & Sons. Gravel:—District No. 1, W. J. Boss, \$2.24 a cord; No. 2, M. Morkin, \$2 a cord; No. 3, M. Morkin, \$2.40; No. 4, M. Morkin, \$3.20; No. 5, G. Alexander, \$3; No. 6, G. Alexander, \$2.90; No. 7, W. J. Boss, \$2.50; No. 8, W. J. Boss, \$2.80. Cement Walks:—North of Dundas street, W. J. Anthistle, 8 cents a foot; south of Dundas street, G. Norton, 8 1/4 cents. Curbs and Gutters: W. J. Anthistle, 28 cents. Portland cement, Chantler Bros., \$2.48 a barrel. Corner irons, Gleeson Bros., \$3.90 per cwt. Iron castings, Vulcan Company, 2 1/8 cents a pound. Broken stone, delivered, F. Hutchinson, \$1.37. Bridge flooring, white oak, Ferguson Lumber Company, 16 feet, \$35.75 per thousand; 20 feet, \$38.75 per thousand. Repairs to steam roller, Warren Bros., \$875. Lumber, Dymont-Baker Company. Hardware, Jas. Cowan & Company.

Nanaimo, B.C.

The following list of tenders for supply of sewer pipes has been sent in: The Dominion Glazed Cement Pipe Company, Vancouver, \$28,645; the Hekman Cement Construction Company, Vancouver, \$30,660; the British Columbia Supply Company, Vancouver, \$33,301; the British Columbia Pottery Company, Victoria (accepted tender) \$33,465; the Ontario Mimico Sewer Pipe Company, Ontario, \$33,448; Hamilton & Toronto Sewer Pipe Company, Ontario, \$35,373; the Dominion Sewer Pipe Company, Ontario, \$45,892; Messrs. Gardiner, Johnson & Company, Vancouver, \$36,160; Messrs. Evans, Coleman & Evans, Vancouver, \$39,523 (delivered at Nanaimo). The two lowest tenders are for cement pipes.

New Toronto, Ont.

Township of Etobicoke have received the following tenders for sewers: Successful bidder, I. M. Scott, Lambton Mills, Ont., \$1,727.93; M. Quillan & Company, \$7,995; Page & Brindell, \$2,293; John Campbell, \$16,889; George Orpen, \$1,200; Thos. Crutenden, \$11,200; J. H. McKnight Company, \$3,345; Excelsior Construction & Paving Company, \$7,782; F. Atworthy, \$4,680; I. M. Scott, successful, \$4,727; For

cott Construction Company, \$4,480. J. A. L. Macpherson.

Winnipeg, Man.

The Stanton Iron Works have just been awarded the contract by the Board of Control for supplying water pipe. This company's tender was the lowest at \$18,131. W. Beverley Robinson, agent, Montreal.

Railroads, Bridges and Wharves

Brantford, Ont.

Tenders are being called by this municipality until April 22nd for a reinforced concrete bridge across the canal on Market street. T. Harry Jones, city engineer. Plans and specifications at offices of the "Contract Record," Toronto, and B. 34 Board of Trade Building, Montreal. For further particulars see advertisement in this issue.

County of Hastings, Ont.

One June 22 the county council will consider a by-law to issue \$20,000 20 years bridge debentures. A. M. Chapman, County Clerk.

Edmonton, Alta.

Work is to commence at once on the completion of the Tofield-Calgary branch of the G. T. P. by Geo. Webster, of Winnipeg, who has the contract for the balance of the 140 miles of the branch. Webster's headquarters will be at Alix. The line will be finished to Calgary this year.

Fredericton, N.B.

Tenders are being called for Clifton high and low water wharf until April 25th by the Department of Public Works. Plans, etc. at the aforesaid department, and at the office of G. B. Jones, Apohaqui, and at residence of Richard Wetmore, Clifton, N.B.

Fort William, Ont.

The C. P. R. will double the capacity of its hard coal storage warehouse at a cost of \$200,000.

London, Ont.

At a conference between London and Westminster townships, it was decided to rebuild the Meadow Lily bridge. The new structure will be of steel and concrete. The township of London will erect two new bridges over Bear Creek, one at Coldstream and the other at Poplar Hill. Both will be of steel and concrete. Geo. Riddell, Odell, clerk of Westminster; Miss M. Grant, London, of London.

Orillia, Ont.

The extension of the C. P. R. line from Coldwater here has been authorized.

Oakville, Ont.

The county council have decided to call for tenders for both steel and cement in connection with the bridge necessary to replace old bridge on Middle road near here. Estimated expenditure, \$17,000. Barber & Hutcheon, engineers, have been consulted.

Red Deer, Alta.

The Canadian Pacific Railway Company (J. G. Sullivan, assistant chief engineer, Montreal, Que.), is reported to have acquired the interests of the Alberta Central Railway Company and will this spring commence work on the line, which will run eastward from the Pacific Coast to Red Deer and then to Saskatoon.

Sault Ste. Marie, Ont.

Time limit has been extended to April 30th for tenders desired for the clearing, grading and bridge work on the 31 mile section of the Algoma Central & Hudson Bay Railway between Hawk Lake Junction

and Hobon. C. N. Coburn, chief engineer, Algoma Central & Hudson Bay Railway.

Trenton, Ont.

The Canadian Northern Railway Company J. M. Campbell, resident engineer, at Belleville), is reported to be making surveys for the line east from Trenton to Ottawa.

Toronto, Ont.

Tenders are being called by the Board of Control until April 19th for the construction of piers, abutments and concrete floor slab for a bridge on the extension of Wilton avenue crossing over the River Don. Advertisement in this issue.

Vancouver, B.C.

It is announced that the first section of the Port Moody, Indian River & Northern Railway, a charter for the construction of which was secured at the last session of the legislature, will be under construction within a few weeks.

Winnipeg, Man.

Tenders addressed to N. E. Brooks division engineer, will be received until April 18th for the excavating and backfilling of trenches for 6 inch pipe lines at the following points on Western Division, C. P. R.: Chaplain and Forres, 1 mile each; Macoun and Grassy Lake, each approximately 6 miles; Walsh, approximately 13 miles. Plans, etc., at assistant chief engineer's office, Winnipeg; division engineer's office, Calgary, and resident engineer's offices at Moose Jaw and Medicine Hat.

AWARDED.

Guelph, Ont.

The Township of Guelph have awarded a contract to Walter Davies of Stratford, Ont., for the construction of a concrete arch bridge consisting of three spans of 33 feet each over the River Speed. The bids were as follows: Walter Davies, \$2,073; H. Croft, Guelph, \$2,200; J. D. Callaghan, Arthur, \$2,475; Fraser & Clemens, New Hamburg, \$2,677.70; Rutherford & Patten, St. Catharines, \$2,775.

Public Buildings, Churches, Schools, etc.

Barrie, Ont.

Tenders will be received until April 18th for work and material required in the erection of a new wing for the Royal Victoria Hospital. F. S. Baker, architect, Traders Bank Building, Toronto. For further information see advertisement in this issue.

Beaverton, Ont.

At a meeting of the ratepayers, it was decided to purchase a site for a new school in the Sunderland section to cost about \$8,000. It is probable that the work will commence at once.

Tenders are being called until April 25th by J. McArthur, Township Clerk, for the erection of the new Town Hall and market here. For further information see advertisement in this issue.

Brandon, Man.

The city council are considering the erection of a new central fire hall and also extensive improvements to the city hall. Ald. McKenzie, chairman, Fire and Light Committee; Engineer Speakman has been authorized to secure cost of the latter, in which Architect Sinclair will assist him.

Calgary, Alta.

The Board of Health have recommended that the City Council call for estimates of the cost for a new city isolation hospital.

W. J. Tregillus has offered the exhibition company a free site of 150 acres just west of the city limits, worth about \$100,000.

Courtland, Ont.

D. W. White, clerk of Middleton, writes that no tenders were received for the reconstruction of the municipal hall.

Edmonton, Alta.

A by-law to authorize the expenditure of \$25,000 for purchase of library site will be submitted to the ratepayers shortly.

Estevan, Sask.

Tenders will be received by B. Glover, secretary, public school board, until April 20th for the installation of a heating and plumbing system in the 8-roomed school. Plans, etc., at Builders' Exchange, Winnipeg.

Fergus, Ont.

Tenders for St. Andrew's Church sheds will be received until April 15th. Plans and specifications can be seen on applying to the undersigned, J. H. Dick, Secretary, Board of Managers.

Tenders addressed to P. Perry, secretary-treasurer, Fergus Library Board, will be received until April 14th for the several trades in connection with the erection of a Carnegie free library here. Plans, etc., at office of W. A. Mahoney, architect, Guelph.

Galt, Ont.

The Scott Opera House was damaged by fire to the extent of about \$20,000.

Hamilton, Ont.

Tenders addressed to W. R. Robb, president of I. O. O. F., will be received until April 21st for the various works required in the erection of a temple for the above order. Plans, etc., at office of the architects, Stewart & Witton. Tenders for each line of work to be separate. A. Fraser, secretary-treasurer, I. O. O. F. Temple.

Hull, Que.

The excavation has begun on Alma street for the erection of a building for the Oblate Fathers and will cost about \$5,000 or \$6,000. The contract was recently given to Messrs. Pepin & Caron.

Lethbridge Alta.

The school board has decided to build an eight-room school at once in the southern part of the city.

Until April 15th tenders will be received for \$30,000 30-years 5 per cent. Protestant public school debentures. C. B. Bowman, secretary-treasurer.

Montreal, Que.

Plans and specifications for alterations to the Lachine Market are being prepared by Dalbe Viau, architect, 76 St. Gabriel street, for the city of Lachine.

Finlay & Spence, architects, Guardian Building, have prepared plans for the erection of an additional building for the Orpheum Theatre interests on St. Catherine street.

Tenders close April 16th at the office of J. Rawson Gardiner, architect, Quebec Bank Building, for the construction of the Tabernacle Baptiste Church to be erected on Delorimiere avenue.

At a meeting of the Board of Governors of McGill University, it is stated, plans were approved for the west wing of the new medical building and authorization was given for the calling for tenders for the construction work.

In the course of a week it is expected that plans will be completed and tenders received for the construction of a new

school building on Stadacona street, for the Hochelaga School Commissioners. Dalbe Vian, architect, 76 St. Gabriel street. (Previously mentioned.)

Moose Jaw, Sask.

W. F. Heal, city clerk, has been authorized to call for plans for a hospital to cost not more than \$9,000, to be in by the 11th inst.

Nanaimo, B.C.

The estimates of the city council for the current year provide for an expenditure of \$75,578.67, including \$24,252 for schools.

New Liskeard, Ont.

The congregation of Church of St. John are considering the advisability of the erection of a new church. Messrs. Morgan Summers and Hutchinson, members of Finance Committee.

Niagara Falls, Ont.

At a meeting of Italian Catholics held here recently it was decided to begin the building of a \$12,000 church on Seventh street within a month. It is the intention to have the church completed during the coming summer.

Orangeville, Ont.

The Town Council has been asked to vote \$5,000 to defray the expenses of building a new wing and making alterations to the High School.

Ottawa, Ont.

The Carleton council could not see its way clear for the present to assume the responsibility for tuberculosis hospital, and so the proposal was turned down. Noted in issue of March 23rd.

Tenders addressed to J. D. McLean, Secretary, Department of Indian Affairs, Ottawa, will be received until April 23rd for the erection of a brick schoolhouse on stone foundation, for the Oneida, Indian Reserve, Ont. Plans, etc., at postoffices in St. Thomas, London and Woodstock, and at the office of the Indian Agent, Delaware.

Prince Albert, Sask.

The Northern Produce Company, it is stated, have purchased ten acres on Miller's Hill as a site for the \$50,000 abattoir to be erected.

Plans for the new Roman Catholic hospital have been prepared by architect Oluf Albrechtsen. Estimated expenditure, \$75,000; tenders are being called for first wing.

Princeton, B.C.

At a meeting of the ratepayers on the 2nd inst. a board of management was elected to investigate as to the erection of a hospital.

Quebec, Que.

Tenders addressed to Alph. Gagnon, Secretary, Department of Public Works and Labor, Quebec, will be received until April 20th for the construction of an annex to the present building of the Laval Normal School, on St. Foy Road. Plans, etc., at the office of the architect, Parliament Buildings.

Regina, Sask.

Tenders will be received for \$45,000 ± 1-2 per cent. 20 instalments school debentures. J. A. McLachlan, secretary-treasurer.

Revelstoke, B.C.

This municipality has decided to take a plebiscite as to where the new school shall be located.

Sandwich, Ont.

It is stated that new county buildings will be erected on the present site of the

County Treasurer's office in Sandwich, to cost about \$20,000. Plans to be submitted to the Provincial Inspector for approval.

Saskatoon, Sask.

The Board of Governors of the University of Saskatchewan have recommended the tender of Smith Bros. & Wilson, of Regina, for the first group of buildings.

The plans of Mr. Webster have been accepted for the new 8-room public school; the board invites plans for a second building on the King Edward school grounds.

Sydney, N.S.

Tenders addressed to James J. Curry, secretary, will be received until April 20th for the erection of the proposed Academy building. Plans, etc., at office of the above mentioned or at the office of the architects, Butler & McDonald.

Toronto, Ont.

The by-law to raise \$250,000 for the new General Hospital was carried.

The City Architect has issued a permit to The City Architect has issued a permit to the Dovercourt Presbyterian Church for a new Sunday school, \$20,000.

It is understood that the Massey estate will make a substantial contribution toward the erection of a new building for the Academy of Medicine, and that a new site in Queen's Park has been placed at the disposal of the trustees.

The Committee on Church Property has recommended that permission be given to Dixie congregation to secure a site and erect a new church.

Vancouver, B.C.

At the meeting of the Exhibition Committee, the executive was given authority to advertise for competitive plans for the grand stand sheds, etc., and also to make further representations to the Marine Department towards the establishment of a fishery building.

Victoria, B.C.

At a meeting of a special committee of the Trades and Labor Council, Messrs. Coldwell, Sherk and Manson were authorized to report as soon as possible as to the best site available for the new building, which will cost from \$60,000 to \$100,000.

Winnipeg, Man.

At a meeting of the Exposition directors held recently the date for the exposition was fixed for 1914.

The Order of Oblates have decided to build a college similar to the University of Ottawa in St. Charles, a suburb of the city.

It is reported that the Unitarians are considering the erection of a church here, if not this year, possibly in 1911. Rev. Dr. Vrooman is interested.

A permit has been granted to the Winnipeg School Board for the erection of the Lord Roberts school, on the west side of John, between Beresford and Rathgar, \$86,000.

The trustees of St. James will issue debentures for \$40,000 to be used towards the erection of the new school, for which the site has been selected on Hampton street north of Portage avenue.

J. R. Jackson, of the firm of Jackson & Rosencranz, architects, has laid before the Y. M. C. A. directors sketches for the proposed new buildings: central building on Vaughan street, six or seven storeys, cost \$300,000.

The Salvation Army has in view the erection of several buildings this year. If the money available should not be sufficient, then the structures will be erected

later. Major Miller, staff architect, is expected here to advise in the matter.

AWARDED.

Estevan, Sask.

School Board have awarded to Snyder Bros. of Winnipeg, the contract for erecting a school building, exclusive of heating and plumbing, at \$22,300. McKenzie & Prevost, of Estevan, bid \$22,796.

Hamilton, Ont.

The following tenders for Nurses' Home have been accepted: Masonry, Geo. Mills, \$6,990; carpentry, Cruickshanks & Young, \$6,490; painting, Goodall & Landlaw, \$1,200; plastering, J. Clapham & Son, \$1,774; plumbing, Adam Clark, \$1,498; tin work, J. E. Riddell, \$484; fire escape, J. Bain & Son, \$310; wiring, Electric Supply Company, \$150. Total, \$18,896. The estimate of the total cost is \$25,000. Drake & Drake, carpenters, withdrew their tender because they were several thousand dollars too low in their figuring.

Kenora, Ont.

The contract for the completion of the lock-up has been awarded to M. A. Pigott, of Hamilton. The work was begun last summer by day labor and the foundations are now in.

Laprairie, Que.

The general contract for the erection of a presbytery for the parish of Laprairie has been awarded to St. Francois Dufresne contractor St. Laurent, Que. G. A. Monette architect, 97 St. James street.

Montreal, Que.

Gray & Wighton have the contract for building the William Dawson School in St. Denis Ward. A. F. Dunlop, architect.

Ottawa, Ont.

Mr. John O'Toole, of this city, has been awarded the contract for the plastering of the new Sacred Heart Church.

The contract for the Registry Office fittings has been awarded to the Office Specialty Manufacturing Company, \$4,495; that for the vault door to J. J. Taylor, \$235.

Stratford, Ont.

The contract for the new Registry Office was let to Messrs. Pounder Bros. of Stratford, \$10,168.

Toronto, Ont.

The Deisenroth Contracting Company, 75 Yonge street, was awarded the contract for putting in the vault and other office fittings for the electrical department at the city hall, \$5,339.

At a meeting of the Hospital Board tenders for the excavations for the main building and administration building facing on College street, and the connecting tunnels, were awarded to Holby Bros., 2 Robert street, city. The work will be commenced at once. The tender was for a stated price per cubic yard of earth removed, and will amount to several thousand dollars, there being 8,000 cubic yards of earth to be removed for the buildings, exclusive of the tunnels and footings for the walls.

Vancouver, B.C.

Campbell Bros. were awarded the contract for excavation of Vancouver Labor Temple. Secretary R. P. Petraposse.

Victoria, B.C.

The contract for the erection of the Y. M. C. A. has been awarded to J. L. Skene, 70,000. This includes wiring, but not heating, bids for which have been deferred for further consideration. Building to be ready by November next. Secretary, Brace.

Residences

Brandon, Man.

A building permit has been granted to Joseph Lott for residence on Lorne avenue, \$2,000.

Brantford, Ont.

A building permit has been issued to T. J. Minnes, brick dwelling on Murray street, \$2,500.

Hamilton, Ont.

Recent building permits include:—R. Spicey, brick dwelling on Homewood avenue, \$2,500; J. P. Shepherd, three brick dwellings on the corner of Main and Park streets, \$5,000.

Montreal, Que.

Tenders will be received until April 16th for a residence to be erected on Ontario avenue for Mr. J. M. Wilson. Saxe & Archibald, architects, 59 Beaver Hall Hill.

Tenders have been received for alterations to a residence on St. Famille street for Doctor England. MacVicar & Heriot, 104 Union avenue, architects.

Tenders are invited for the construction of a country house at Ste. Jeanne Ile Perrot, Quebec for Mr. L. Lemieux. Messrs. MacDuff & Lemieux, architect, Quebec Bank Building.

Tenders were received until April 12th for the erection of three flats on St. Hubert street for Mr. Victor Martineau. Dalbe Viau, architect, 76 St. Gabriel street.

Tenders will be received until April 16th for the erection of three flats on Alwyn street, for Mr. O. Cardinal. Dalbe Viau, architect, 76 St. Gabriel street.

Plans and specifications will be prepared and tenders will be received up to April 20th for the erection of an apartment house on Fort street for Mr. H. S. Phillips. Theo. Daoust, architect, 103 St. Francois Xavier street.

Mr. E. Payette, architect, 15 St. James street, is preparing plans for alterations to a house at St. Margaret, Que., for Dr. R. Masson.

Dalbe Viau, architect, 76 St. Gabriel street, is preparing plans and specifications for an apartment house to be erected on Boulevard St. Joseph for Mr. J. A. Jarry.

Outremont, Que.

Recent building permits include: L. A. Lapierre, residence, Boulevard street, St. Joseph, cost \$8,000; A. C. Miller, cottage, MacDougall avenue, cost \$4,500; G. Fellows, three cottages, Wiseman avenue, cost \$15,000; Geo. Goodbody, six pairs of semi-detached houses, Derippe street, cost \$33,000.

Plans have been prepared and tenders are being invited for the erection of a house on MacDougall avenue for Mr. H. S. Thomas. Philip J. Turner, F.R.I.B.A., architect, Board of Trade Building, Montreal.

Peterborough, Ont.

A building permit has been issued to W. H. Baker pressed brick dwelling on Rubidge street, \$3,500.

Renfrew, Ont.

Tenders were called for April 13th for various trades required in the erection of dwelling house for J. A. Allan. Plans, etc., at office of the architects, Weeks & Keefer, Free Press Building, Ottawa.

St. Lambert, Que.

Tenders are being called for additions to residence for W. B. Powell. Philip J. Turner, F.R.I.B.A. architect, Board of Trade Building, Montreal.

Vancouver, B.C.

Building permits have been granted to Mr. John A. Seabolt, for a 3 storey apartment house on the corner of Davis and Jervis streets, to cost \$85,000; also another to the Hose Investment Company for 5 storey apartment, 50 x 20, fireproof. A. J. Bird, architect, 79 Hastings street.

Winnipeg, Man.

A building permit has been issued to Messrs. Carson, Falkner & Ladell for the erection of an apartment block one the north side of Buell street between Home and Arlington, \$25,000.

Purcer Bros. are building six residences at an average cost of \$4,400, on Dorchester avenue.

MacMillan & Vollans have secured a permit for the erection of an \$80,000 apartment block at the corner of Cumberland and Kennedy.

AWARDED.

Welland, Ont.

Cozy Homes, Limited, have let the contract for the construction of twelve houses on Division street, east of Queen, three of which will be built at once. Average value, \$1,200.

Strathcona, Alta.

Wolfe, Howe & Baldwin have the contract for the erection of residence for Major G. W. Marriott. Herrald & Wilson, architects.

Business Buildings and Industrial Plants

Belleville, Ont.

The 4 storey grist mill, on Moira street, owned by the Carlaw Milling Company, was damaged to the extent of about \$30,000 recently.

Brandon, Man.

A building permit has been granted to Beatty Bros. for a brick warehouse on Pacific avenue to cost \$10,000.

The Western Canada Flour Mills Company have announced their intention to add another storey to their warehouse here.

A building permit has been granted to Ald. B. D. Wallace for the erection of a brick office on Eleventh street, cost \$2,500.

Brantford, Ont.

It is understood that the Cockshutt Plov Company will in the immediate future make some large extensions to their plant.

Mr. R. M. Jaffray, of Detroit, has been investigating as to the advisability of locating an automobile factory here in which he is interested.

Calgary, Alta.

Judge Travis, Beveridge Bros. and Geo. Bryan will erect a five storey block here, work to commence immediately. Cost, \$25,000.

Collingwood, Ont.

Architect Wilson is preparing plans for a 2 storey brick addition, 50 x 100 feet, for Mr. H. Poehlman, to be erected on a portion of the Toner & Gregory property on First street.

Large and important extensions in the way of office building, second factory, etc., are among the plans of the Bryan Manufacturing Company here; F. W. Bryan, president; W. T. Herrington, secretary-treasurer.

Craik, Sask.

The time for receiving tenders for erection of Farmers' Elevator has been ex-

tended to April 23rd. E. A. Phipps, secretary-treasurer.

Dalry, Man.

The Scott elevator was destroyed by fire recently. Loss, \$10,000.

Edmonton, Alta.

The permit for the new Canada Permanent Mortgage Building has been taken out, \$60,000. Tenders are also being called for the new National Trust Company Building, \$50,000.

Enderby, B.C.

The Bank of Montreal will erect a reinforced concrete building this summer.

Fort William, Ont.

It is stated that a site has been selected for the hardwood plant for Messrs. Seaman & M. Kent, of the Seaman, Kent Company, Meaford, Ont., for which plans have been approved.

Fort Frances, Ont.

L. Christie will erect a \$10,000 block.

Granby, Que.

J. Bruce Payne Cigar Company, Limited, are erecting an addition to their factory with frontage of 45 feet on Queen street by 80 feet in depth and three storeys high. Material, concrete.

Kelowna, B.C.

Fire destroyed the warehouse and offices of S. T. Elliott here recently. The loss is \$16,000.

Kenora, Ont.

Mr. Bain, surveyor for the Hudson Bay Company, has surveyed the site for the new mill and plans have been submitted to the council.

London, Ont.

It is reported that Hon. Adam Beck's box manufacturing company will establish a branch at Winnipeg, Man.

It is reported that the Barker property, between Clarence street and Wellington street, on Dundas, will be torn down and a large new building erected. Leases expire on April 1, 1911.

Moose Jaw, Sask.

Tenders addressed to T. W. Robinson Company, Limited, will be received until April 15th for alterations and additions to their Main street store. Plans, etc., at office of Elliott & Gorman, architects.

Montreal, Que.

Selected tenders will shortly be invited for the construction of the new office and factory building to be erected for the Holland Varnish Company.

Messrs. Findlay & Spence, architects, 59 Guardian Building, are preparing plans for the extensive remodelling of Kastel's restaurant on St. Catherine street west.

Tenders have been received by MacVicar & Heriot architects, 10. Union avenue, for the general contract for alterations to the premises at 138 Peel street, for R. J. Inglis.

Tenders will be received until April 14th on plans for alterations to the premises at 416 St. Catherine street for F. Matthew & Company. MacVicar & Heriot, architects, 104 Union avenue.

Selected bids are now being invited to figure on the general contract for the erection of a new building for the Montreal Steel Works, Limited. T. Pringle & Son, Limited, architects, Coristine Building.

Plans and specifications have been prepared and tenders are invited until April 14th for alterations to Cigar Box Factory on Jurors street, for Adam Beck, Esq.

Hutchison, Wood & Miller, architects, Royal Insurance Building.

Messrs. Willis & Company, Limited, have had plans prepared for the erection of an eight storey building on the southwest corner of St. Charles and Drummond streets on the site of the premises now occupied by Mr. J. A. Harte's drug store. Ross & McFarlane, architects.

The rumor is again current that the extensive down town property, formerly occupied by S. Carsley & Company, Limited, fronting both on St. James and Notre Dame street will be transformed into a modern hotel building. This large block is at present unoccupied.

The Chas. Thackeray Company, general contractors, are the lowest tenderers for the construction of the reinforced concrete building to be erected on the Blumenthal estate, St. Catharine and Balmoral streets, and it is expected that the contract will shortly be awarded to them. Ogilvie & Mitchell, associated architects, Molsons Bank Building, St. Catharine street.

New Liskeard, Ont.

Mr. O. H. Moxley is building a new mill, foundation of which has been laid.

New Westminster, B.C.

Contracts have not yet been let for the main building of the new B. C. E. R. station on Columbia street; it is understood that plans call for red brick and granite, with interior of tiled floors and marble walls.

North Vancouver, B.C.

Mr. Walter Ker, of Vancouver, and Mr. David Ker, of Victoria, representatives of the Brackman-Ker Milling Company, have been looking over the prospects relative to erecting a large office and store rooms on their property on the Esplanade.

Orillia, Ont.

E. Webb has the superintendence of the erection of the new Tudhope carriage factory, which will be four storeys high, 162 x 77 feet, and of brick and slow-burning construction.

Peterborough, Ont.

A building permit has been granted to the Quaker Oats Company for a brick storehouse, cost \$80,000; contractors, Leonard Construction Company. It is expected that the building will be completed by October.

Port Colborne, Ont.

A by-law granting aid to the Canadian Cork Company, Limited, will be submitted to the ratepayers on April 29th. The company intend to build a \$30,000 factory.

Portage la Prairie, Man.

It is understood that a representative from the Rogers Fruit Company will shortly arrange for the erection of their distributing warehouse on Tupper street, which is to be of brick, 90 x 100 feet.

Quebec, Que.

It is reported that the Bank of Montreal has secured the corner of St. John and Palace streets as a site for the erection of their new branch.

The Canada Gazette announces the incorporation of the Dominion Drydock Company, headquarters at Quebec capital \$1,000,000. The incorporators are Sir Thomas Shaughnessy and Mr. Hugh Andrew Allan, of Montreal; George D. Davie and William M. Dobell, of Quebec; Walter E. Foster, of St. John, N.B.; Baron Perrie, of Belfast, and Sir Robert W. Perks and Arthur M. Grenfell, of London, England. The company is empowered to carry on a

general business of shipbuilding and ship-repairing, building and operating drydocks and subsidiary undertakings. It is proposed to build plants at Levis, and St. John, N.B., within the year.

Qu'Appelle, Sask.

Surgeon Bros. machine works were destroyed by fire on the 5th inst. Loss, \$20,000.

Red Deer Alta.

The Merchants Bank has purchased two 25 feet lots.

Saskatoon, Sask.

C. H. Stephenson, merchant, will build a \$20,000 block here.

St. Boniface, Man.

The store occupied by John Barkwell, 139 Tache avenue, was destroyed by fire on the 3rd inst. Estimated loss, \$2,500.

St. Thomas, Ont.

Architect N. B. Darrach has prepared plans of the proposed new factory for the Nursery Shoe Company, to locate here provided the ratepayers endorse the loan of \$15,000 to the company on April 18th. Plans call for a building 40 x 120 feet, and will contain general offices and the various workrooms. It will be so constructed that additions can be made to it at any time. Noted in last issue.

Tilbury, Ont.

As soon as the fire losses are adjusted work will be commenced on the rebuilding and repairing of the three blocks damaged by fire recently.

Toronto, Ont.

The warehouse of the Salada Tea Company at 32 Yonge street was badly damaged on the 11th inst. Estimated total loss, \$50,000. P. C. Larkin, president.

The Bank of Toronto recently purchased 20 feet 8 inches by 95 feet lot on the northwest corner of Yonge and Charles streets, on which they will erect a branch office.

Tenders addressed to A. L. Hertzberg, division engineer, will be received until April 20th for the construction of a new station building, North Parkdale (C. P. R.).

The northeast corner of Dovercourt road has been purchased as a possible site for a new departmental store. W. O. McTaggart & Company, 979 Bloor west, effected the sale.

Uxbridge, Ont.

Tenders will be received by J. J. Gould for the erection of a bank building.

Vancouver, B.C.

Building permits were granted to The Home Investment Company, five storey block, Hornby street, between Nelson and Helmcken, cost \$75,000; Mr. J. A. Seabold, covering a three storey block at 1314 Davie street, costing \$78,000.

Vermilion, Alta.

The Canadian Slate Products Company, capitalized at \$2,500,000, as soon as the necessary formalities of incorporation takes place, will commence the erection and installation of plant here. Estimated to cost about \$1,000,000.

Victoria, B.C.

It is announced that negotiations are in progress between the G. T. P. and the Hudson Bay Company for the acquisition of property on Wharf street, on which the former may erect a new hotel.

Warwick, Que.

The agricultural implement factory and warehouse owned by Usine Cantin were

destroyed by fire on the 7th inst. Estimated total loss, \$50,000.

Windsor, Ont.

It is reported that D. W. Murray, of Johnstown, Ohio, representative of a firm which manufacture sheet brass fittings for automobiles, has purchased property on the corner of Sandwich street and Louis avenue.

Winnipeg, Man.

It is reported that negotiations are in progress for the erection of a cement mill in the city by the Canada Cement Company.

The Coleman Baking Company, of Toronto, will build a bakery 90 x 132 feet on 666 Elgin avenue, to cost \$50,000. W. C. Parnell, western manager.

Gowans Kent Western, Limited, it is stated, have completed arrangements for the erection of their 6 storey warehouse on Market street, 50 x 157 feet, of reinforced concrete. F. S. Parlier, western manager. Noted in issue of February 16.

J. D. Atchison, architect, is preparing plans for the new Eastern Townships Building. Plans call for a frontage of 45 feet on the east side of Main street, with front 40 feet in height, of a handsome granite. Building operations will commence on May 1st.

Tenders are now being called for interior finishings on the upper three storeys of the Union Depot, to be occupied by the G. T. P. and C. N. R. Estimates of architects preparing plans for finishing show that the work will amount to a quarter of million dollars over and above the contracts already let.

Yarmouth, N.S.

The Higgins shoe factory was destroyed by fire on the 4th inst. Estimated total loss, about \$30,000.

AWARDED.

Collingwood, Ont.

The Sheldon Manufacturing Company have the contract for the equipment of the dry kiln to be erected for the Bryan Manufacturing Company.

H. G. Wynes has the contract for the cement foundations for the new buildings being erected for C. Stephens Company. J. Wilson, architect.

Edmonton, Alta.

The contract for the Canada Permanent Company's new \$65,000 office building on McDougall avenue has been awarded to Pheasay & Batson.

Halifax, N.S.

M. S. Brown & Company have awarded the contract for an addition to their building to Freeman Bros.

Kelowna, B.C.

Mr. Geo. E. Ritchie has secured the contract for the erection of a \$6,000 cannery building for the Kelowna Canning Company. Construction will commence shortly.

Montreal, Que.

We are informed that the amount of contract awarded to Bishop Construction Company for C. P. R. viaduct Windsor street station, is \$75,000.

The contracts for the erection of a building at 1203 St. Denis street have been awarded as follows: Excavation and concrete work, S. F. L. Dasablon & Company; plumbing, heating, painting, etc., A. Mercure.

The following contracts have been awarded to date in connection with the erection of the new plant for the Shaw

(Continued on page 32)

Tenders and For Sale Department

To Contractors

Sealed separate or bulk bids will be received by the undersigned up to 12 o'clock noon of MONDAY, 18TH APRIL, 1910, for all the work and material required in the erection of a new wing to be added to the Royal Victoria Hospital, Barrie, Ontario.

Copy of plans and specifications may be obtained at the Hospital or at the office of the architect.

The lowest or any tender will not necessarily be accepted.

F. S. BAKER, Architect,
Traders Bank Bldg., Toronto.

15

The City of Calgary

Tenders will be received by the City Commissioners up to and including APRIL 22ND, 1910, at 4 o'clock p.m., for supplying the City of Calgary with the following material:

Salt Glazed, Vitrified Clay Sewer Pipe, according to specifications to be furnished by the City Engineer. Tender to state price, f.o.b. Calgary.

A marked cheque for \$100 to accompany each tender.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,
City Clerk.

Dated at Calgary March 17th, 1910. 16



Department of Railways and Canals, Canada

Sault Ste Marie Canal

Notice to Contractors

Sealed tenders addressed to the undersigned and endorsed "Tender for Removing Range Beacon, and widening the Channel at the Upper Entrance," will be received at this office until 16 o'clock on THURSDAY, THE 28TH APRIL, 1910.

Plans, specifications and the form of the contract to be entered into, can be seen on and after the 8th April, 1910, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Engineer in Charge, Sault Ste. Marie, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$500.00 made payable to the order of the Minister of Railway and Canals, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfillment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 8th April, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16

YORKTON, SASK.

Tenders for Concrete Sidewalk

Tenders will be received by the Secretary-Treasurer of the Town of Yorkton, Sask., until MONDAY, APRIL 25TH, 1910, for the furnishing of all material and the construction of approximately 80,000 square feet of concrete sidewalk. Particulars may be had on application to the Town Engineer. A marked cheque for \$300 to accompany each tender. Lowest or any tender not necessarily accepted.

F. T. McARTHUR, B.Sc.,
Town Engineer.

15.

City of Brandon

Sealed tenders will be received by the City Clerk, Brandon, Manitoba, "Endorsed Tender for Road Roller," until 12 o'clock noon on MONDAY, THE 25TH DAY OF APRIL, inst., for a Steam or Gasoline Road Roller, weight 12 tons.

Proposals must contain full specifications. Roller to be delivered f.o.b. Brandon, freight and duty paid.

The lowest or any tender not necessarily accepted.

R. E. SPEAKMAN,
City Engineer.

Brandon, April 9, 1910. 16

The City of Calgary

Tenders will be received by the Commissioners of the City of Calgary up to and including the 22ND DAY OF APRIL, 1910, at 4 o'clock p.m., for the construction of the following works, according to plans and specifications to be furnished by the City Engineer:

Five miles of sewer, including pipe,
Three miles of water mains, city supplying pipe.

A marked cheque for \$500 to accompany each tender.

A bond of maintenance for one year signed by a satisfactory surety company to be delivered when work is completed.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,
City Clerk.

Dated at Calgary, 17th March, 1910. 16

City of Port Arthur

Pavement Construction

Sealed tenders addressed to the undersigned and endorsed on envelope, "Tenders for Pavement Construction," will be received up to 12 o'clock noon of

Saturday, April 30th, 1910

for approximately 50,000 square yards of Sheet Asphalt or Asphalt Block Pavements on concrete foundation.

Plans, profiles, specifications and forms of tender are on file in the City Engineer's office, and specifications and forms of tender may be obtained from the City Engineer and any further necessary information.

A marked cheque for 10 per cent. of the estimated cost of the paving must accompany tender.

The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

J. McTEIGUE,
City Clerk.

Corporation Offices, Port Arthur,
April 7th, 1910. 16

City of Brantford

Tenders for Reinforced Concrete Bridge

Sealed tenders addressed to Ald. Joseph Minshall, in care of the City Clerk, Brantford, Ontario, will be received till 12 o'clock noon on

Friday, April 22nd, 1910

for a reinforced concrete bridge across the Canal on Market street. The bridge will consist of one 60 foot arch span and approaches, one 46 foot girder span, one 42 foot girder span and two 36 foot girder spans, all of reinforced concrete. Length of bridge, 246 feet. Width, 64 feet.

Plans and specifications may be seen and instructions to bidders and forms of tender obtained at the office of the City Engineer. Each tender must be accompanied by a marked cheque for \$1,000 payable to the order of the City Treasurer.

Copies of the plans and specifications may be seen at the offices of the "Contract Record," Confederation Life Building, Toronto, and at B34 Board of Trade Building, Montreal.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.

City Engineer's Office,
Brantford, April 5th, 1910. 16



Department of Railways and Canals, Canada

Trent Canal

Ontario-Rice Lake Division
Section No. 6

Notice to Contractors

Sealed tenders addressed to the undersigned, and endorsed "Tender for Trent Canal," will be received until 16 o'clock on TUESDAY, THE 26TH APRIL, 1910, for the works connected with the construction on Section No. 6, Ontario-Rice Lake Division of the Canal.

Plans, specifications and the form of contract to be entered into, can be seen on and after this date at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared, or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation and the place of residence of each member of the firm.

An accepted bank cheque for the sum of \$10,000, made payable to the order of the Honourable the Minister of Railways and Canals, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent will be returned to the respective parties whose tenders are not accepted.

The cheque of the successful tenderer will be held as security or part security for the due fulfillment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 5th April, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16

City of Woodstock Concrete Sidewalk

Tenders addressed to John Morrison, City Clerk, Woodstock, will be received up to SATURDAY, THE 23RD inst., at 10 a.m., for the constructing of concrete sidewalks during the season of 1910.

Specifications and further information at my office.

The lowest or any tender not necessarily accepted.

F. J. URE,
City Engineer. 15

PLANT FOR SALE

One No. 3 Gates crusher, complete.
Three revolving stone screens.
110 elevator buckets.
One 70 h.p. Loco fire box boiler.
One 30 h.p. Loco fire box boiler, on wheels.
One 25 h.p. Loco fire box boiler, on skids.
One 12 h.p. "Champion" boiler and engine.
One single drum Buffalo horse power.
One double drum horse power.
26 pairs 18-inch car wheels with axles, 3-foot 6-inch gauge, with boxings.
A lot of derrick castings and irons.
Wire guys.
One piece of shaft, 3 7-16 inch by 18 feet 9 inches.
One piece of shaft, 2 15-16 inch by 12 feet.
One D. S. D. D. Steam Hoist.
Some belt pulleys.

16.

J. C. INGLES,
Hagersville, Ont.



Department of Railways and Canals, Canada

Trent Canal

Ontario-Rice Lake Division
Section No. 4

Notice to Contractors

Sealed tenders addressed to the undersigned, and endorsed "Tender for Trent Canal," will be received until 16 o'clock on THURSDAY, THE 5TH MAY, 1910, for the works connected with the construction of Section No. 4, Ontario-Rice Lake Division of the Canal.

Plans, specifications and the form of the contract to be entered into, can be seen on and after this date at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared, or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$20,000.00 made payable to the order of the Honourable the Minister of Railways and Canals must accompany each tender, which sum will be forfeited, if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security for the due fulfillment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 7th April, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16

To Contractors

Sealed bulk or separate tenders endorsed "Tender for Town Hall" and addressed to Mr. J. McArthur, Township Clerk, Beaverton, Ont., will be received until noon on

Monday, April 25th, 1910

for all trades, in connection with a proposed new Town Hall and market at Beaverton, Ont. Plans and specifications may be seen, on and after April 4th, and form of tender obtained at the office of W. F. Shepherd and J. Harvey Self, associated architects, 436 Yonge street, Toronto, or at the office of the Township Clerk, Beaverton.

A marked cheque for \$50.00, payable to the order of J. McArthur, Township Clerk, Beaverton, must accompany each tender and will be retained as security for immediate execution of a construction contract and satisfactory guarantee bond. Deposit cheque of tenderers will be returned if unsuccessful, or, if successful, on execution of construction contract and guarantee bond. Neither the lowest nor any tender will necessarily be accepted.

15

JOHN MCARTHUR,
Township Clerk.

Piers, Abutments and Concrete Floor Slabs

Wilton Ave. Bridge

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on TUESDAY, APRIL 19TH, 1910, for the construction of Piers, Abutments and Concrete Floor Slab for a Bridge on the extension of Wilton avenue crossing over the River Don.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering, as prescribed by the city by-law, must be strictly complied with or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.
City Hall, Toronto, April 4th, 1910. 15



Temiskaming and North- ern Ontario Railway Commission

Sealed tenders addressed to the undersigned, and endorsed on envelope "Tender for Passenger Station at Matheson, Ont." will be received up to 12 o'clock, noon, WEDNESDAY, APRIL 20TH.

Plans and specifications may be seen, and forms of tender obtained, from John M. Lyle, architect, 14 Leader Lane, Toronto, Ont., and the office of the Chief Engineer, North Bay, Ont.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-Treasurer of Commission, for 10 per cent. of total amount of tender must accompany each tender.

Lowest, or any tender, not necessarily accepted.

A. J. McGEE, Secretary-Treasurer,
25 Toronto St., Toronto, Ont.

Papers inserting this advertisement without authority shall not be paid for same. 15
Toronto, April 12th, 1910.



Notice to Contractors

For the Supply of Cast Iron Water Pipe for the Year 1910

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on TUESDAY, APRIL 19th, 1910, for the supply of 3, 4, 6, 8, 10 and 12 inch cast iron water pipe for the year ending April 30th, 1911.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer upon application.

The usual conditions relating to tendering as prescribed by City By Law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control,
City Hall, Toronto, April 4th, 1910. 15

Positions Vacant

WANTED.—ARCHITECTURAL DRAFTSMAN, good all-round man. Steady employment if services prove satisfactory. Send references, state experience and salary wanted. Address Box 953, Contract Record, Toronto. 15

Positions Wanted

ARCHITECT'S MANAGING ASSISTANT, 16 years, first class experience (London and Glasgow), used to taking full charge, desires change, well up in banks, office blocks, drainage, etc. Further particulars—Hunter, 33 Thornwood Drive, Glasgow, Scotland. 16

Miscellaneous

GOOD SECOND HAND HYDRAULIC HOIST complete, capacity 2½ tons. For sale, very cheap. Apply to R. J. Dodds, 16 King street east, Toronto, Ont. 15

FOR SALE—Eighty-eight (88) pieces of Luckawanna Steel Sheet Piling, twenty-two (22) feet long, twelve and three-quarter (12¾) inches wide, three eighths (¾) inch thick. WM. LESLIE, Walkerville, Ont. 15

New Companies

The Tourville Lumber Mills Company, Limited, Montreal, Que., capital \$275,000. Incorporators, Rodolphe Tourville and Arthur Tourville, manufacturers, Montreal, Que.

The Verdun Lumber Company, Verdun, Que., capital \$20,000. Incorporators, Messrs. Laurent Justinien Marchand, manufacturer, and Geo. Napoleon Monty, accountant, of Emard, Que.

La Compagnie Gaulin, Limited, St. Francis, Que., capital \$125,000. Incorporated to construct railway locomotives, electric or steam cars, etc. Incorporators, Alfred Gaulin, manufacturer, St. Francis, Que., and Edward Hunt, accountant, Quebec, Que.

Canadian Hoskins, Limited, Walkerville, Ont., capital \$40,000, incorporated to manufacture, operate and deal in electrical machines such as electric furnaces, pyrometers, etc. Incorporators, Alfred Leroy Marsh, electrical engineer, and Wm. W. Talman, manufacturer, both of Detroit, Mich.

Business Buildings and Industrial Plants

(Continued from page 20)

inigan Cotton Company, Shawinigan Falls, Que.: General contract, C. E. Deakin; reinforced concrete construction, J. F. Jago & Company; iron castings, Canada Iron Corporation, Limited. T. Pringle & Son, Limited, architects, Coristine Building.

Tenders have been awarded as follows for the erection of factory buildings and stables for the J. Barsalon & Company 222 Plessis street: Excavation and masonry work, F. L. Dusablon; brick work, S. Rochon; carpentry, and joinery, U. Pauze & Fils; plastering, J. Lefebvre; painting and glazing, J. A. Gauthier; vault doors, Ahern Safe Company; stable fittings, Warden, King, Limited. Eugene Payette, architect, 15 St. James street. Estimated cost, \$90,000.

Contracts have been awarded as follows in connection with the erection of a new factory building for the Walter M. Lowney Company of Canada, Limited: Masonry and brick work, Messrs. Byers & Anglin; carpentry work, D. M. Long; steel work, Phoenix Bridge Company; concrete work, Messrs. Lewis & Ross; painting, A. Craig; roofing, Geo. W. Reed & Company; plumbing, James Ballantyne; ornamental iron work, Jno. Watson & Company. Hutchison, Wood & Miller, architects.

New Westminster, B.C.

The Fraser River Lumber Company has awarded to S. H. Abbott, of Seattle, contract for a nine mile extension of its standard gauge logging railway in the Comox district. Construction work is now in progress. Cost of construction, about \$10,000 a mile. The company has just ordered 100 logging cars from the Dominion Car Company, Montreal, and two additional Baldwin locomotives from the Baldwin works at Philadelphia, delivery being called for in September.

Three Rivers, Que.

The general contract for the erection of additions to the Wabassa Cotton Company's new buildings has been awarded to C. E. Deakin, general contractor, Montreal; T. S. Pringle & Son, Limited, architects, Coristine Building.

Toronto, Ont.

The Sanitary Floor Company, 544-546 King street west, have the contract for the factory floors in the new premises of Heintzman Company, Yonge street.

Power Plants, Electricity and Telephones

Aylmer, Ont.

The residents favor the establishment of a municipal lighting plant, electricity to be generated by a steam plant, perhaps in conjunction with the waterworks plant. J. Bradley, town clerk.

Bracebridge, Ont.

Tenders are being called until April 15th by the Bracebridge & Muskoka Lakes Telephone Company Limited, for construction of telephone line from Port Carling to Bala. For particulars apply to P. Hutchison, this place.

Edmonton, Alta.

The new power house erected last fall is showing signs of collapse and it is likely that the walls will have to be razed and reconstructed of brick.

Fort Frances, Ont.

The special committee appointed to deal with the telephone question recommended

that plans be prepared and tenders called by the town for the installation of a modern plant.

Peterborough, Ont.

It is stated that the proposed extension to the plant of the Canadian General Electric will be built. This was decided at a joint meeting of the City Council and Water Commissioners, when the company's offer was accepted. Noted in last issue.

Regina, Sask.

Tenders addressed to S. P. Porter, Deputy Minister Railways, Telegraphs and Telephones, will be received until April 20th for telephone lines (1) Weyburn-Stoughton-Arcola; (2) Wapella-Carlyle; (3) Abernethy Melville Esterhazy, Wapella; (4) Saskatoon Warman, Humboldt; (5) Moose Jaw, Outlook.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until April 19th for conduit. Specifications may be obtained from the Toronto Hydro-Electric System, City Hall.

Tenders for the mason work, roofing, plumbing, painting, for the new electric sub-station on the corner of Duncan and Nelson streets will be received until April 19th by G. R. Geary, chairman Board of Control. Plans, etc., at office of the City Architect.

Winnipeg, Man.

The power construction engineers have recommended to the Board of Control the tender of J. W. McKinley, reeve of Springfield, for the erection of the fence for the power transmission line right of way, although the said tender is not the lowest.

Tenders addressed to the Chairman of the Board of Control will be received until April 30th for supply of arc lamps and regulating apparatus, switchboards and accessories insulated line wire and mast arm parts. Specifications, etc., at office of city electrician. M. Peterson, secretary, Board of Control.

AWARDED.

Chilliwack, B.C.

J. W. Pike, of Vancouver, has been awarded the contract for building the Sumas section of the B. C. E. R. Company's Chilliwack line.

Miscellaneous

Dartmouth, N.S.

Tenders are being called by the Ferry Company for a steel propeller boat and for a wooden side wheel boat according to plans on file in office, said plans having been made by the Lockwood Manufacturing Company.

Hamilton, Ont.

The following building permits have been issued: Thomas W. Reid, brick dwelling, Victoria avenue, for E. P. Smith, \$2,300; J. Tulloch, brick dwelling on Spruceside avenue, \$2,400; Arthur Bell, two storey brick store and dwelling on Barton street, \$2,500.

Hanover, Ont.

The County Council of the County of Tay will consider a by-law to raise \$20,000 for local improvements. John Rutherford, County Clerk.

Kingston, Ont.

The enlargement of Kingston harbor is under consideration. It is proposed to destroy the Cataraqui wooden bridge and to replace it with a new one half a mile northward with Belle Island, in Cataraqui river, as the centre of two new iron bridges. The Government, it is expected,

would largely aid in the construction of bridges for military purposes.

Medicine Hat, Alta.

On May 9 the ratepayers will vote on the question of raising the following moneys by debentures: Sewers, \$35,000; cement walks, \$30,000; plank walks, \$5,500; Medicine Hat Society, \$10,000; municipal warehouse, \$7,000; road making machinery, 20,000; parks, \$36,000, or a total of \$143,500. Later on in the year a vote will be taken to authorize the issue of debentures to the amount of \$50,000 for the installation of an electric power plant.

Montreal, Que.

The part of the work announced to be undertaken this year by the Harbor Commission is as follows: A two million bushel elevator, \$800,00; raising the railway tracks to high levels so as to be available in winter and summer both, \$200,000; raising Victoria pier to high level, leaving part of the low level for river vessels, \$400,000; the completion of the Dominion coal dock at the east end, \$100,000. It is announced that a British firm will construct a floating dry dock with a lifting capacity of 25,000 tons and also a ship-building plant, the dry dock to be ready by the summer of 1911.

Ottawa, Ont.

Tenders are being called by the Department of Railways and Canals until April 26th for the works connected with the construction on Section No. 6 Ontario-Rice Lake Division of the Canal. For further particulars see advertisement in this issue.

Prescott, Ont.

The stables of Dr. J. D. Reid, M.P., were destroyed by fire on the 9th inst. Total estimated loss, \$9,000.

Prince Albert, Sask.

Tenders addressed to C. O. Davidson, city clerk, will be received until April 16th for supply of cement for the year 1910, price to be f.o.b. cars Prince Albert, to be delivered in lots of 500 bbls. as ordered. Approximate amount required, 2,500 bbls.

Peterborough, Ont.

Tenders addressed to L. K. Jones, Secretary, Department of Railways and Canals, will be received until May 5th for the works connected with the construction of Section 4 Ontario-Rice Lake Division of the Trent Canal. Advertisement in this issue.

Sault Ste. Marie, Ont.

Tenders addressed to L. K. Jones, Secretary, Department of Railways and Canals, will be received until April 28th for removing Range Beacon, and widening the channel at the upper entrance. See advertisement in this issue.

Truro, N.S.

The ratepayers have approved of the expenditure of \$48,000 for town improvements.

Westmount, Que.

The proposed loan for local improvement was endorsed at the meeting of the Municipal Association, held on the 6th inst.

AWARDED.

Hull, Que.

The tender of J. Lepine was accepted for the numbering of streets, 8 cents each; houses, 5 cents each; total, \$2,500. Hull Equipment & Supply Company also tendered.

Ottawa, Ont.

The supply of asphalt for city plant has been awarded to the Barber Asphalt Paving Company at \$27.80 a ton.

Contract Record

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Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

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Vol. 24

Toronto April 13, 1910

No. 15

A Perennial Complaint

It is somewhat disconcerting to observe again this season, as for years past, indications of dilatoriness regarding construction work on the part of municipal officials and others. As we have pointed out before, the legal formalities and other preliminaries in connection with public improvements should be undertaken in the fall or winter instead of at the opening of the building season. Delay of the latter kind means that the completion of the project will not be effected until the fall, when the cost is increased by uncertain weather and scarcity of labor. That contracting interests can do something towards improving matters in this regard is exemplified by a letter sent out earlier in the season by the Illinois Association of Municipal Contractors to the various boards of local improvements throughout the State. From this communication we cull the following extract:

Owing to the many advantages to be derived from an early award of contracts for municipal improvements and in view of the time necessary to follow the legally prescribed course of proceedings and secure confirmation of the same, we suggest an early start on proceedings for all contemplated improvements for the year 1910.

Reports from many sections indicate that the coming season will be a very busy one, and we are prepared for a vigorous campaign—to improve the Quality, Quantity and Efficiency of Public Improvements.

We realize that in order to accomplish this, it will be necessary to secure a high degree of accuracy in the legally prescribed

procedure and proceedings, to eliminate from specifications conditions which are onerous to the contractor and wasteful to the public, to have estimates made sufficient to enable the contractor to employ the materials and construct the work as prescribed by your plans and specifications, at a fair profit, thus stimulating the market and demand for your bonds and protecting the contractor against unwarranted extractions and unreasonable discounts.

Nineteen hundred and ten is going to be a big year—the biggest yet in the ordinary course of events—and it will be positively sinful if contractors are impeded by the sloth of municipal officials. We would advise any of the latter who have been delinquent in this matter to put forth their best efforts and make up for lost time, if they do not wish to incur the anathema of the whole contracting fraternity.

Foreign Plans for Canadian Work

Considerable feeling has been aroused in western architectural circles over the practice of sending to the United States for plans of important buildings. The principal offenders in this regard are public institutions which exist by virtue of the business given them by the people of western Canada. It would seem that the architects themselves or their associations should have actively interested themselves in this question long ago. It is gratifying, however, to notice that the Manitoba Association of Architects is emulating the example of its sister society in Ontario and starting an active campaign against the custom. It is coming to this: that Canadian architects are being barred against their own field. American firms should have the opportunity to compete for important work on equal terms with Canadian practitioners, but surely if any preference is to be given it should be to our own people. The campaign which the architectural associations are inaugurating will be directed chiefly against American firms which have no resident offices in Canada. At the present time the duty on plans is insufficient to prevent the Canadian public from employing United States architects if they desire to do so. The Ontario Association is desirous of obtaining convincing data from contractors and others. When the necessary information is collected it will be placed before the provincial and dominion governments with a request for protective legislation.

A Logical Result

An Ontario township in perfectly good standing recently called for tenders on the reconstruction of a municipal hall. Upon inquiry we learn that not a single bid was received. What is the matter with this township? Is it the victim of a boycott or have the contractors in that vicinity more work than they can handle? It would be infra dig to mention the name of the township in this column, but a careful perusal of our contracts Department will possibly reveal its identity. In fairness to ourselves it must be said that tenders for the work were not advertised in the "Contract Record." The moral is plain.

Methods of Laying Concrete Under Water

Detailed Description of Extensive Operations on Quebec Canal System —Construction of Five Miles of Concrete Wall Without Unwatering*

By H. R. LORDLY, M. Can. Soc. C.E.

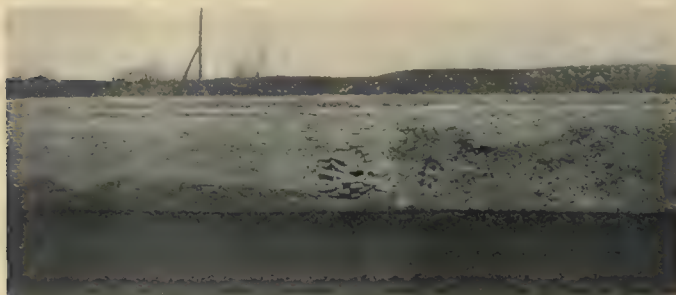
Before directly entering on the subject proper of this paper, it will be well to review briefly canal slope-wall construction, and particularly the conditions on the Lachine Canal, which gave rise to the necessity of subaqueous work.

This historic waterway, in its various stages of enlargement, the construction and reconstruction of its prism walls, affords much information that may be useful in many branches of hydraulic work. It also proves one important point, viz., that with modern sized vessels, more powerful propulsion, and a greater requisite speed, earth embankments and small rip-rap must give way to concrete, and that in established waterways, where repairs must be made without unwatering, this new method of lining can be applied effectively and economically without interfering with navigation.

In the report of the International Waterways Commission, 1898, various methods of constructing canal embankments are discussed, but it is doubtful if, outside of the pitched stone, or rip-rap, used on the banks of the Manchester Ship Canal, any of the other methods described, such as earth embankments, with or without bermes, etc., would be of value on our Canadian canals, at least those of the standard size. In this connection it must be noted that a canal which has to be unwatered for short periods in the spring of each year, and which has earth embankments covered with light rip-rap, is likely to have these slide in and cause much damage. In this respect, ice is also a factor which must be considered.

One engineer, quoted in the above report, stated that a test had been made on a German canal with a lining of sand beton. Small slabs were moulded in boxes, and, when set hard enough, were placed in the wall. This plan was afterwards given up, and the blocks moulded on the banks, the thickness of the covering being about six inches. The proportions of the beton were one to ten, and it was only used at levels below water-line. The mixture was found too lean to be of value when exposed to the air.

On some French and Italian canals a covering of beton, made with hydraulic lime, has been used. On canals of very small cross section an attempt at waterproofing this



Heavy Dry Masonry and Old Rip-rap Injured by Derrick Spud

beton has been made by covering it with "chape," a mortar of Portland cement. All of the above work has been done in the dry.

It would appear that the construction of heavy concrete slope-walls in canals of the larger size, and particularly by a subaqueous process, has been first carried out in Canada,

and the experience gained here should prove of value. Vertical walls are also being built under water in the same manner.

Plate A shows sections of the various enlargements and deepening of the Lachine Canal. No. 3 shows the section when, during the period from 1840 to 1870, the canal had a navigable depth of nine feet. The dotted line represents a section of the Manchester Ship Canal. No. 4 represents the section after the year 1870, and it is during this period that the question of slope-wall construction became an important one. Types 1, 2, 3 and 4 show the various kinds of protection used for the face of the slopes.

Originally the slope walls were rip-rapped, or pitched, as it is termed in England, largely with the stone excavated from the work. Some of this stone, which was of the nature



Concrete Belt Wall over Rock—Dry Masonry on Top

of a dark shale, disintegrated, and under the increased wave action, due to steam towage and steam-propelled vessels, large areas of the walls were destroyed.

In 1898 it was decided to rebuild the damaged wall in heavy courses with crystalline grey limestone from the Caughnawaga quarries. The base of the new wall was about three feet thick, and the courses decreased one inch per foot of slope. Above the water line was a coping course, and on top of this a revetment of broken stone was placed, to take the wash of the steamers (Plate A, type 1). This work was carried on for a number of seasons during the period of unwatering, in the month of April. As there were upwards of seven miles of wall to rebuild, and the progress made by working only two or three weeks each year could not be otherwise than slow, it was seen that some other method must be adopted in order to hasten the protection of the banks. In 1904 the author, who was then in charge of the work, was instructed to prepare plans for rebuilding the walls in a more expeditious manner.

The Superintending Engineer of the Quebec Canal Division, Mr. E. Marceau, approved of using concrete on the slope walls, and this material had already been very largely used in rebuilding the locks and the vertical walls at the entrance to the canal. By the use of concrete much skilled and expensive labor could be dispensed with; stonemasons were difficult to get and harder to hold, particularly in the early spring time. The face of the slope wall is about 24 feet (slope 1 to 1). It was first decided to use a belt of concrete, 8 to 12 feet wide and 1 foot thick. This belt was to be placed in the

*Extracted from paper read before the Canadian Society of Engineers.

middle section of the wall, leaving in any rip-rap below which was in good condition, and running the concrete all the way down in a column, 5 feet wide, to a firm foundation, at points about 24 feet centres.

From the 16-foot level, up, the ordinary limestone rip-rap, as originally designed, was to be used. With this plan of doing the work it seemed possible to provide for a considerable length of the concrete belt being placed rapidly, so as to permit the stonelayers to finish the work by the first of May, when the water was run into the canal, and also to save portions of the old rip-rap that were firm. The work was generally started by April 3rd or 4th, but usually it was difficult to get more than three good working weeks.

In the execution of this plan some difficulty was found in using mould boards for the face. They proved difficult to keep in place, and more expensive to handle than was anticipated. In some portions of the wall an attempt was made to use a stiffer concrete, about one foot thick, laid on without any forms, but this proved too slow. About a quarter of a mile was done in three weeks, although the rocky bottom of this particular portion of the canal did not require as much concrete as would be called for in other sections.

The method outlined above gave a higher class of wall, and more of it, in a limited time. By it also the cost of labor was reduced, thus offsetting to some extent the extra cost for cement.

The wall on the south side of the canal, upper reach, was steadily getting worse, and on the north side a number of leaks were in evidence. The method of doing the work in the dry had proved too slow, and some more rapid system had to be devised.

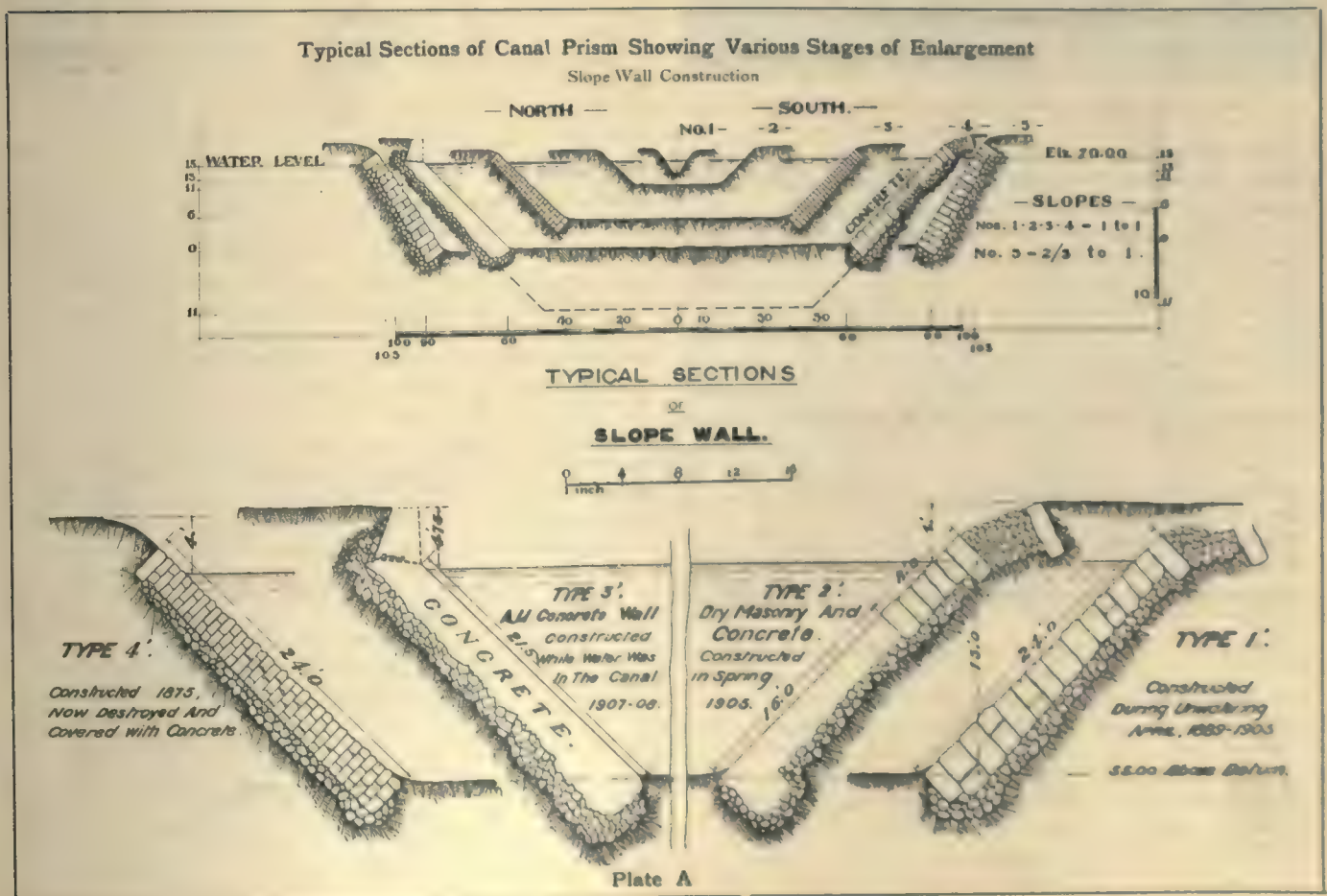
It was then proposed that the walls should be laid entirely in concrete, except the revetment, and that the whole work should be done without unwatering the canal and during the period of navigation.

Under-water concrete work had already been done in some

minor cases on the canal, and one experience, that of the abutments of Black's Bridge, was taken as suggesting the possibility of successful subaqueous construction of the slope walls. In the spring of 1903, during the building of the north abutment of this bridge, just after the forms had been placed, the water in the river rose rapidly, until there was a depth of 23 feet over the foundation. Time did not permit of waiting for the water to recede. At first a wooden chute was used and the concrete dropped through it, but after one corner of the forms had been filled, the box was discarded, and the concrete was dumped from barrows directly on the edge of the filled portion and allowed to flow forward at its own natural slope. The slow movement of the concrete was the best guarantee against washing out of the cement. The water was cold, and the set retarded sufficiently to aid the work in preventing injury to the placed concrete while the successive batches were dumped on the top of the sloping mass in situ. There was no current in the canal, but, on account of the rise and fall of the water in the river, a slight undulating movement was experienced. This abutment, which had a width of from 14 to 8 feet, and a total length of 80 feet, was thus satisfactorily completed in time. The face of the wall, when the forms were removed, was found smooth and in perfect condition.

In lining the prism walls below water with concrete a different problem arose. Navigation was to be maintained; the current in the canal of about one mile per hour and the wash of passing vessels had to be provided for. The face of the wall is 24 feet, slope 1 to 1. The thickness of concrete required 18 inches, and, as mould boards would have to be used, there was a danger of the concrete clogging between the form and the projections of the old masonry wall, thus creating large voids. A method of preventing the clogging and forcing the concrete down in place had to be devised.

After some preliminary discussion, the contractors for the original work, Messrs. Haney, Miller, Quinlan & Robertson,



came forward with an offer to do the work under the above conditions, and agreed to build the following plant: Six moulds, or forms, 100 feet by 24 feet face; a mixing plant, with a ram and box that would carry the concrete down between the wall and the forms; a lifting scow; a diving plant, etc., etc. The plant was calculated to do 200 yards per day.

It was proposed to prepare the toe of the walls during the spring unwatering. The forms were to be floated to the work, during the period of navigation, placed by the aid of the lifting scow and divers, and heavily loaded at the bottom to remain in position.

Each form would be kept in place until the concrete was set sufficiently hard to permit of its removal, and would then be moved to the head of the line in order to continue the work. The designing of the forms and plant was placed in care of Mr. A. T. Gibson, the chief assistant engineer for the contractors.

While the resultant pressure behind the forms would not be great, their large size, the flotation to be overcome, and the force of the wash from passing steamers was sufficient to make the problem of their design and retention in place a difficult one. A special lifting scow for erecting and removing the forms was also required.

In designing the mixing and laying plant, which was to be on scows, some important points had to be considered. 1. The scows must be narrow and lay parallel (longitudinally)

capacity, is shown in three positions, and its method of operation is well worth a careful examination. After being fed by the chute while in its lowest position, the cement being placed in from the side by hand, the car ascends the double-rail track and turns completely upside down. ((See position 2 and 3). The intermediate position between 2 and 3 would show the rear wheels, first in the air, free of any rail, and next engaging the rail, which carries it while dumping. This apparatus, as designed by Mr. A. T. Gibson, was one of the most efficient parts of the plant. The feed car dumped into the mixer hopper, and, after the materials were mixed, the concrete was dumped into a receiving hopper, from which the box on the ram was supplied. This supply hopper held about three batches of concrete, and allowed the mixer to be run almost continuously without depending on the speed of the ram, which was at times likely to be irregular. The face mould is shown in place, in this sketch, with its loading ballast and lower layer of concrete in process of filling in. The ram is in its highest position, the box being ready to receive its supply, about 12 cubic feet, from the hopper.

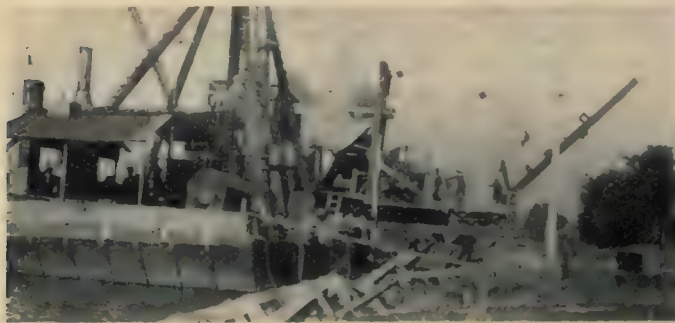
It will be noted that the strain on the ram arm is taken by a wire cable, operated with block and tackle by means of a winch from the frame above the mixer. A part of the frame is omitted from the sketch in order to show the measuring car. The additional illustrations will show the operating details more clearly.

Ram and Guide—It will be remembered that one of the problems of this undertaking was to place the concrete between the old masonry wall and the forms for the concrete facing without clogging up the space near the top, and thus creating voids at the bottom of the wall. Had the thickness of the new wall been greater, or the surface of the old masonry wall, or the bank, been smoother, this difficulty would not have occurred. As a matter of fact, as results proved, there were places where the ram was not required. In most of the work the guide was maintained at an angle of 45 degrees, but it could be adjusted to work nearer the vertical if required. The ram frame was made of timber, and the guide of 15-inch steel channels. The latter was carried in a gudgeon bearing attached to the inclined post support, which may be seen in plate B. The ram and box would drop by gravity, and were drawn back or controlled by a steel cable operated from the hoist.

The Plant in Operation—The entire plant was ready for work early in June, 1907. In April the canal was unwatered for a portion of the month and gangs of men put on to prepare the slope wall, on the south side, for the new facing. All the loose stones were removed and the toe of the wall made ready to receive the bottom of the mould. Photographs were taken of any sections presenting unusual irregularities, and all the necessary data provided as to the condition and slope of the bank.

Placing the Moulds—The first section was started on the south bank, a few hundred feet above the Cote St. Paul bridge, a location which, in so far as agitation of the water and limitation of working room were concerned, was the worst possible.

The moulds were floated opposite the site, raised up by the slings with the lifting derrick, and lowered down in front of the bank. The diver then descended and checked the distance from the wall to the mould, guided the rail-ballast to place, and saw the toe properly braced with large flat stones lowered down for that purpose. The top of the mould was placed in alignment by setting off the given distance from the base line. In some places the top of the bank or revetment wall was so badly washed that it was not possible to take a line from it. The top of the mould was secured to the bank by timber braces and cables to anchor blocks placed at convenient points.



Mould in Position and Mixing Plant at Work

to the banks in order not to obstruct navigation. 2. The ram carrying the box with movable bottom to deposit the concrete required to be operated on a slope of 45 degrees. 3. Its tendency to move with the wave undulations had to be overcome. 4. The ram had also to be so designed that it could be moved past any obstructions on the banks, electric current poles, telegraph poles, etc. 5. The operating machinery of the ram required to be under perfect control and but little agitation of the water behind the forms created by its action.

In addition to the above, a supply bin, an automatic hoist and measure, to feed the mixer, had to be designed to suit the requirements of the work. A diving outfit and lifting scow, anchors for the moulds, etc., were also required. It will be thus seen that the conditions were many and somewhat difficult to overcome.

Moulds—The moulds were constructed of heavy timber, each mould being 100 x 22 feet, additional width being added at the top by placing longitudinal planks on the part out of the water.

Plate A gives a good idea of the method of construction and the details of the longitudinal trusses to give stiffness to the frame work. The heavy timbers were British Columbia fir. A platform or cradle was provided about five feet from the bottom of the mould to hold iron rails for ballast. The entire plan was carefully carried out, and, as will be seen later, the moulds were perfectly successful and rigid enough to be kept in nearly perfect alignment.

Measuring Car—The measuring car, about 32 cubic feet

Operating the ram—After the moulds were ready, the mixing scow was floated into place, the arm run out over the bank and moored at rest over the longitudinal beams arranged to slide it forward on, when the scow was moved.

Tests were now made in lowering and raising the ram, and, beyond the usual stiffness expected in new machinery, everything worked satisfactorily.

A few batches of concrete were next tried, and it was noticed, as the bucket was lowered, that the water which rushed in at the top caused no violent washing out of the cement. After a little experience in lowering the ram, no discoloration of the water appeared, which showed that the

cement was not being washed away. The ram was run to the bottom, about 23 feet on the slope, and, as the concrete filled in below, it was found quite easy to judge the proper point at which to stop the ram. This operation was continued until the top was reached, and a section of about 20 feet, at bottom, was filled before the plant was moved forward. The scow was moved about every 8 or 10 feet as the work progressed. When the concrete reached to within 4 or 5 feet of the top of the wall it was found unnecessary to use the ram, and the concrete was allowed to flow into place from the open bucket.

Concluded in next issue

Use of Concrete in Pavement Construction

The Makeshifts Adopted before the Evolution of the Modern Pavement—Durability and Other Advantages of Concrete—Origin of Its Use*

BY JAS. PEARSON, President Constructing and Paving Company, of Ontario, Ltd.

The first important step towards improvement in road making was the invention of John L. Macadam, who, in or about the year 1818, devised the road made of broken stone and still known by his name. So far as country roads are concerned, it is still the recognized standard all over the civilized world, and when well laid is a good one for country use, but when heavily travelled requires constant repair. Since the advent of the motor car the macadam road will be still more difficult to keep in good condition.

Although no change has been made up to the present time in the construction of the macadam road, this device did have something to do in the development or evolving of the ideal smooth surfaced pavement, with concrete foundation, of the present day, and this is how it occurred: In the district of Val de Travers, canton of Neuchatel, Switzerland, macadam roads were made of a broken brown bituminous limestone. Under the pulverizing effect of the traffic, and the influence of the sun, in softening the bitumen, the surface of the pavement became welded together in a continuous sheet, and in 1854 the first pavement of this material was laid in Paris, on Rue Bergere, and this is what is known as rock asphalt, now so extensively used throughout the cities of Europe. It is also known by the name of Val de Travers. It has also been used to some extent in some of our own Canadian seaport towns and at Ottawa, but the cost, in comparison with the use of Trinidad and other American asphalts, which have since come into competition, makes its further use in America prohibitive.

The success of this bituminous rock as a pavement led a French chemist named Edward de Smedt, to analyze it. He came to America in 1870, and among his experiments devised a practical paving material similar in effect to the Neuchatel bituminous rock but less expensive. De Smedt tried the use of a mixture of Trinidad asphalt with sand, and laid samples of pavement with it in several American cities to keep alive his patents. In 1877, on Pennsylvania avenue, in Washington, between the White House and the Capitol, outside of some samples referred to, was laid the first asphalt pavement in America. It took the place of an old worn out wooden one, which had supplemented a previous macadam. The history of street paving on this continent. First the earth road or turnpike rounded up with a ditch at each side—then the macadam. Sometimes if the ground were soft, as a foundation it was laid on a layer of split cedar logs. After this, came the wooden block, and when sawn in rectangular shape,

laid on a tarred board foundation two layers of inch boards crossed, such as was the wooden block pavement laid in Toronto over thirty years ago on King street from Yonge to York. But our experience of wooden block pavements was mostly with the round cedar block cut from the log and laid on either tarred boards or on a bed of sand and gravel, mostly the latter, and a wretched experience it was.

There was also the cobblestone pavement—roughest of all, and where the cost could be borne, as it was expensive, stone block pavements of granite or sandstone were resorted to. Such were the devices and makeshifts adopted before the modern pavement was evolved.

Origin of the Use of Concrete

In experimenting it was found that asphalt, whether Val de Travers, Trinidad or any other, was only serviceable as a surfacing material. To make a pavement with it, a firm and rigid base or foundation was absolutely necessary. As a surfacing material, smooth, easily kept clean and repaired, sand and pulverized limestone mixed with sufficient asphalt to cement them together, made the nearest approach to the ideal pavement surface that had yet been hit upon, but it was absolutely useless without a rigid base to support it, so a cement concrete was tried and found to meet the requirements, and thus the use of concrete originated as an asphalt pavement base.

Noting the utility and success that attended concrete as a base or foundation for asphalt pavements, it has been adopted generally by civic engineers as a base for most other pavements, such as brick, vitrified block, asphalt block and even granite block is now laid on concrete, as experience proves that it gives and maintains a more even surface to any class of pavement.

As a base it has many advantages over any other foundation. On streets where the subsoil has been cut and disturbed by putting down sewers, water and gas pipes and making connections with buildings and where a settling is likely to take place, a good 5 or 6-inch concrete will maintain any ordinary traffic, even if unsupported at these cuts. Its use has also entirely supplanted the use of stone in curbs and gutters and with great economy as to cost, a stone curb and gutter that would cost about \$1 per lineal foot can be laid for half that cost with cement, while the latter far exceeds the former in durability and appearance. Stone curbs made of straight blocks do not compare in appearance with the graceful curve of a concrete construction on a winding street, nor will stone curbs remain in position no matter how well set, owing to the depth of the frost in our cold winters. The recognized construction of concrete curb and gutters now is to have them

*Extracted from Paper read at the 2nd Annual Convention of the Canadian Cement and Concrete Association.

constructed on the concrete base and at the same time. This saves material and forms one solid body consisting of base, curb and gutter. Sometimes when the sidewalk is constructed before the pavement and is placed out adjoining where the pavement is to be, the curb is built as a part of the walk and is then made of sufficient depth to form a curb to the bottom of the base of the intended pavement.

As a base for pavements, concrete has another advantage in that it can be laid on ground that is wet and even soft, as moisture only improves its quality, and, being a solid body, it will bear up the traffic even if there are weak spots underneath. Its use is now revolutionizing the construction of those parts of street pavements occupied by street car lines or tracks. Heretofore the rails have been almost entirely laid on wooden ties resting on the ground. With the modern large street car and heavy traffic, tracks so laid are continually sinking so that the rails have, at great expense and inconvenience to traffic, to be frequently shimmed up to keep the motors underneath clear of the pavement. But by the use of concrete under the ties or under the rails without ties, a rigid and permanent track can be had and the pavement between the rails kept even, with that on the outside, thus giving the whole street an even and durable surface except as to the groove for the flange of the car wheels to run in.

Durability the Greatest Advantage

These are some of the advantages recognized in the use of concrete as a base for the modern pavements, but the greatest of all is its durability. It is permanent, so that when the wearing surface wears out, which in time all wearing surfaces will, it is still there as good as ever, ready for a new top—and thus it is in the end the most economical. In fact, so generally recognized has concrete become as the proper base for all the best pavements, that the proper definition for a permanent pavement as distinguished from others may be said to be a pavement having a concrete base. And right here I would tender some advice to the small towns that are raising funds for permanent pavements on their main streets, that no matter what surface they adopt, whether asphalt, asphalt block, brick or bituminous macadam, they should insist on a concrete base. In this they will then always have a valuable asset—a base that can be resurfaced from time to time after the first one wears out. It will prove to be the most economical in time.

With regard to the use of concrete as a wearing surface, while it is recognized as the most excellent material when properly made, for sidewalks, presenting a beautiful surface that wears evenly and is more durable than stone, except perhaps granite, yet it does not form a good wearing surface for a busy street with much vehicular traffic with iron tires. It has no resiliency and is too brittle, and when it wears uneven by reason of the constant beating of the iron tires and horses' shoes, it is difficult to repair. In fact, the quality of rigidity which makes it a perfect base militates against its use as a wearing surface. This conclusion is not mere theory for it has been tried as a wearing surface. About fifteen years ago a street in Utica, half a mile in length, was paved with it under the highfaluting name of Silica Byritic, but even the name did not save it from wearing into ruts and holes within two years. There is also a pavement of it on a short street in Toronto, laid about ten years ago, not a success. But it is now being adopted rather extensively for paving lanes and areas where there is little traffic.

If the time should come when increased travel by the rubber tired motor car should remand roads set apart for their exclusive use, a concrete pavement would, I believe, make the most ideal one.

In conclusion, I may add that the recently reduced cost of Portland cement in comparison with former years will add an additional incentive to the use of this most valuable material in the construction of modern pavements and the beautifying of our towns and cities.

Tapering Concrete Chimneys

The majority of the numerous reinforced concrete chimneys that have been built are cylindrical in shape, due to limitations in the design of the forms, and where a variation in diameter is made this has been effected by an offset, says the Engineering News. Recently, however, some special designs of form construction have been devised which permit the building of tapering stacks without excessive cost for this feature of the work. The forms, which are 5 feet high, consist of sets of rings, steel plates forming the surfaces, and long bolts by means of which the adjustments of diameter and wall thickness are made. The rings are of sufficient diameter to enclose the base of the chimney, and are made of heavy angles bent to varying radii and spliced into complete circles. The radial bolts must be long enough to permit of their extending into the chimney surface when the diameter is smallest (at the top of the chimney). The diameter of the rings remains constant, standard sets of form rings being carried in stock for various sizes of chimneys. The steel sheets are of standard size, and are filled out with split sheets, made interchangeable. The sheets are secured by flat-head stove bolts to vertical stiffeners on the outer surfaces of the forms, except at one rib, where the adjustment is taken up. The varying diameter is obtained by means of the long radial bolts which turn through small angles attached to the steel rings, and end in malleable clips which grip steel bands on the outside of kerfed wood strips which press the sheets in to the desired radius. Permanent centers are kept at the base of the chimney and on the scaffold above, and each section of the chimney is plumbed. Thus perfect alignment is secured throughout the construction.

Blistering and Peeling of Paint

One of the complaints occasionally made in connection with the painting of frame houses is that the paint blisters and peels from the outside of the building, in some cases peeling clear to the wood. This is attributed in a measure to bad priming and painting when the wood is green or damp, and much of it is doubtless due to this fact. Boiled or fatty oil has no place in a priming paint for wood, nor should a priming be stout. There is nothing better than pure lead and well settled, but not fatty, raw linseed oil, mixed fairly thin and without dryers for new work, and such prime should be rubbed well into the dry wood. Over such a priming paint is not likely to blister or peel, unless there are some local defects in the surface or behind it, such as plastering in damp weather, or leaky gutters on the roof.

In repainting old exterior surfaces the painter should, as an act of precaution, assure himself before he undertakes the work of the actual condition of the old paint, which may appear to be solid and intact all over, and yet, where the new paint has been applied over it for six months or a year, may loosen its hold, taking the new paint with it and coming off in large blotches. A tap on the old paint here and there will tell whether it is adhesive and solid, or whether it is loose. The new paint cannot penetrate through the old paint and fasten it to the surface; on the contrary, when contracting as it dries, it is liable to draw away still further from the wood, especially if the priming has been defective. It is advisable to remove all of the old paint, either by burning or scraping.

In deciding upon the amount of paint required for a given surface, the makers of paints usually advise two coats of ready mixed paint for 200 square feet of surface to the gallon. This is only approximately correct, however, because much depends on the character of the surface to be treated, and the consistency of the paint to be used. Some paints will go much farther than others. It is estimated by some experts that 18 pounds of white lead will be required to make paint to cover 200 square feet of surface. This would indicate 18 pounds of lead to a gallon of paint.

An Analysis of Concrete Bridge Failures

Typical Cases Exemplifying Common Errors—Defective Design, Lack of Care in Preparation of Concrete, Insecure Foundations and other Sources of Trouble

BY C. R. YOUNG, of Messrs. Barber & Young, Bridge and Structural Engineers, Toronto*

In order to ascertain the ground, if any, on which the representations of the opponents of concrete bridges are based, the writer has looked into the cases of concrete bridge failures of which he could obtain reliable information pointing to the cause of failure. The number of these cases is necessarily small, for, although many failures have taken place in the years that concrete has been in use as a material for bridge construction, it is difficult, for obvious reasons, to obtain information for publication concerning such. However, through the kindness of several engineers, it has been possible to supplement to some extent the data obtainable from published records and personal observation, although from the nature of the subject, the location of the bridges and the names of those who might in any way appear to be responsible are withheld, except in certain cases where such information has already appeared in the technical press. The former cases are therefore designated by number only.

The data thus collected are presented below in as concise a form as possible consistent with a full statement of the circumstances in any way likely to aid in placing the responsibility. Some attention is given to cases of pronounced cracking of spandrel and wing walls, since such developments, while not incapacitating the bridge for present traffic, constitute failure to the extent of impairing the bridge aesthetically, if not materially shortening its life. From this evidence the cause of failure (complete or partial) is deduced in each case and a summing up of the cases is presented at the close of the paper.

Case 1.—Reinforced concrete slab or flat-top bridge of 10 ft. span, intended to carry a fill of thirteen feet above the top of the slab; slab, 12 inches thick, reinforced by longitudinal rods $\frac{3}{4}$ inch



Fig. 1, Case 1.

in diameter spaced 12 inches centre to centre, and transverse rods of the same size, 2 feet centre to centre; spandrel walls, 2 feet thick at the bottom, reinforced by vertical $\frac{3}{4}$ in. round rods, 2 feet centre to centre.

After the concreting had been completed nearly two months and some 10 feet of the earth fill had been placed, the centres were struck, with the result that almost immediately the slab collapsed under the weight of the fill alone, leaving the spandrel and wing walls intact, as shown in Fig. 1.

An examination of the wrecked structure at once directed suspicion to the design rather than to the materials or workmanship. The concrete was apparently of correct proportions, had set satisfactorily, and had evidently been placed with care. Computations based upon measurements of the slab taken after the failure showed a fibre stress of 41,500 pounds per sq. in. in the steel and 1,100 pounds per sq. in. in the concrete under a 10 ft. fill. Apparently, no special care had been taken to properly anchor the longitudinal reinforcing rods, so that under this stress, considerably in excess of their elastic limit, they had pulled through the concrete, as was evidenced by the polished state of the concrete in contact



Fig. 2, Case 4.

with these rods. The failure can therefore be wholly attributed to a defective design.

Case 2.—This structure, which is typical of a number of reinforced-concrete girder bridges completed in a county in the State of Indiana some three and a half years ago, was of span 15 feet in the clear and 16 feet clear roadway. Two longitudinal girders 15 ft. 10 in. centre to centre carrying a seven inch slab comprised the superstructure. Upon this slab was placed a 12 inch earth fill and in addition it was supposed to carry a uniformly distributed load of 200 lbs. per sq. ft. or a 20 ton road roller. The slab was reinforced by transverse of a sectional area of 0.78 sq. ins. each, one inch from the bottom and 10 inches centre to centre and by longitudinal rods $\frac{1}{2}$ inch in diameter and about 3 feet centres.

Before the striking of the centres, Mr. Daniel B. Luten, President of the National Bridge Company, in a communication to the Engineering News, pointed out the weakness of the design and questioned its safety. He showed that under dead load alone the compression in the concrete of the slab would be about 1,000 lbs. per sq. in., while for the specified live load consisting of a 20 ton roller these figures became 3000 and 55,000 lbs. per sq. in. respectively.

Before Mr. Luten's letter had appeared in the journal mentioned, startling confirmation of his deductions was given by the collapse of the bridge under a traction engine the day following the removal of centres. From the testimony of the engineer in charge of the engine, the bridge gave way when the rear wheels were about in the centre of the span, and indications pointed to the slab as the initial source of failure. Careful examination of the wreck disclosed no broken steel and failure was apparently caused by excessive compression in the concrete of the slab. Under the loading of the traction engine

* Extracted from Paper read at the 2nd Annual Convention of the Canadian Cement and Concrete Association at London, Ont., March 30th, 1910.

which weighed about 16,500 lbs. and of which 9000 lbs. were concentrated in the rear axle, this compression could not have been less than 180 lbs. per sq. in. with the tension in the steel about 32,500 lbs. per sq. in. The corresponding stresses in the girders were about 1,000 lbs. per sq. in. for the concrete and 20,000 lbs. per sq. in. for the steel. The compression in the centre of the slab was therefore, nearly equal to the ultimate strength of



Fig. 3, Case 4.

a good concrete one month old, and in excess of the strength of the material used, which appears to have been of poor quality, on account of the presence of "dirt" in the sand. Very bad design and lack of care in preparation in the concrete, were, therefore, clearly responsible for the collapse.

Case 3.—Reference has been made to a number of girder bridges similar in design to that of Case 2, constructed during the same year as the latter, in the State of Indiana. One of these of 24 ft. span developed a bad crack in one of the beams shortly after the striking of the centres; but, managed to hang together and carry the traffic for about a year and a half. There was no load on the bridge when it finally fell and no evi-

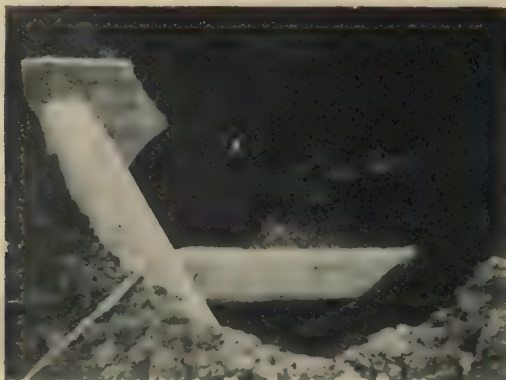


Fig. 4, Case 5.

dence could be discovered of any weakening or undermining action from floods or other causes. It, therefore, appears that its downfall, like that of its companion in disaster, was due to the errors of an inexperienced or careless designer.

Case 4.—Plain concrete railroad culvert of 20 ft. span and 10 ft. rise, carrying a fill of about 10 feet over the crown; crown thickness 18 inches; foundations were carried about 4 or 5 feet

below the natural level of the ground. The situation of the bridge was on marshy soil and the foundation bed was of soft clay with considerable organic matter present, but no piles whatever were used.

As the filling was placed on the arch, cracks began to develop, in the case of the west wall, passing vertically up the wing walls near their junction with the spandrels, then crossing this corner and trending to the crown of the arch, reaching it at about one-quarter of the length of the barrel in from the face of the spandrel walls (Figures 2 and 3). In the east wall a large vertical crack passed from the footing up the soffit to near the crown where it joined a large horizontal crack running along nearly the whole length of the arch barrel. In addition to these very prominent cracks many other tributary cracks of lesser extent developed.

Careful examination of the cracks in conjunction with the originally level mould board lines conclusively showed that the abutments had settled from 4 to 6 inches under the heavy load of the fill, and that the insecure foundations were wholly responsible for the failure.

The writer is indebted for the above information to Mr. F. L. Somerville, M. Can. Soc. C.E., under whose observation this failure came, but who was in no way responsible for the design or construction of the bridge.

Case 5.—A plain concrete railroad culvert 10 feet in span carrying an embankment 52 feet in depth, was constructed in the winter. The foundation bed was of soft clay and no piles were used. In the following spring when the frost came out, a portion of the barrel near the middle collapsed under the weight

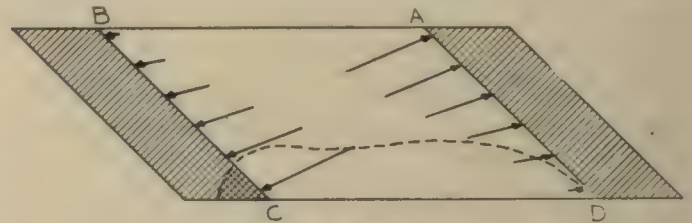


Fig. 5, Case 7.

of the fill and a part of one end with one of the wing walls gave way under the sliding of the embankment, as shown in figure 4.

The explanation offered for this failure, and one that appears reasonable, was that the spring thaw had destroyed the even bearing of the culvert on the foundation-bed and that the barrel had thus been resolved into a beam at several points, the wrecked end portion acting as a cantilever. Had reinforcement been used, which is particularly desirable in winter work of this class, the structure would no doubt have safely withstood the adjustment.

Case 6.—A reinforced, concrete arch highway bridge of about 10 ft. span, resting directly upon a quicksand bed and in a situation involving the excavation of a new channel for the stream. Shortly after the striking of the centres the arch ring collapsed, although subsequent computation showed the design to be sufficient.

While the early removal of the forms may have been to a small extent responsible for the failure, the excavation for the new channel appears to have immediately precipitated the fall. Under the considerable weight of the arch, and favored by the removal of material between the abutments, lateral flowing of the quicksand with attendant settlement and tilting of the abutments naturally followed. Had the foundation bed been piled, this development could not have taken place. Faulty design of foundations was, therefore, primarily responsible for the failure; but, unless some of the piles had been driven on a batter, bad cracking of the spandrels would have occurred under the conditions named.

Case 7.—Some seven years ago a Monier arch of considerable size, and built at an extreme skew, collapsed at Bendigo, Australia, with loss of life. The failure was sudden and unattended by any premonitory signs of distress, unlike the recorded char-

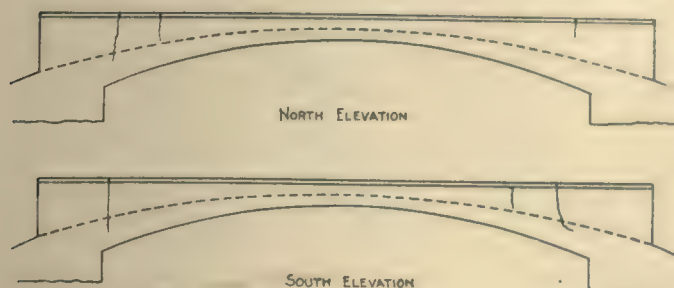


Fig. 6 Case 10.

acter of failure of Monier arches, which had been tested to destruction in Europe and elsewhere. In view of the fact that the abutments were especially massive and securely founded on solid rock and that the materials were excellent, the contractor attributed the disaster to incorrectness in the received theory of skew arches, and retained the services of the late Professor W. C. Kernot, of the University of Melbourne, to conduct a thorough investigation and report upon the cause of failure.

By means of measurements of the deformation of loaded India rubber models and by ingenious electrical experiments on a metallic model, corroborated by mathematical calculations, Professor Kernot was able to show that Rankine's theory of the skew arch, which had up to that time been universally accepted, was altogether erroneous. Rankine's view, as stated in his "Applied Mechanics" was that "the forces which act in a vertical layer or rib of a skew arch with its abutments, are the same with those which act in an equally thick vertical layer of a symmetrical arch with its abutments, of the same dimensions and figure, and similarly and equally loaded." It followed from this assumption, therefore, that the design of a skew arch in no way differed from the design of a right arch of the same span as the span of the former measured parallel to the longitudinal axis of the bridge. Professor Kernot, however, conclusively demonstrated that there is a great intensification of stress along the short diagonal AC of a skew arch (as indicated by the arrows in Fig. 5), the actual stress being almost exactly double the stress along lines parallel to AB. At the same time the stress along the long diagonal BD was excessively small.

The existence of such a stress condition is particularly serious since the acute angles of the abutments are of insufficient mass to properly resist the augmented thrust in the direction of the short diagonal, and if the skew be large, the factor of safety



Fig. 7, Case 10.

low or the test load unusually heavy, the abutments may give way at these points. This is precisely what happened at Bendigo, for the acute angle C of one of the abutments was literally pulverized over the double hatched portion by the local intensification of the stress, and the part of the arch enclosed by the irregular dotted line and the line CD had consequently fallen.

The cause of this failure lies unquestionably in the lack of knowledge at that time of the true principles of proportioning skew arches and their abutments.

Case 8.—The most recent concrete bridge failure of magnitude occurred on February 28th, 1910, when a reinforced concrete arch highway bridge of three spans over the Flat Rock River near Edinburg, Ind., collapsed during a flood of exceptional height. The bridge had been open to traffic for about eight months, and during that time had stood one severe flood accompanied by an ice jam.

As designed, the structure consisted of one central span of 90 feet and two side spans of 75 feet each, all foundations to be on piles. Although the design was submitted by a well-known and responsible concrete bridge company, the County Commissioners decided with the wisdom born of inexperience, to save money by omitting the piling and carrying the piers and abutments down to a somewhat greater depth than originally contemplated. Beyond furnishing the design, which appears to

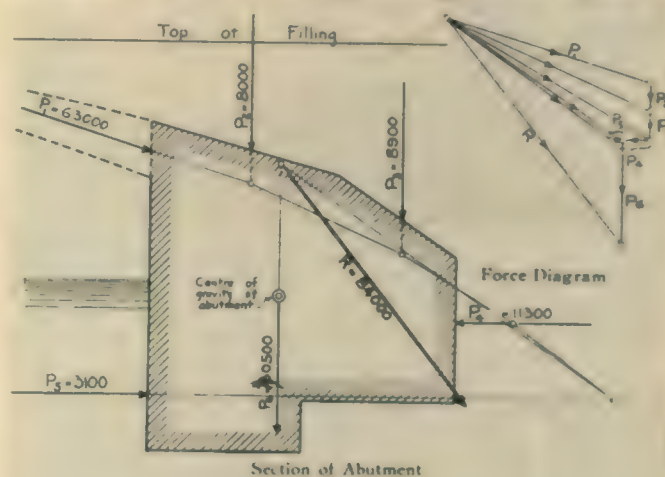


Fig. 8, Case 10.

have been entirely satisfactory, with the possible exception of insufficient provision for flood waters, the bridge company had nothing to do with the work, and the County Commissioners for whom the bridge was built had no engineer to advise them or supervise the construction. In spite of this, and to the credit of the contractor, the materials and workmanship were of excellent quality, many of the particles of stone and gravel of the concrete having split instead of being torn out of their places by the collapse.

Upon careful examination of the wreck by a member of the editorial staff of Engineering News, it was found that the scour actuated by a considerable quantity of lodged drift had undermined the upstream end and one side of one pier, causing it to tip forward and endwise, and resulting in the fall of the two arches which it carried. The other pier being thus left without support to counteract the thrust of the remaining arch, likewise tilted, allowing this span to drop vertically into the river. There was no evidence to point to any other cause of failure than undermined foundations, and the responsibility for this rests with those who altered the original plans and specifications.

Case 9.—The most extensive failure in reinforced concrete bridge construction of which records are available, is that of the City Bridge across the Illinois River at Peoria, Ill. On May 1, 1909, three spans and two intermediate piers of a six-span arch structure which had been opened to traffic only a few weeks, collapsed before the supporting centres had been struck. The wrecked spans were each Melan arches 125 feet in the clear, of

13½ feet rise and of the solid spandrel type. Practically all of the earth filling was in place at the time of failure. The two ruined piers were specified to be founded upon piles driven to bedrock, though subsequent investigation showed that probably most of the piles stopped at less stable material. In addition, the piles were to be enclosed by permanent water-tight tongue-and-groove sheet-piling or Wakefield piling to safeguard the pier foundation against scour; but, in spite of repeated warnings on the part of the consulting engineers, this was not done, nor was any protection in the way of riprapping provided by those directly in charge. As a result, during the high water of the spring of 1908, the scour was most serious, in the case of one pier reaching to 3.8 feet below the base of the pier, or 11 feet below the original bed of the river.

Since the design and construction of the superstructure was apparently entirely satisfactory, it was, therefore, not difficult to assign the cause of failure. The lateral support and the frictional resistance of the piles under the two piers in question having been largely removed by the excessive scouring action of the water, buckling and considerable settlement would naturally follow. This action was no doubt largely precipitated by a serious settlement and movement in a shoreward direction of one



Fig. 9, Case 11.

of the abutments, which began a year prior to the collapse of the structure.

Under such circumstances, there is little doubt that the cause of failure was insecurity of foundations.

Case 10.—This is not a case of total or even partial collapse, for the bridge in question has been in constant service since its completion some two years ago. It affords, however, an excellent example of spandrel wall cracking, and as such will be used to illustrate a general discussion of this defect, which, as has already been stated, constitutes failure to a limited degree.

This bridge, having a span of 60 feet in the clear, a rise of 6 feet and a crown thickness of 15 inches, developed pronounced cracks in the spandrel walls, as shown in Fig. 6, immediately upon the striking of the centres, although the spandrels are reinforced in the region of the springings by three longitudinal ¾-inch round rods. One of these rods is in the coping, and the others are located at distances of 1 and 3 feet below it. Each of the abutments rests upon a large number of vertical piles driven into quicksand.

The conspicuous character of the cracks is evident from Fig. 7, giving a photographic view of one of them in the south-east spandrel wall. In this case the crack passes well into the ring, although not as far as the one in the southwest spandrel, which reaches practically to the centre of the ring, as shown in Fig. 6.

With the object of explaining the existence of these cracks

in spite of the longitudinal reinforcement in the spandrels, the writer obtained information concerning the dimensions of the abutments and constructed the diagram shown in Fig. 8. In this diagram the various forces acting upon the east abutment are shown in magnitude, direction, sense and point of application for a vertical longitudinal rib or strip, 1 foot in thickness. The thrust of the arch P_1 is given for the weight of the arch ring and filling only, since the spandrel cracking occurred without any live load on the span. P_2 and P_3 are the weights of the two trapezoidal prisms of filling resting on the abutment; P_4 represents the lateral pressure of the earth filling acting on the vertical projection of the abutments and tending to force it forward into the stream; P_5 is the pressure of the water and the saturated material of the stream bed, acting on the face of the abutment; and P_6 is the weight of a strip of abutment one foot thick reduced for buoyancy of the submerged portion. These various forces, when combined, produce a resultant action, R , on the base of the abutment having a magnitude of 84,000 pounds and passing altogether outside of the base instead of cutting it near the centre as it should in a properly designed abutment.

With the aid of Fig. 8, the spandrel cracks in this arch are therefore not difficult to explain. If the abutment were merely a simple block of masonry acted upon by the forces indicated in the diagram with no others operating, it would overturn about the lower right-hand corner; but, the presence of the spandrel walls with their reinforcement supplies sufficient resisting moment to preserve equilibrium, although not without overstressing them and causing the very pronounced cracks indicated.

Apart from the obvious effect of this serious error in the design, it is probable that spandrel cracks would have still occurred, although not to the same extent, as shown in Fig. 6. The abutments, as has been noted, were founded on certical piles driven into quicksand, and under the thrust of the unusually flat arch lateral yielding of the piles would in all probability have been followed by cracking of the spandrels. The practice of founding arch abutments on piles, none of which are driven on a batter, or where no abutment ties are employed, is in the majority of cases likely to result in unsightly or dangerous cracks.

Spandrel cracks are so often found in concrete arches that their presence cannot always be attributed to badly designed abutments or to yielding foundations. The writer knows of one case where spandrel cracking occurred in an arch the abutments of which were founded upon solid rock and where, it is believed, the design was in general satisfactory. The spandrels, however, contained no longitudinal reinforcement, and the settlement of the crown when the centres were struck, had induced sufficient negative bending moment in the spandrels near their junction with the abutments to overcome the tensile strength of the concrete and cause conspicuous cracking. In all probability no such development would have taken place if the spandrel walls had been well reinforced, certainly not with properly designed arch ring and abutments.

The objectionable practice of inserting gas pipe or other metallic hand-rail posts in the spandrels of arches, strongly favors the development of spandrel cracks. Since the temperature of the exposed metal rises more rapidly than that of the concrete under the heat of the sun's rays, the posts expand more rapidly than the concrete and cause cracking of the latter at every post, which apparently increases with time on account of the swelling action of the rust at the surface of the spandrel wall.

Case 11.—The badly cracked wing wall shown in Fig. 9 is typical of a great number of like cases which exist throughout the country. Such a development does not, of course, put the bridge out of commission; but it necessitates the expense of shoring and repairs and at the same time provides a never-failing stimulus for remarks uncomplimentary to engineers. The source of the trouble is generally in bad design, and, sometimes in careless workmanship. In this case the wing wall is about 24 feet high, 3 feet thick at the base and 18 inches at the top, with no

reinforcement whatever. The workmanship and materials were good, and the failure is therefore entirely due to the absurd proportions of the wall. A number of cases of cracking of correctly designed wing walls at their junction with abutments are known to the writer, where trouble might have been avoided by a small amount of horizontal reinforcement at the corners.

Conclusion.

Summing up the eleven cases cited, the principal, and therefore primary, causes of failure are found to be as follows:—

Causes of Failure.	No. of Cases.
1. Design of foundations originally defective or rendered defective by alterations not approved by the designing engineers	6
2. Design of superstructure defective	5
Total	11

It therefore appears that in the cases discussed over one-half of the failures occurred from defective design of foundations. Especially significant is the fact that in the case of the two most extensive failures described, the original designs and specifications for the foundations were satisfactory, and that the disastrous results were caused by alterations in the plans made by persons in authority without professional advice. The time is coming when engineers in self-protection will refuse to allow their plans and specifications to go out and suffer interpretation and alteration by laymen, but will insist upon the same expert attention to the work under construction as in the designer's office.

A feature of the above tabular statement which may occasion some surprise is the fact that in all of the cases considered, failure was primarily due to errors in design, either of sub-structure or superstructure, and that the material, except to a limited degree in Case 2, was not in any way responsible for the unfortunate results.

It is perhaps unnecessary to remark that no special selection of cases was made for the purpose of this paper, but every case has been included concerning which reliable data could be obtained in a short space of time. Since these cases are probably typical of most of the failures of concrete bridges, there does not appear to be any ground for the disquieting statements which have been made by interests antagonistic to concrete with the object of discouraging the use of the material in engineering works. On the contrary, the successful employment of concrete in thousands of bridges during the past 15 or 20 years amply justifies the belief that structures of this material, when properly designed and constructed, are at least as permanent as those of stone masonry.

Reinforced Concrete vs. Steel for Short Span Bridges

The American Railway and Maintenance of Way Association has issued Bulletin No. 117, containing the report of the Committee on Iron and Steel Structures, in which appears the following abstract:—

In any bridge the qualities to be desired are: adequate strength, freedom from vibration and excessive deflection, economy in first cost economy in maintenance, and permanence.

The theory of flexure of reinforced concrete is sufficiently well understood to enable safe and economical designs to be made of this material, and experience with reinforced concrete structures carrying dead loads only has been abundant. Experience with such structures carrying heavy live loads and subjected to the shock and vibration of these loads, moving at high speed, has not been so extensive, but reinforced concrete girders can be designed and built in short spans of any strength required, or likely to be required, by railway loads. In the event of overloading or defective construction, reinforced concrete will give quite as much warning of probable failure as other materials.

One of the chief advantages of reinforced concrete over steel for short spans is that the form lends itself more readily to ballast floor construction, the superiority of which to open decks is evident to every operating officer, not only on account of the absence of wood, which may rot or burn, or exposed steel, which requires protection from brine drippings or other corrosive influences, but also on account of the freedom from vibration and excessive deflection and the reduction of the cost of maintenance to a minimum.

The comparative economy of the two styles of construction is a matter which is not easily determined in general terms, depending as it does upon the market price of steel, concrete materials and labor. The character of the design is also a factor of first importance. Generally, speaking, if it is not considered advisable to use ballasted floors in a particular case for that case the short span of I beams with ordinary floor of wooden ties is the cheaper construction in first cost. If, however, a large number of similar spans are to be built, so that concrete slabs can be constructed in a central and conveniently arranged plant, and if the erected price of steel work approximates three (3) cents per pound, the difference between concrete slab construction built with ballast floor and steel construction with open wooden floor, will be small, and in many cases will be favorable to the concrete.

If the designs contemplate the use of I beams embedded in concrete, compared with reinforced concrete girders, economy will be all on the side of the latter.

Short spans of reinforced concrete also permit a substantial economy in the design of abutments carrying them.

It is the opinion of your committee that reinforced concrete flat slabs or girders are not generally advisable for railway loads in spans exceeding 40 feet, but, as the great majority of structures carrying tracks over openings in the roadway are of spans less than 40 feet, the importance of these small structures is very great, and we believe the use of reinforced concrete for these small spans is desirable.

Long-Span Concrete Bridges

Long-span concrete bridges are receiving attention so extensively that there can be no question about the firm position this type of structure now holds in engineering practice. In this country we have only recently completed the 233-foot Walnut Lane span in Philadelphia, and the Rocky River Bridge of 280-foot clear span is now under construction at Cleveland. A bridge having a central span of 281 feet has been designed by the city engineer of Spokane to carry Monroe Street across the Spokane River. A span of 285 feet has been adopted to carry the New York barge canal over a gorge in the vicinity of Medina, N.Y. The 710-foot span of the proposed Henry Hudson Memorial Bridge at New York City has been the subject of so much discussion that it is at once recalled when the design of long-span concrete structures is mentioned. This bridge, however, is apparently not likely to be constructed for some time, owing to the action of the city authorities in withholding further appropriations for the engineering work. With the exception of the Henry Hudson bridge, the longest span yet proposed is that of a bridge recently placed under contract by the civic authorities of Rome. This will cross the Tiber with a span of 328 feet, having a rise of 3:10 and carrying a roadway 65.6 feet wide. The cost of this bridge has been estimated at £50,000. A bridge comparable with it in every respect is now more than half finished at Auckland, New Zealand. It has a total length of 919 feet, and its main feature is a span of 320 feet, which will carry a 40 foot roadway at an elevation of 147 feet above the ground below.—Engineering Record.

Mr. J. P. Keep, testing engineer in the department of City Engineer Macallum, of Hamilton, is resigning his position and will leave shortly for California.

Modern Cement and Concrete Construction

Ruling Characteristics of Cement as now Manufactured—Controlling and Limiting Features During Construction—Suggestions for the Future*

BY CECIL B. SMITH, of Messrs. Smith, Kerry Chace, Consulting Engineers, Toronto

Cement is essentially a human product, and therefore imperfect. What is very important and noticeable is that it is varying year by year in its characteristics, moulded at times by true skill and science, or through the demands, often mistaken, of those who use or control the use of the material.

At present it is considered in America that a cement manufactured from ground quarry rock of certain *average* ingredients, blended with a second material to give correct chemical proportions, is the cheapest product, and is quite satisfactory not only to the trade, but to the skilled engineer and scientist. This is a grave question, however; the highly limed, highly burned, finely ground clinker gives a cement which, when deadened by gypsum, will prove by all the gods (laboratories) fit to meet the specific tests now prescribed, but high tensile strength at one week proves nothing, except that the product matures early. The writer is painfully aware of the present tendencies. The engineer thinks he is leading, but he is being pushed along by the manufacturers into desperate courses, in a vain attempt to control the product to his satisfaction. The writer has been testing and using various cements in large quantities for 25 years, and also spent five years studying the characteristics of cement, and he is far from satisfied with present methods and usage.

Methods of Testing and Using Cement

Boiling tests, at best, are irrational, arbitrary and inconclusive, and are not safe grounds for absolute rejection. Hot water tests are less severe, but of the same inconclusive order. The only just and safe method, apparently, is to wait a month and observe the action of natural conditions. Cement is shipped too green, used too soon, and not given a fair chance, so keen is present-day commercialism. To be specific, gypsum dosing to regulate the time of setting and to disguise the presence of free lime is too prevalent, and early shipments of cement still containing free alumina, hot and variable in nature, are not uncommon practice. Upon the cement arriving at the works there is often no time to wait, and either without tests or only with hurried ones, the cement is put into service, if the sieving, boiling, specific gravity and one-week tests are acceptable, but after-results prove that in many cases the mortar in six months' time will show brittleness and unsoundness, and will in due course disintegrate. The view is here expressed that present specifications demand too much strength at early tests, but not enough by way of uniformity, soundness and ultimate toughness, and it would be well to consider the advisability of adopting the British custom of airing the cement before use, which may be done by the user, or more rationally and economically by the manufacturer. By suitable arrangements the cement might be thoroughly aired and cooled, and the customer could well afford to pay the extra price for a cement proven to have been properly aged and aired before shipment. By such methods less gypsum would be used and a sound product assured. Again, something further is wanted in the way of being able to secure a cement at a certain time of the year, and for a certain use, which has a certain time of setting to suit the circumstances. The Canada Cement Co., having control of so many mills and having a highly skilled organization, can effect this, and I trust they will do so when it becomes evident that variation in the time of set is a marketable quality.

We all read, year by year, the text-book views and ordinary specifications as to aggregates, and, no doubt, sound knowledge on this important question is becoming more widespread, but it must

be clearly kept in mind that laboratory sand and pit sand are different products.

Laboratory tests are comparative, relative and protective only, but practice demands that the sand, gravel or broken stone most convenient, or cheapest, be made use of, if possible, and it becomes necessary for a practical man to size up the local situation and take action.

Speaking generally, a run of crushed rock is suitable for heavy concrete masses unless exceptional strength is required, but care must be taken that the design of storage bins is such as to prevent a separation of the larger pieces, which, rolling towards the outlet, will give a variable product. To determine the proper proportion of sand for the concrete, the average percentage of voids in the crushed rock should be determined and a slight excess of sand used, say 10%. If the rock used is sound, limestone, granite or trap, the finer particles from the crusher represent some of the required sand, but in some cases, the amount of dust produced, necessitates screening.

The writer is not in favor of the use of sand rolls to make artificial sand, as the result from the grinding of most rocks is a mixture of dust and slivers, and the concrete therefrom weak, variable and sloppy. The constitution of gravel may make it an ideal material for straight concrete, but in most cases the variation is so great as to warrant screening and reportioning; however, a well made gravel concrete is usually heavier than a rock concrete, although not usually as strong. The variations in quality of sand makes it a difficult subject to discuss.

Everyone knows what a good sand should be, namely, of blended sizes, angular grained, clean quartz, and, for concrete, rather coarse, so as to economize in the use of cement. But usually one must accept an article only approximating the ideal and a fine, round-grained sand, with some clay or loam, must often be made the best of. Of course, if it is too poor it must be washed, but the usual course is to select the best available, and add more or less cement as may, in the user's judgment, be required to properly coat the particles, for which again a determination of the voids in the sand is advisable and a 10% excess of cement used.

Once the concrete ingredients have been determined upon, we come again to the question of human agency. The writer remembers well in building a large undertaking that some months after the concrete had been laid, a soft spot was found, and, upon careful investigation, it was determined that a mass of about 20 cubic feet had absolutely no cement in it. It was carefully dug out from the side of the wall and good concrete packed into the hole. It was evident that the inspector and men at the mechanical mixer had failed to put in any cement.

In practice, a suitable arrangement is to have a young student at the mixer to watch the assembly of materials and mixing, and a veteran builder at the wall to supervise the placing of the mixtures, but even with ample inspection, the human equation must be reckoned with.

It would not be suitable in this discussion to rehearse in detail the ordinary routine of mixing and placing cements. We all realize the numerous sources of error, and the necessity for constant and intelligent supervision. It is proposed rather to discuss certain special features and incidents arising from a rather varied experience.

Character of Foundation

Assuming that the concrete is properly constituted and placed, undoubtedly the most essential feature is the character of the foundation, for whilst concrete, owing to its monolithic nature,

* Extracted from paper read at the Second Annual Convention of the Canadian Cement and Concrete Association.

will span over small deficiencies in foundation, yet the limit is quickly reached: if, for instance, the structure is a large arched waterway, under railway embankments, this feature becomes vital. The writer has vividly before him disasters arising from upward pressure, between the two main walls, causing a complete wrecking of the structure. To meet this, future structures were placed on piling and heavy reinforcement added. Again, disaster, less severe than formerly, but still serious, occurred, and it was the evident deduction from these experiences that the only method of meeting the condition of deep and unstable clay foundations is to build an arched waterway, having a heavy superimposed load, with an inverted arch to completely meet the upward thrusts, and this has been found satisfactory. Another feature of design, often serious, is the special strains coming on the headwalls and wings of such structures. From the use of many types and after several disasters, the writer is of the opinion that when dealing with unstable materials, no amount of reinforcement or mass will fully meet the terrific stresses applied by sliding embankments. The only safe design is to carry the barrel of the arch forward and omit parapet and wings entirely. These remarks do not apply when ordinary dry materials are placed by teams or wagons, but to train-filled embankments made from unstable materials. In a recent train-filling experience, the whole valley was liable to be distorted by the superimposed loads placed on the clay bottom, and the chief engineer successfully prevented local distortion by a very heavy treatment of cross-logging placed in the embankment after it was partly made. This saved the arched culvert from destruction. The writer also calls attention to the undue burden placed on concrete abutments by attempting to shorten the spans. It is impressed on him that the proper course to pursue, where the nature of the filling or foundation is in doubt, is to lengthen the spans and reduce the abutments to mere bridge seats. The equilibrium of the hill-side will then be preserved.

Cold Weather Work

The placing of concrete in cold weather is a much discussed subject, but it has no real limits, except expense. To be specific, the writer has placed concrete river piers in February, with temperature 20 degrees to 40 degrees below zero, with perfect and economical results, as follows: Hot sand, stone and water—no salt—and the structure protected during construction by a large tent in which a stove maintained a reasonable temperature when aided by the heat of chemical action during the process of setting. Again, the concrete has been placed at Point du Bois, Winnipeg River, all the winter under a huge shed warmed by stoves. The sand is in a large mass, and is heated by a buried steam pipe freely flowing. The economy and results are quite satisfactory. On the other hand, the writer cannot advocate the placing of small masses without adequate protection, or the placing in cold water in small batches. The chances are that the setting action will be suspended. The writer knows of several instances where concrete placed both under the water and in open air in cold weather in even large masses has not set until the next May or June. The criterion is to provide enough warmth for a long enough period and to conduct the work continuously. Once the crystallization has commenced, the danger is passed.

In the construction of walls required for water-tightness and for decent finish, the method found most satisfactory is to place a continuous mortar facing, 3 to 4 inches thick, of 1 to 1 mortar, simultaneously with the placing of the mass concrete. This is not a difficult process when systematized, and is the only proper method of obtaining certain and perfect results, as any attempt at spading back the stone from the face of the wall is never perfectly done, and is a poor substitute at best for the facing method. To obtain a smooth finish, of course, one should use dressed matched forms, but the addition of soft soap, swabbed on with a brush, will give better results than oil, and is not an item of serious expense. When the walls are built in the summer season, there is a danger of surface cracking, even if the forms are left in to protect the wall from the sun's rays, but this may be avoided by placing a pipe with perforations along the top of the wall and pumping water through; or, if less expensive, a hose may be used, but the former

is preferable if the work is of an extensive nature. This treatment should be continued for a fortnight, if possible.

One of the least understood questions is that of expansion. This should be treated from several view points. In the first place, do engineers realize that cement, when of the most perfect character and used to form concrete masses, skilfully mixed and placed, has a certain definite action during the process of crystallization? This has no relationship to soundness or unsoundness, high or low temperature of air or ingredients, methods of placing, or density, but is an essential and necessary action arising during the natural process of setting and hardening. The outcome is that contraction in air or expansion under water takes place. But as concrete is usually placed under water in large masses, and as this expansion can be taken up by internal compressive stress, no harmful results follow, whilst on the other hand the contraction in air has certain results, whether this stress is met by reinforcement, by introduction of free joints, or by irregular ruptures, and with the free expansion joints we are now concerned.

The writer's practice is to create an absolute cleavage plan, approximately every 50 feet, unless the wall is shallow and on solid rock. If so situated, the joints should be closer or the adhesion of the concrete to the foundation will create local ruptures. When the wall is to contain water under pressure, evidently the joint must be made water-tight. This may be done either by the use of an oak key or, preferably, by a concrete prism, having an asphalt plug or rod. This is easily introduced, and gives an elastic and perfect seal. The prism should be slightly tapered and swabbed with tar or asphalt, or covered with paper. The sections of wall may be built either alternate or by stair steps, but the separation may be easily effected either by paper or asphalt, as in the case of the key.

Once the hardening process has reached a practical limit, the temperature changes are not serious, and may be disregarded, but the initial shrinkage is, from general observation, within limits, $\frac{1}{4}$ inch per 50 feet.

In hurriedly designed structures, particularly buildings, another class of cracking is met with, arising from variation in loading. The writer's observation is that not nearly enough attention is given to this, with the result that loads varying from 1 to 3 tons per sq. ft. may be introduced and the compression of the foundations throws local stress of a serious character onto the lower portion of the structure.

Suggestions Tending to Advancement

In conclusion, the writer desires to emphasize chiefly one thought, namely, the artificial character of concrete. The ultimate product has been the result of man's human agencies. The production has involved the use of skilled and unskilled labor. The chances of imperfection are many, and unceasing vigilance is the price of success. First and foremost, vigilance regarding the cement—a serious effort to secure, by the best tests we can devise, a sound article—but above all by the use of cement properly constituted, chemically, and aged, by taking care of it when it is received, by intelligent proportioning, careful placing, skilful designing, all necessary precautions; and, last of all and not least, by a hesitancy to use it indiscriminately, and realizing that we must not trust too implicitly in the permanency of steel reinforcement unless used with great care, so as to minimize the chances of corrosion of the steel by the action of ingredients in the concrete itself, or by permitting even the faintest percolation of air, which will be certain, in due course, to corrode or rust it. Finally, if we are to expect to build a permanent structure and to retain the ultimate respect of the public, it is certain that the treatment of concrete must be natural and not imitative. Each building material has its natural beauty, and the enduring grace of structures made of this material will be achieved when our engineers and architects have, by simple, massive treatment, educated the public to acquire a taste for concrete in no way related to preconceived notions of what is beautiful in similar structures built of stone, brick or wood. Much has already been achieved in this direction, and we may reasonably expect that in due course certain canons of taste in respect to concrete structures will be recognized not only by the profession, but by the general public.

Slating and Roof Tiling

The following are the customary rules of measurement as codified and revised by the Standard System of Measurement in London, Eng.:

Slating

Slating—Net area, after deducting all openings containing 4 feet superficial or over.

Mansard, vertical, dormer, cheeks, small surfaces under 10 feet superficial, circular, conical, octagonal or turret roofs to be measured separately.

Eaves—A lineal measurement to be taken to the equivalent of 12 inches deep.

If irregular or cut to follow drips of gutters, an extra measurement of 6 inches to be taken.

In the case of all random slating add a further 6 inches.

If bedded or pointed, to be charged separately.

Verges—A lineal measurement equivalent to 6 inches wide to be taken at all square verges, and secret gutters.

If slate and a half or special wide slates are used, add a further 12 inches.

Top Edge—A lineal measurement equivalent to 6 inches deep to be taken on either side of ridges, under sills of dormers, lanterns, skylights, and any openings where top course slates are used.

Square abutments—A lineal measurement equivalent to 6 inches wide to be taken where slating adjoins sides of all chimney stacks, dormers, skylights, and other openings; also at one end of slope where slating finishes between parapet or party walls.

Circular cutting—A lineal measurement equivalent to 12 inches wide to be taken.

Raking Cutting—A lineal measurement equivalent to 6 inches wide to be taken at all rakes.

Valleys—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all valleys.

If special wide slates or slate and a half are used, take an additional 12 inches on both sides.

Hips and Angles—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all hips and angles.

If special wide slates or slate and a half are used, take an additional 12 inches on both sides.

Mitre Cutting—A lineal measurement to be taken for all mitres (in addition to the usual cutting), whether at hips, valleys, or other places where slates are close cut; to include all necessary oil cement.

Ridge and Hip Coverings—A lineal measurement of all ridges and hips, including setting and pointing in cement.

All splays, cut ends, mitres, intersections and top ends to be numbered and taken separately.

Tiling

Tiling—Net area, after deducting all openings containing 4 feet superficial or over.

Mansards, vertical, dormer, cheeks, small surfaces under 10 feet superficial, circular, conical, octagonal or turret roofs to be measured separately.

Eaves—A lineal measurements equivalent to 8 inches deep.

If irregular or cut to follow drips of gutters, an extra measurement of 6 inches to be taken.

If bedded or pointed, to be charged separately.

Verges—A lineal measurement equivalent to 6 inches wide to be taken at all square verges, and secret gutters.

If on rake, take an additional 6 inches.

Top Edge—A lineal measurement equivalent to 6 inches deep to be taken on either side of ridges, under sills of dormers, lanterns, skylights, and any openings where top courses are used.

Square abutments—A lineal measurement equivalent to 6 inches wide to be taken where tiling adjoins sides of all

chimney stacks, dormers, skylights, and other openings; also at one end of slope where tiling finishes between parapet or party walls.

Circular cutting—A lineal measurement equivalent to 12 inches wide to be taken.

Raking Cutting—A lineal measurement equivalent to 6 inches wide to be taken at all rakes.

Valleys—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all valleys, including all necessary tile and a half.

Bedding and pointing to open valleys to be charged separately.

Valley tiles to be measured extra only, over the usual measurements on both sides.

Hips and Angles—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all hips and angles to include all necessary tile and a half.

Hip and angle tiles to be measured extra only, over the usual measurement on both sides.

Mitre Cutting—A lineal measurement to be taken for all mitres (in addition to the usual cutting), whether at hips, valleys, or other places where tiles are close cut, to include all necessary tile and a half.

Ridge and Hip Coverings—A lineal measurement of all ridges and hips, including setting and pointing in cement.

All splays, cut ends, mitres, intersections and top ends to be numbered and taken separately.

Permanent Fence Posts

Concrete fence posts are rapidly coming into general use. Only a few years ago the farmer who was enterprising enough to adopt them was thought by his neighbors to be spending his money extravagantly. To-day in these same localities posts of this kind are common and are being generally adopted by thousands of the most progressive farmers in all sections of the country. One western farmer makes all his own posts in a mould which he has designed himself and is at present preparing to use them in fencing his entire property, consisting of 160 acres.

Proper Mix for Concrete

A correspondent writes:

I have an argument on hand as to the proper way to put in concrete, that is, to make the best work. I have never seen it proven, whether it makes the best work in walls put in wet or mushy, or if put in wet enough just to tamp. Is there any rule which can be followed to determine amount of water to be used in mixing concrete?

Answer—In practice there is no rule which can be used to determine the exact amount of water required in mixing concrete. The class of work is usually considered the governing factor. The condition of the weather, the dryness of the sand, gravel and crushed stone, the proportions of materials, the time of removal of forms, and the required density of the concrete also govern the amount of water to be used. Under ordinary conditions the concrete should be of such a consistency that when tamped it will quake and water will flush to the top.

In order to obtain a dense watertight concrete, enough water should be used in mixing to ensure the closing of all the voids; in other words, concrete should be wet enough so that it can be puddled instead of tamped. In this case the thin mortar will flow, filling the spaces between the larger aggregate, thereby producing a dense concrete. This does not mean, however, that an excess of water should be used; if mixed too wet the water will have a tendency to wash the cement from the sand and gravel or crushed stone, and to separate the mortar from the large aggregate.

Projected Harbor Extensions at Montreal

Details of Important Scheme Recommended by Board of Engineers, for which is Asked an Initial Expenditure of \$2,500,000—Other Montreal News

Montreal Office of "The Contract Record,"
April 9th, 1910.

Full particulars are now available concerning the scheme of harbor extensions (for which a loan of \$6,000,000 is being asked) now before the Dominion Government.

Consultative Board of Engineers.

On March 31st, 1909, the Chief Engineer reported to the Commissioners that the comprehensive scheme of harbor extensions which he had been instructed to prepare, in May, 1908, was so far worked out that he desired the authority of the Commissioners for the engagement of a Board of Engineers to go over the plans with him, for consultation and report.

With the authorization of the Commissioners, the following gentlemen were invited to join the Board, under the chairmanship of the Chief Engineer, and they all kindly accepted and gave the matter their earnest consideration.

Mr. John Kennedy, Consulting Engineer.

Mr. Arthur St. Laurent, Engineer, Georgian Bay Canal.

Mr. Henry Holgate, Consulting Engineer.

Mr. G. J. Desbarats, Deputy Minister Marine and Fisheries.

Mr. Louis Coste, Consulting Engineer, Public Works of Canada.

Mr. Ernest Marceau, Superintending Engineer, Quebec Canals.

The first meeting of the Board was held in the Chief Engineer's office, Harbor Commissioners Building, April 24th, 1909.

A memorandum of instructions, dated April 21st, was read, and the Harbor Commissioners personally welcomed the Board, and desired that, after their consultation, a scheme would be recommended which would not only meet the ever-increasing requirements, but would result in making the port of Montreal one of which Canadian could be proud.

The report and plans of Mr. R. C. H. Davidson, M. Inst. C.E., an eminent English dock engineer, who had, at the request of the Harbor Commissioners, in 1907 made a study of the situation at Montreal with a view to designs for harbor improvements, having in the meantime been received, the Commissioners asked the Board of Engineers to take them into consideration, the Commissioners being desirous of having as wide a range of expert opinion as possible in connection with the port and its economic development.

Nine meetings were held, the full Board being present; and seven meetings of the committee for the drafting of the report of the conclusions of the Board.

On October 31st, 1909, after a thorough discussion and consideration of the problems placed before them, the Board of Engineers unanimously agreed upon outline plans and a programme of works, which they submitted to and recommended for adoption by the Harbor Commissioners.

The complete scheme of extensions prepared by the Harbor Commissioners' Chief Engineer, and the estimates prepared, were endorsed throughout, with one exception, and as recommended by the Board several improvements and modifications were worked out which will greatly improve the scheme.

Scheme Recommended by Board of Consultative Engineers.

The scheme of improvements, as recommended, was intended to be carried out within the next 12 years and to serve the growing business of the port during that time, that being, according to the opinion of the Board as far into the future as the requirements of the trade could well be foreseen.

The Board reported that in their opinion the works should be

commenced forthwith and carried out within the term of from 8 to 12 years.

The chief characteristics of the scheme of improvements thus outlined and the advantages to be gained by carrying them out may be summed up as follows:—

There will be added in the most advantageously situated parts of the harbor:—

1. New high level quays so arranged as to give berths for 24 ocean vessels of from 600 to 800 feet in length; aggregate frontage, 16,800 lineal feet.
2. New low level quays, 5,800 lineal feet.
3. Combined area of the new high and low level wharf spaces and extensions, 74 acres.
4. New sheds, floor area, 1,386,000 square feet.
5. Two new elevators with extensive conveyor system, combined capacity 2,000,000 bushels.
6. Additional high level railway tracks on the wharves, 22 miles.

The Board of Consultative Engineers, of which the Harbor Commissioners' Chief Engineer was a member, recommended that the time for construction should extend over a period of 8 to 12 years, and that the appropriations for the first two years should be at the rate of about \$2,500,000 per year, the large appropriations for the first two years being to provide the rapid construction of elevator No. 2, the anchorage banks in the Lapriatic Basin, the new Victoria Pier and Market Basin, and the extension of the high level railway tracks along the harbor front.

The board of Engineers reported with reference to the proposed overflow dam between the Guard Pier and St. Helen's Island, which would make the central part of the harbour now the St. Mary's current, a still basin at low water and with a comparatively slight current at high water in the spring, that after a careful examination they omitted it from the list of works recommended because it would entail a very large expenditure in fulfilment of the recommended plan, would so enlarge the crosssections of the river as to appreciably lessen the present St. Mary's current. They reported that should it be subsequently desired to completely eliminate the St. Mary's current it would be quite practicable to further deepen and widen the South channel and to build an embankment dam between St. Helen's Island and the Guard Pier, which would convert a large part of the Harbour into a still water basin, allow of much more advantageous arrangement of wharf space, and increase the safety and convenience of navigation. All the works recommended for that part of the harbor are so designed as not to prevent this being ultimately carried out.

The Board called the attention of the Harbour Commissioners to the desirability of changing the sewer outlets in the Harbor to such positions as would ensure their discharge into running water.

The programme of works as recommended by the Board of Engineers covers work which will double the capacity and convenience of the harbor, and will require a period of about 10 or 12 years for completion.

Details of Programme for 1910.

1. Grain Elevator No. 2. Capacity, about 2,000,000 bushels. Equipped for receiving grain either by railway or from vessels. Capacity from railways, 250 cars of 1,000 bushels each per day. Capacity from vessels by two marine towers, 300,000 bushels per day. Foundation to be permanent on reinforced concrete

piles to rock. To be completed ready for operation October, 1911. Appropriation for 1910, \$800,000.

2. High level railway tracks from the high level wharves above the Victoria Pier until Hochelaga and Molsons Creek, available for winter and summer use. Three tracks and all crossings down as far as Hochelaga to be by subways. Appropriation for 1910, \$200,000.

3. New Victoria Pier and Market Basin. The up-stream and outside wharves to be high level for ocean vessels, and all the inside to be low level for river craft, giving 2,700 lineal feet of wharves having a depth of 35 feet at low water for ocean vessels and 4,000 lineal feet for river vessels. Appropriation for 1910 for 600 feet of high level wharf and 800 feet permanent low level, and other works, \$400,000.

4. The completion of the Dominion Coal Company wharf at Hochelaga, length 291 feet. Appropriation for 1910, \$100.

5. Dry-dock. The Commissioners are pleased to announce that a well-known British firm will proceed at once to construct a large floating dock with a lifting capacity of 25,000 tons net, and able to dock the largest vessels now afloat. This firm, in addition to constructing a floating dock, will also erect in conjunction with it a large ship repairing plant.

Opening of Navigation Delayed

The Government ice breakers reached Montreal last week, announcing the river clear of ice as far as this city. On top of this we are informed that it will be fully another month before the local canal system will be available for service. The reason given for the delay is the extensive repairs that will be necessary to make to the canals before they can be watered. It seems rather unfortunate when we are favored with ideal condition for the early opening of navigation that delay should be caused from such a source. On the other hand, it is questionable whether the larger ocean vessels would be willing to inaugurate an early sailing season to the port of Montreal, owing to the fact that insurance companies demand almost prohibitive rates from vessels venturing to this district in the early spring months. Apropos of this we note that the Montreal Board of Trade has decided to address the Department of Railways and Canals, asking that in future the St. Lawrence Canal be opened much earlier than heretofore.

Sinking Foundation Piers with a Shield

The new passenger terminus of the Chicago and North-Western Railway at Chicago has about 100 foundation piers sunk to rock at a depth of 115 ft. to 120 ft. below the surface. They pass through about 15 ft. of earth and made ground, and 60 ft. of blue clay, to a shale bed, 10 ft. to 20 ft. thick, which overlies a water-bearing stratum of sand and gravel with boulders. The quantity of water was so great that the open pit excavating system had to be abandoned. The 5 ft. open pit was carried down into the clay, being lined with vertical, tongued, and grooved planks, braced by interior steel rings. Then a chamber was excavated and filled with concrete, in which was embedded an air lock 4½ ft. in diameter and 6 ft. high. In the excavation below the lock, was erected a shield, consisting of a steel ring or shell, 3½ ft. high, with a cutting edge. This was forced down by jacks, and at each 3 ft. of advance the excavation was lined with the plank lagging and steel rings. Considerable trouble was experienced with the escape of air through the sand and gravel, the air being noticed at excavations half a mile distant. When the well or excavation reached the rock its interior angle rings were removed, but in most cases it was not possible to recover the shield. The rock having been cleaned, concrete was deposited as rapidly as possible, the angle iron rings which braced the lagging being removed as the concrete reached them. When the concrete reached the lock, this was removed, and concreting continued to the surface, making a solid cylindrical pier of concrete, 5 ft. diameter. The forcing down of the shield was done by four 10-ton jacks.

Fort William Water Supply

An extensive paper on the Fort William water supply, prepared by Mr. H. S. Hancock, Jr., engineer-in-charge of the Fort William Waterworks Department since 1906, was read before a meeting of the general section of the Canadian Society of Civil Engineers, on the 7th inst.

In the absence of the author, the paper was read by Mr. R. S. Lea, of Montreal. The paper outlined the development of the city's water problem since 1906.

The source of the water supply is Lock Lomond, situated approximately six miles south of Fort William, and to bring and distribute water throughout the city proved an engineering task of no small moment, owing to the exceptional difficulty of securing proper labor and supplies. The tunnel into the city was completed June 31st, 1909, at a total cost of \$450,812.

Summary of the Cost of the Work.

Section 1.

By contract	\$93,475.70
Day labor	29,453.11
Engineer, Supt. and Legal	3,493.21
	\$126,422.02

Section 2.

Pipe line	\$44,197.93
Roads	2,158.23
Reservoir	23,106.03
Engineer, Supt., Inspection	2,625.40
	72,087.59

Section 3.

Tunnel.

Labor	\$73,312.23
Material	26,053.63
Fixed charges	35,908.95
Superintendence	6,974.09
Engineering	3,740.00
	\$145,988.90

Outside Work.

Roads	\$6,858.10
Concrete culvert	8,933.42
Gate house	2,120.95
Intake pipe	17,900.02
Forebay	10,182.95
Employers' Liability Ins..	915.61
Engineering	1,246.33
By-Laws and Legal	519.79
City contingency account	741.00
	195,407.07

Section 4.

Pipe line	54,749.09
River crossing	1,015.40
Engineer and Superintendent	1,131.20
	56,895.69

Grand total\$450,812.37

City Engineer Jones, of Brantford, Ont., paid a visit to New York City last week to see a test of certain cement sewer pipes. Tenders were recently called for by the city of Brantford for cement tiles. Among the tenders was one from a New York firm, \$6,000 less than any Canadian bid.

The American Society of Civil Engineers will convene at Ottawa the last week in June or the first week in July. The visitors will be entertained by the Ottawa branch of the Canadian Society of Civil Engineers.

Senator Edwards of Ottawa, has been elected president of the Canada Cement Company. The preferred stock of the company has been put on a dividend paying basis at the rate of 7 per cent. per annum.

Our Winnipeg Letter

Office of "Contract Record,"
Winnipeg, April 8th, 1910.

Building operations are now in full swing. The season is at least a month earlier than ever before. This is due partly to the exceptional weather and partly to the large number of plans that developed in the fall and winter.

Building material is in great demand, and will be more so as the season advances. Inquiries made by this office indicate that no great stocks of building material are held in the West. Quite a number of brickmakers say they have no stocks in hand, that their output is all contracted for, etc. If this is true, it will not be long before brick manufacturers away from the vicinity of large cities and United States dealers will be called upon to fill the shortage.

There has been "something doing" in paint during the last few weeks. Flaxseed prices have been soaring high in the United States. Consequently a gallon of boiled linseed oil which sold for 80 cents a year ago is now held at \$1.30—and apparently the end is not in sight. One day the paint manufacturers had to swallow a jump of 25 cents in one day. Everything is quiet in labor circles, and there are no grounds for anticipating serious trouble from this source.

Vancouver Correspondence

Building Records being broken at the Coast—Stiffening Tendency in Some Materials—Items of Interest

Office of "Contract Record,"
Vancouver, B.C., April 8, 1910.

With the building season well started and with all kinds of construction work in sight, backed up by a total of approximately one and one-half millions for March permits, everything is humming in this city. Building Inspector Jarrett is continually breaking records. One day recently in the short space of six hours he was called upon to inspect plans and issue permits for no less than seven new apartment houses, all of good dimensions.

The prices of many lines of building material are evincing a tendency to stiffen, and the probability is that before the season gets very far advanced there will be a really formidable jump in the construction cost of the ordinary home as compared with last year.

McDonald & Co., who have a contract for supplying about fourteen miles of 25-inch iron pipe to the corporation of New Westminster, have commenced operations. The plant, though small, is very complete, all the heavy machines for rolling, punching and rivetting were brought from Grand Forks, B.C., where Mr. McDonald formerly conducted a business. The pipe will be made of rivetted sheet iron, and the output will be about 330 feet of pipe per day. Mr. McDonald has manufactured pipe for the Granby smelter, for Portland, Seattle, and other Coast cities, and expects to continue in business in New Westminster after completing his contract with the city.

Contractors do not always make the proverbial barrel of money. Take the Lulu Island bridge at New Westminster as an example. The people who built it lost \$30,000, the amount representing the excess of the actual cost of the bridge over their estimates.

As a result of the repeated protests and warnings emanating from Building Inspector Jarrett, of Vancouver, the Civic Building Committee has empowered him to demand a higher standard of construction for apartment house blocks in future. The new regulation requires that all apartment houses over two stories

in height and having three or more suites on each floor, must be of mill construction.

The new Court House in Vancouver, though still far from completion, has been so long under construction that already it has been found inadequate for the needs of the city. The Government has ordered the addition of a new wing on the Robson Street side, which will cost \$200,000. This will make the cost of the finished structure about one million dollars.

There appears to be good grounds for believing that the long talked of bridge across the Second Narrows, connecting Vancouver with ambitious North Vancouver, will be undertaken by a syndicate of capitalists in the near future, the Provincial Government and interested municipalities having promised liberal grants.

Progressive North Vancouver

Indications point strongly to the probability of North Vancouver securing in the near future a great industry in the Pressed Steel Sleeping Car Company. Mr. C. Wilson, of Seattle, who is at the head of the capitalists, is interested. It is stated that a million dollar plant is to be installed, which will require a large staff. These cars will be decidedly new departures from the ordinary railroad cars, being made almost entirely of steel and almost unbreakable. There are parts of wood in their manufacture, but this wood amounts to but little. One of the features, it is said that they combine, is that every compartment is practically a separate stateroom in place of berths, as in the average sleeping car. The berths shove up to the ceiling out of the way of the traveller, who may, when he desires, extract a washstand and other necessary travelling conveniences out of the floor of his room.

The city of New Westminster is laying a considerable mileage of new cement pavements, the color being terra cotta. City Engineer Blackman states that in many English towns and cities these pavements are taking the place of the old white cement, which reflected the sun to a much greater extent, so that persons of weak eyesight were obliged to wear blue glasses.

Another huge office building is to be added in the near future to the half-dozen or so constructed in Vancouver during the past twelve months. The Dominion Stock and Bond Corporation, recently organized with a capital of \$2,000,000, will be the owners, and contemplate putting up a twelve-storey building to cost \$600,000. The site favored is the southwest corner of Howe Street and Hastings Street West.

Victoria Paving Problem

Victoria City Council has been wrestling with a paving problem. Work had been approved which would require a million and one-half blocks, but prices have risen. The tenders received from local milling companies showed that wood blocks now cost from \$14 to \$16 per thousand, which three years ago cost but a trifle over \$6. It cost \$2.87 to lay a block pavement in 1908; last year it cost \$3.70, and this year the figure would be in the neighborhood of \$4 per square yard. The establishment of a municipal block factory is talked of.

Municipal engineers in many places seem to experience a lot of trouble with electrolysis, but here in the West we do not have many complaints, the reason being that we put down wire-wound wood pipe for water systems, the use of which will soon be general throughout the prairie towns. The advantages claimed for wood pipe are economy in cost, durability and greater discharging capacity. The extensive plants of the Pacific Wood Pipe Co., the Canadian Wood Pipe Co., and the Municipal Construction Co., of Vancouver, and the Dominion Wood Pipe Co., of New Westminster, may be mentioned as the principal in this line. Practically all the wood stave pipe in use on the Pacific Coast is made of high-grade, well-seasoned Douglas fir.

An action has been entered by the Canada Industrial Company, Limited, against the municipality of Notre Dame de Grace to compel the execution of a \$20,000 contract for the purchase of lots required for street extensions.

Mr. W. A. McLean

Provincial Highways Engineer for Ontario.

Mr. W. A. McLean, Provincial Engineer of Highways, Ontario, is of Scottish and United Empire Loyalist descent, and belongs to a well-known Elgin County family. His education was received in the collegiate institutes at Ingersoll, Strathroy and St. Thomas, with a special course at the School of Practical Science, Toronto. After spending a year as reporter and editorial writer on the St. Thomas papers, he entered the office of the St. Thomas City Engineer, where, during the three years preceding 1896 he was engaged in general municipal work on sewers, waterworks and pavements, together with municipal drainage. In 1896 he entered the Provincial service as assistant to Mr. A. W. Campbell, Commissioner of Highways. With the recent promotion of Mr. Campbell to the Federal service, Mr. McLean becomes director of the Highways Division of the Ontario Department of Public Works.



Mr. W. A. MacLean, Provincial Engineer of Highways,
one of the most active supporters of the
"Good Roads" Movement.

Thus closely identified with the "Good Roads" movement for over fourteen years, Mr. McLean has devoted special attention to bridge construction, has the designing of a large number of highway bridges to his credit, and through the publications of his Department has done much to improve the standard of highway bridges throughout the Province.

Since the passing of the Highway Improvement Act in 1901, whereby the Province contributes one-third of the cost of county roads, Mr. McLean has, as engineer, represented the Province on this work. He has had charge of various model roads in the Province, and has been widely consulted by town councils as to methods of street improvement.

Mr. McLean is a member of the Association of Ontario Land Surveyors, and of the Canadian Society of Civil Engineers. By experience and training he has specialized in all branches of highway engineering including roads, bridges and pavements. In accordance with past methods of the "Good Roads" office, reports and bulletins will be issued; and so far as more definite

duties permit, his services will be available to all municipal councils for consultation by correspondence or personal visit.

Enthusiastic as to the future of road improvement in Canada, and the efficiency of present Provincial measures, Mr. McLean urges that the greatest good can come from a thorough reorganization and reform of township road systems in such a way that the present large expenditure will be effectively directed.

An Ancient Concrete Bridge

In the south of France is a concrete arch bridge known as the Pont du Gard, which was erected in the year 56 B.C. The concrete in this was not composed of crushed stone or other small aggregate of the variety now employed in concrete bridge work, but was of the old style, consisting of alternate layers of large and small stones, gravel, etc., and of cementitious materials. Vitruvius describes the materials and methods in use before the Christian era, and other writers, like Alberti in 1845, and Polladio in 1570, accurately describe the method which the "ancients" (as they call them) employed, "of using boards laid on edge and filling the space between with cement and all sorts of small and large stones mingled together." It is very improbable that the Pont du Gard would have withstood the rigors of the Canadian climate, but its actual state of preservation, as well as that of many other specimens of ancient concrete work, proves that if modern work is honestly executed it will many times outlast any reasonable bond period, so that a very small yearly sinking fund per cent. is all that is required for properly designed and erected concrete work.

A Side Light on the Winnipeg Plumbers' Union

The counsel of the Winnipeg Plumbers' Union, who has just returned from London, Eng., after getting the worst of it in the Privy Council on the right of a union to picket during a strike, gives it as his emphatic opinion that the Union lost its case owing to its inability to produce the necessary records when the action was first called, thereby making it impossible to learn who was actually responsible for the strike and for the administration of the Union's affairs. Unfortunately for the Union, however, the Privy Council took the view that if any body of men purposely destroyed their Union records they must have something to conceal, which entitled them to little consideration. And it was this view that resulted in the prompt decision of the Privy Council to refuse the right of appeal.

Montreal's Proposed Subway

The promoters of the proposed subway for Montreal are apparently working energetically in the preparation of the necessary preliminary details for this extensive project. It is stated that the route of the new subway will connect the eastern and western ends of the city and at the same time a cross line will be built from the river front northward. There is a persistent rumor that the Canadian Northern Railway Company will be prepared to give the scheme every support, since it would allow them an excellent entrance way to the centre of the city. The organization of a syndicate to carry out this work is said to have been completed. It involves English, American and Canadian capital to the extent of \$20,000,000. Montreal financiers said to be interested in the project are Messrs. Rodolphe Forget, M.P., H. S. Holt and W. G. Ross.

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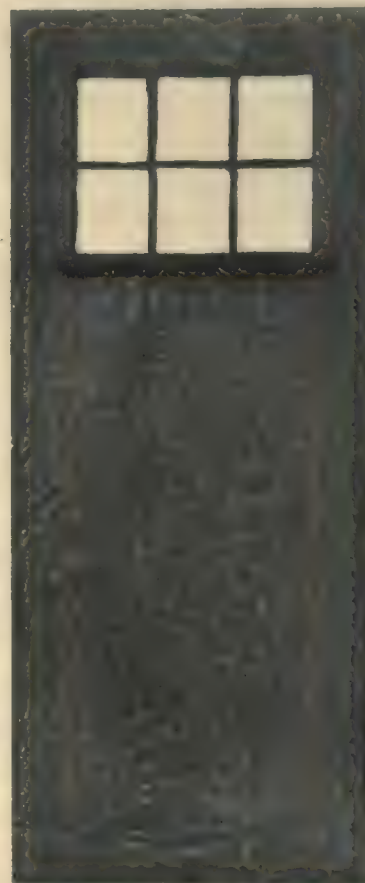
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Personal News and Notes

Mr. John Roger has been appointed county engineer of Perth, Ont. to succeed Mr. G. L. Griffith.

The Vancouver city council is considering a proposition to engage an expert supervising engineer for the city.

We regret to report the death of Mr. Geo. Parsons, a well known contractor of Brantford, Ont. Mr. Parsons was only 27 years of age.

The Canada Foundry Company have organized a department of field erection, of which Mr. J. J. Scollan has been appointed superintendent.

Jens Orten-Boving & Co., hydraulic engineers. London, Eng., have opened offices at 164 Bay St., Toronto, under the charge of Mr. F. A. Yerbury.

Hon. A. P. McNab, Minister of Public Works for Saskatchewan, is visiting Vancouver and the Coast. Mr. McNab is recuperating from a recent illness.

Mr. A. W. Campbell, Deputy Minister of Railways and Canals, delivered an interesting address at Mocton, N.B., last week on the subject of street improvements.

Mr. R. H. Saunders, late of the Waterworks Department, Toronto, has accepted a position with Mr. J. M. Wilson, who was recently appointed city engineer of Moose Jaw, Sask.

Mr. Geo. Powell, Roadway Engineer for the city of Toronto has been recommended for the position of assistant city engineer made vacant by the resignation of Mr. T. S. Scott.

The contract for the construction of an important branch line in Saskatchewan, the new road from Yorkton to Kenora, has been awarded to Peter Veregin, formerly leader of the Doukhobor contingent.

According to a recent dispatch from Cambridge, Mass., a Harvard professor of civil engineering is so impressed with the value of practical work that he has hired out temporarily as a laborer at \$1.50 per day.

The contractors who have just completed the Lulu Island bridge, New Westminster, B.C., lose something in the neighborhood of \$30,000 on their venture, this amount representing the excess of the actual cost of the bridge over their estimates.

The Victoria City Council received a petition recently from a number of property owners asking that certain paving work should be done by contract and stating the belief that this would effect a saving of from 80 to 100 per cent. over day labor.

A visitor of Winnipeg last week was Mr. Patrick Hirsch, a prominent railway contractor of New York City. Mr. Hirsch is reported to aspire to the construction of some of the important railway works that are to be carried out this year in the Canadian west.

A strike of the building trades which would affect 350,000 workers, is threatened in Germany, owing to the rejection of the wage scale offered by the master builders. It is possible that a revised wage scale will be drawn up by an equal number of representatives of employers and employed.

The National Iron Works, Toronto, commenced operations last week, when Mr. Cawthra Mulock poured

the first pipe. The new plant is claimed to be the most up-to-date foundry on the continent. The company have a considerable number of important contracts in hand, including a large order for 16-inch pipe for the city of Toronto.

Mr. R. E. W. Hagarty, Toronto, Secretary-Treasurer of the Canadian Cement and Concrete Association is leaving New York on the 26 inst. for an extended trip to Europe. Mr. Hagarty is desirous of improving his knowledge of general engineering work as carried on in the Old World and of studying European systems of engineering organization.

The Builders' and Contractors' Association of Essex have secured new quarters in the new Thompson Block, Windsor, Ont. The formal opening of these rooms took place on April 5th, when a euchre contest was held, the successful players being Messrs. Penington, Parker and Laisser. An enjoyable banquet was held afterwards. A committee of the Association has been appointed to co-operate with the Board of Trade and the Windsor City Council in matters pertaining to the general advancement of the city.

A meeting of the Manitoba Association of Architects was held last week at Winnipeg, Mr. J. H. G. Russell, president, occupying the chair. The principal business was in respect to a communication from the Ontario Association of Architects, which stated that it was the intention of that body to take active steps to regulate the American invasion of Canadian territory. It was decided to prepare data in respect to the work handled by American architects and contractors and to have the information thus secured placed before the provincial and Dominion governments.

Answering a question relative to the recent competition by Canadian architects for design for new departmental building at Ottawa, the Minister of Public Works stated last week that the Government had awarded the prize to the architects whose designs were considered best by the judging Committee. The Government had not adopted any of the designs, as none was considered suitable to build upon. It was intended to build on another design prepared by the department. This action was not regarded as a breach of faith with the Canadian architects, as the conditions under which they tendered provided that the designs for which prizes were awarded should become the property of the Government.

Big Contract for Progressive Toronto Concern

The Don Valley Brick Works have secured the contract for the brick required in the construction of the Museum Building to be erected by the University of Toronto. The facing brick, of which approximately half a million will be required, are the "J.A.P." variety, a semi-vitreous, variegated shade of dark buff brick, 12 in. long and 2½ in. thick, manufactured according to the specifications of the architects, Messrs. Darling & Pearson. The company report trade exceptionally good. They are at present turning out from their plant 200,000 brick a day and are providing for an increased output of 10 per cent. by extensive additions to their machinery and kilns. Mr. Bowman, the manager of the concern, considers that the contracts under way and others anticipated for the present year are the largest Toronto ever knew. One of the best features of the situation, in Mr. Bowman's opinion, is the increasing sense of loyalty to Canadian architects. Apropos of this subject Mr. Bowman may be interested in an article published on the first editorial page of this issue.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Amherst, N.S.

The ratepayers have authorized the town council to borrow \$30,000 for the purpose of extending the sewerage system of the town.

Cumberland, B.C.

Tenders addressed to A. McKinnon, city clerk, will be received until May 4th for the construction of certain works for this municipality. Plans, etc., at office of the above.

Chatham, Ont.

Tenders addressed to A. McArthur, clerk of the council, 31 King street, this city, will be received until April 27th for constructing a large outlet drainage work. Engineer's estimate (exclusive of bridges and incidental expenses), \$31,400. Wm. Abraham, reeve.

Dauphin, Man.

Waterworks and sewerage by-law was passed, \$175,000.

Estevan, Sask.

The 25,000 sewer by-law was carried.

Fernie, B.C.

The city clerk was instructed to secure the necessary petitions for the following money by-laws: Water extensions, \$19,000; sewers, \$41,000; surface drainage, \$27,000; street improvements, \$10,000.

Haileybury, Ont.

On May 2nd the ratepayers will vote on bylaws to issue \$25,000, 30 years, 5 per cent. waterworks debentures and \$10,000 15 years 5 per cent. street improvement debentures. Theo. H. Connor, Town Clerk.

Montreal, Que.

The Board of Control are considering alterations to Victoria Square with a view of improving its appearance. The plans include the installation of an artistic water basin.

Moose Jaw, Sask.

The by-law to raise \$140,000 for the construction of pavements and the widening of existing sidewalks was carried.

North Vancouver, B.C.

Engineer Hane's report on sewerage was as follows: On the question of sewerage, under local improvement on the council's initiative the engineer reported as follows: Esplanade, from Forbes avenue to St. Andrew's avenue, \$10,900; First street, from Forbes avenue to St. Patrick's avenue, total cost, \$18,625; Second street, from Forbes avenue to 300 feet east of St. Andrew's avenue, total cost, \$14,815; Third street, from Forbes avenue east to St. Andrew's, total cost, \$21,875. The plan was figured out on a 20-year basis.

Port Hope, Ont.

On the 28th inst. a bylaw will be voted on by the ratepayers to issue \$12,000 30-year sidewalk and road debentures.

St. Boniface, Man.

A by-law is being prepared to submit to

the ratepayers to issue \$128,450 debentures for the construction of a trunk sewer.

Saskatoon, Sask.

Tenders addressed to J. H. Truesdale, city clerk, will be received until April 25th for concrete sidewalks. Plans, etc., at office of city Engineer.

Sanford, Man.

Tenders addressed to H. Griffiths, secretary-treasurer, will be received until April 27th for the grading of about 25 miles of road in the municipality of Macdonald.

Sault Ste. Marie, Ont.

Tenders are being called until May 2nd by this municipality for cement walks, etc. See advertisement in this issue.

Vancouver, B.C.

It is probable that a new sewer by-law will be submitted for about \$500,000.

Victoria, B.C.

The by-law to provide for the widening of Fort street has been passed by council, and a commencement on the big undertaking will be made at an early date. It was decided that whenever any tenders were called for civic work the engineer should be asked to tender. It was resolved to call for tenders for 80 per cent. of the year's supply of beach gravel about 15,000 cubic yards), the tenders to state where the gravel comes from in order that no foreshore rights may be infringed.

Weyburn, Sask.

Tenders are still being called for water works and sewerage. See advertisement in this issue.

Westmount, Que.

The ratepayers recently approved the expenditure of \$550,000 for sidewalk, roadway and other improvements.

Winnipeg, Man.

The board of control will call for tenders on the following sewers and water mains in Elmwood: Sewers—Martin avenue, \$4,251; Tweed avenue, \$4,983; sewer in Basswood place, \$2,411; sewer in Sherbourn street, sewer in Andrews, from Burrows to Alfred, in Martin, from Watt street to C.P.R. track. Water mains on Martin avenue, \$7,728; Tweed avenue, \$4,415.

Tenders are called for asphaltting the following streets: Market street, \$16,793; Salter street, \$6,736; Boyd avenue, \$5,976; Inkster avenue, \$28,432; Aberdeen avenue, \$17,700; Florence avenue, \$14,685.

AWARDED.

Hamilton, Ont.

S. Cheesemen for sewer on Boulah avenue, 89 cents per foot, and on Wentworth street, from Francis street to Mara avenue, at \$1.09 per foot.

London, Ont.

Thomas Henry has the contract for 1,500 feet of water sewer work in South London; C. F. Gillam that for grading at 95 cents a rod. F. W. Farncomb, C.E.

Mimico, Ont.

The Foreatt Construction Company were

given the contract at \$2,495 for the construction of a pipe sewer connecting the Victoria Industrial School with the new sewerage system of New Toronto. J. A. L. Macpherson, engineer in charge.

Ottawa, Ont.

John Lowry, of Ottawa, has the contract for the construction of a protection pier at Winnipeg Beach, Man.

Toronto, Ont.

The J. H. McKnight Construction Company were awarded the contract for laying and jointing cast iron water mains up to a diameter of 12 inches, the contract to expire on December 31st. The contract price is \$51,845. Other bids were: \$52,050, \$56,032, \$61,327, \$62,393, \$67,558. Somerville, Limited, were given the order for brass curb cocks required by the waterworks department, at the following prices each: 1-2 inch, 53 cents; 5-8 inch, 73 cents; 3-4 inch, 93 cents; 1 inch, \$1.41. Excelsior Construction Company will construct a sewer on Salem avenue for \$243. Highest bid was \$315.

Railroads, Bridges and Wharves

Brandon, Man.

This city will have a transfer railway connecting the three big systems which have line here and another industrial track built by the C. N. R., which will open an avenue of commerce through the central part of the city, providing sites for warehouses and manufactories. H. Brown city clerk; G. E. Shaw, traffic manager, C. N. R.

Chatham, N.B.

Tenders will be called shortly for building I. C. R. Chatham division.

Fort William, Ont.

C. P. R. has given the contract for the changing of the piers at the Gravel River bridge to Stewart & Hewitson, who are considering the proposition.

Moncton, N.B.

McDougall's bridge below the dam, being constructed by the Shediac Electric Light Company, was carried away.

Montreal, Que.

The G. T. R. is calling for tenders for 500 special automobile cars. Over \$3,000,000 of freight equipment, it is stated, will be required, such as 2,500 steel frame box cars of 100,000 pounds capacity.

New Liskeard, Ont.

Tenders addressed to E. F. Stephenson, clerk, will be received until the 25th inst. for erection of bridge, 75 feet length, work to be completed by June next. Plans at Speaker office.

Niagara Falls, Ont.

G. F. Hanning and staff have completed the survey of the C. N. R. to the Falls. The Niagara, St. Catharines & Toronto Railroad, owned by Mackenzie & Mann interests, will build a line to Fort Erie during the coming summer, forming a belt line through the Niagara district as a feeder for the C. N. R.

Ottawa, Ont.

The bill to incorporate the Ottawa, Rideau Valley and Brockville Railway Company has been passed. Promoters:—Alfred McDiarmid and Robert E. Elliott, of Montreal, and others.

The C. P. R. roundhouse was damaged to the extent of about \$12,000 on the 12th inst.

The bill respecting the Kingston, Smith's Falls & Ottawa Railway, as amended, carried in the Railway Committee of the Commons. The amendment provides that the road must be started within three years.

Phoenix, B.C.

It is announced that contract for construction of a ten miles extension of the Kettle Valley Lines Railway has been awarded to W. P. Tierney & Company, railway contractors. Work on the extension will commence in the course of a month.

Quebec, Que.

Tenders for the construction of the Quebec bridge, it is stated, are to be invited next month.

Tenders are being called by the Department of Railways and Canals for the erection of a boarding house at the site of the Quebec bridge. Plans, etc., at office of J. H. Paquet, 105 Dalhousie street.

St. Charles de Caplan, Que.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, will be received until May 13th for the construction of an extension to the wharf here. Plans, etc., at above department, and at office of A. R. Decary, district engineer, Quebec, and on application to local postmaster.

Union Bay, B.C.

The clearing of the right of way for that branch of the proposed east coast extension of the E. & N. Railway, lying between Oyster River and this place will be under way shortly. H. E. Beasley, superintendent of the road, announced that tenders for the work would be invited immediately.

Vancouver, B.C.

The presentation of plans for the proposed new bridges over the Great Northern Railway cut at Victoria and Park drives are under consideration and call for 30 and 42 foot width respectively, with 26 foot walks on each. Both bridges will be of steel of the deck design and will cost approximately \$18,000 to \$20,000. Assistant Chief Engineer, G. N. R., Stewart. Clements, city engineer.

Winnipeg, Man.

Bids are wanted for heavy trestle work and pile driving. Apply by letter to P. O. Box 1678, Winnipeg.

Plans for the McPhillips street subway have been completed by the C. P. R. and work will start at once.

AWARDED.**Hickson, Ont.**

James Anderson, clerk, East Zorra, sends us the list of tenders for bridge: A. Hill & Company, Mitchell P. O., \$1,750; R. McManners & Company, Hamilton, \$1,925; Western Bridge Company, Chatham, \$1,575; Petrolea Bridge Company, Petrolea, \$1,750; Dickson Bridge Company, Campbellford, \$1,549; Hunter Bridge Company, Kincardine, \$1,1550; Fraser & Clemens, N. Hamburg, concrete arch only, \$2,300; Bealey Bros., Woodstock, abutments, per cubic yard, \$5.09; H. S. Dibble, Hickson, abutments, per cubic yard, \$6.50; Hamilton Bridge Company, abutments and bridge,

complete (accepted), \$2,029. The first six were for bridge complete.

Lindsay, Ont.

J. R. McNeillie, clerk, sends us the following list of tenders for Little Bob Bridge, Bobcaygeon, Ont.:—Two steel spans, including metallic reinforcement for concrete floors—Western Bridge & Equipment Company, Chatham, \$2,075; The Jenks-Dresser Company, Sarnia, \$2,150; the Hunter Bridge & Boiler Company, Kincardine, \$2,700; R. Macmanus Company, Hamilton, \$2,375; the Dickson Bridge Works Company, Campbellford, \$2,048; the Hamilton Bridge Works Company, Hamilton, \$1,840. The tender of the Hamilton Bridge Works Company was accepted with additions, as follows: Two spans, \$1,736; channel curbs, \$90; steel aprons, \$60; concrete floors, \$504; approach railings, 40 running feet, \$40; railings on each side of centre fill, 200 running feet, \$200; total, \$2,630.

Port Stanley, Ont.

The contract for the dock for the new boat to Cleveland has been awarded. Work will be commenced immediately, will cost about \$10,000.

John McGugan, of Payne's Mills, has secured the contract for building the 250 feet of dock for the Southwestern Traction Company.

Woburn, Ont.

Rutherford & Patten were awarded contract for construction of reinforced concrete arch bridge over the River Rouge, \$3,600, by the Scarboro Township Council. Other tenders were: Horace Thompson, \$4,600; McManus & Company, \$5,520; Rutherford & Patten, \$3,600; B. W. Hyde, \$10,495; E. J. C. Elliott, \$4,690, and J. A. Watson, \$5,510. Prices do not include cement and engineering costs.

Winnipeg, Man.

It is stated that contracts have been awarded by R. J. Mackenzie for extensions of the Canadian Northern in Saskatchewan and Alberta totalling 230 miles, thus:—Half of the contract on the Maryfield extension to the Cowan Construction Company, the balance of the work at the Maryfield extension to the Northern Construction Company.

Public Buildings, Churches, Schools, etc.

Brantford, Ont.

St. James Church will consider the removal of church this year.

Tenders are being called until April 27 for extensions to King Edward and Ryerson Public Schools. Geo. W. Ball, architect. See advertisement in this issue.

The public school board authorized the calling for tenders for the new school additions.

Barrie, Ont.

St. Mary's Church are considering the improving of the Deanery.

Brandon, Man.

W. A. Elliott who built the fire hall at Moose Jaw, estimated the cost of an efficient one here at \$20,000. It is possible that something definite may be done at council.

Carleton Place, Ont.

The building of a public hospital for the town has been publicly endorsed, estimated cost, \$25,000.

Estevan, Sask.

The \$10,000 by-law to complete town hall was carried.

Edmonton, Alta.

The exhibition directors are calling for tenders for the erection of the following buildings: Stables for horses, sheep, cattle, swine, and a cottage for the resident superintendent.

The Public Works Department are calling for tenders for conduit wire, supply of wood fibre plaster and maple flooring for Ponoka Asylum, tenders to be in by April 23rd.

Fernie, B.C.

A \$7,000 by-law for school improvements will probably be submitted.

Fort William, Ont.

A site has been purchased for the new Y. M. C. A. near Syndicate avenue, 100 feet frontage. General secretary, G. H. Williamson.

Flesherton, Ont.

Tenders are being called until April 28th for erection of 6-room school. See advertisement in this issue.

Fredericton, N.B.

Tenders addressed to J. D. McLean, Department of Indian Affairs, Ottawa, Ont., will be received until April 30th for the erection of frame school houses for Woodstock, Oromocto and Burnt Church Indian reserves, N.B. Plans at post offices at Chatham, Newcastle, Woodstock and this city.

Galt, Ont.

It is stated that the theatre that was recently destroyed by fire will be rebuilt, but on another site.

Grimsby, Ont.

Tenders addressed to H. N. Grout, secretary-treasurer of Education, Grimsby, will be received until May 30th for the various trades required in the erection of a high school. Plans, etc., at offices of architects, Munro & Mead, Hamilton, and also at office of W. W. Kidd, this place.

Hamilton, Ont.

Controller Cooper has announced that the registry office would cost \$39,000, leaving a balance of \$700 for sundries. Noted in issue of April 6th.

Halleybury, Ont.

The Anglican congregation will build a parish hall, \$10,000.

Halifax, N.S.

It is reported that the Home of the Guardian Angel, N. W. Arms, will be begun this summer. St. Edwards Catholic Church, for which lots on Coburg road have been purchased, will not be begun until the Guardian Angel Home building is finished.

The building committee of the Halifax Y. M. C. A. have decided to ask for new tenders for the construction of their Y. M. C. A. Building. The general plans will be adhered to but Ross & Macfarlane, the Montreal architects, will be asked to amend the specifications to reduce the cost of this building.

Kildonan, Man.

On April 30th the ratepayers will vote on the \$11,000 school bylaw.

Kenora, Ont.

Department of Militia have decided to erect a drill hall here on a portion of the town park east of the Central School. It is quite likely that work will be commenced on the building this summer.

Lockport, N.S.

Consul Alfred J. Fleming reports that the plans have been matured for the cold storage plant to be built here and to cost \$85,000. It will have the most modern equipment. The glue plant, which receives

no Government aid, will have a capacity of 50,000 tons annually.

Ladysmith, B.C.

Tenders will shortly be called for hospital, for which \$10,500 is available in cash.

London, Ont.

At a meeting of the Board of Governors of the Western University, a committee was appointed to investigate the question of sites. Secretary Baker.

The school board have recommended that \$5,000 be spent on enlarging No. 22 Hamilton road east school. Mr. Duncan, principal; R. Saunders, chairman.

Lethbridge, Alta.

The Trades and Labor Council will have a 2 storey building erected, 50 x 125 feet. cost, \$75,000.

Medicine Hat, Alta.

A new school is to be built at Finnis Lake. Jas. Plumley, secretary, 602 Esplanade.

Montreal, Que.

Plans have been submitted by Building Inspector Chausse for the enlarging of City Hall by the erection of an annex, cost about \$175,000.

Plans for public underground lavatories, prepared by Mr. Howard, of the city surveyor's department, have been laid before the Board of Control. Cost \$6,500 each.

The Board of Governors of the Institute des Petites Filles de St. Joseph have decided to erect a school building on Sherbrooke street near Atwater avenue. Estimated cost \$100,000.

No awards have yet been awarded in connection with the additional wing to be added to the new Medical Building, McGill University, but the matter is still under advisement. Brown & Vallance, architects, Canada Life Building.

A movement is on foot to raise money for the purpose of building a gymnasium building for McGill University; estimated cost, \$250,000.

It is stated that the Y. W. C. A. are considering the inauguration of a campaign to raise \$100,000 to be used in the erection of an eight storey extension to the Dorchester Building.

The Cote St. Paul Academy for Boys, managed by the Christian Brothers was burned to the ground on the 16th inst. Loss about \$35,000.

North Portal, Sask.

Construction will shortly commence on the immigration and detention building, 73 x 37 feet, on a site opposite Canadian customs. J. Bruce Walker, Commissioner of Immigration, Winnipeg, Man., C. W. Speers, Canadian Colonization Agent.

New Westminster, B.C.

The plans for the new Royal Columbian Hospital, to be built by the Provincial Government have been approved by the board of directors of the institution. The structure will cost \$75,000. It will be built of red brick and stone, with slate roofs, the entire edifice being fireproof. Plans were submitted in competition and were adjudicated upon by F. M. Rattenbury, local architect. Construction work will commence immediately.

Ottawa, Ont.

Mayor Hopewell has stated that the contract for the installation of the civic incinerator would likely be let shortly, and that the plant here will be fashioned after that at Seattle, Wash.

Crawford Ross, secretary-treasurer public school board, is calling for tenders un-

til April 26th for the erection and completion of two new schools on Hopewell and Breeze Hill avenues. Plans at office of W. B. Garvock, superintendent of buildings, Creighton Street School.

Tenders will be received until April 21st by John Henderson, city clerk, for alterations to the City Hall. Plans, etc., at office of the architect, C. P. Meredith, 126 Sparks street.

Port Arthur, Ont.

Out of over thirty designs submitted by architects residing in the principal Canadian cities for Carnegie library, the design of Hood & Scott, of this city, was awarded the first premium.

Quebec, Que.

The sum of \$15,000 was voted in the House of Commons for the extension of the Quebec Drill Hall.

Regina, Sask.

It is stated that the board of governors of Saskatchewan University have accepted the tender of Smith Bros. and Wilson for the buildings.

Revelstoke, B.C.

\$30,000 have been voted for the erection of a new 8 roomed school on Sixth street, southeast corner of the city. A by-law for the purchase of a block opposite the present school in the centre of the city was defeated.

St. Eustache, Que.

Fire destroyed the Protestant church and about sixteen houses on the 17th inst. Total estimated damage, \$40,000.

Thorold, Ont.

The ratepayers voted in favor of asking for a grant of \$10,000 from the Carnegie fund for libraries. Mayor McCulloch.

Sydney, N.S.W.

Competitive designs are being called for, in which city designers all over the world are free to compete, for the federal capital at Yass-Canberra in New South Wales; competitions to be open for 12 months. The Minister, Hon. G. W. Fuller, has not yet fixed the amount of the prize money to be offered, but it is reported that he is anxious that it should be a sum large enough to attract the best talent in the world. Panoramic views of the federal territory, together with details of its geological features, climate, etc., will be supplied in order to assist the competitors in getting out their designs.

Toronto, Ont.

Tenders addressed to A. W. Holmes, architect, 10 Bloor street east, will be received until April 27th for masonry, etc., required in the erection of St. Augustine's Seminary. See advertisement in this issue.

The Northern Congregational Church members have decided to sell their present church.

At a meeting of the Anglican Church of St. Mary the Virgin, corner of Bloor street and Delaware avenue, plans for a new church were favorably considered.

The congregation of St. Stephen's Anglican Church, corner of Bellevue avenue and College street, are to have a new building, \$60,000.

Tenders will be called about May 15th for a new residence for Victoria College. Sprout & Rolph, 90 Yonge street.

The members of St. Martin's Church have decided to erect a new edifice. Rector, Rev. S. de K. Sweetman.

It is stated that the Friends' Association are considering the establishment of an institution to be used as headquarters

for their general work. President, W. G. Brown; secretary, Miss Mary Youmans.

The Toronto Arena Company, Limited, has secured incorporation, capital \$250,000; provisional directors, Irving Wells Smith, insurance agent; E. G. Long and A. Mearns, both of Toronto.

Building permits have been issued to St. Paul's Church, near Church street, on Bloor east, \$265,000; Dovercourt Presbyterian Church, 2 storey brick school, corner Dovercourt and Hepbourne, \$20,000; Lourdes Roman Catholic Church, 2 storey brick presbytery, near Sherbourne, on Earl, \$10,000.

Vancouver, B.C.

Mayor Taylor and Messrs. G. H. Healey and F. C. Wade have settled all matters regarding Detention Home except that of a site. Capt. Collier, of Salvation Army, probable detention officer.

N. A. Leach, school architect, has prepared plans for the three new schools, each at a cost of \$45,000.

The Mount Pleasant Conservative Club have under discussion the erection of handsome quarters.

Messrs. Pervy and Alexander have prepared plans for the new St. James Church. Church committee, Messrs. Taylor, Coles, Peake, etc. Estimated cost, \$100,000.

Tenders have been called for removal of Grace Methodist Church and the putting in of full size basement under the same. Plans, etc., at Mr. T. M. Howe's, 6 Fourteenth avenue east.

A committee was appointed by St. Mark's parish to secure plans for a new church. J. L. Duncan, church treasurer.

The time for receiving tenders for construction of two fire halls has been extended until the 21st inst.

The Dominion Government has authorized the lease of admiralty site for Isolation Hospital.

Victoria, B.C.

The Dominion Trust Company has instructed its architect, H. S. Griffiths, to prepare plans for an eight storey block of white stone, cost over \$100,000, on Wharf street, fronting on the inner harbor. The two lower floors, and perhaps a third, are to be devoted to the use of the J. B. A. A. Work will start as soon as possible.

The necessity of a new Christ Church cathedral is felt, and it is thought that something will be done when the new rector, Rev. J. A. Doull, assumes charge in May. Architect, Mr. Keith.

Woodstock, Ont.

The council have authorized the town solicitor to prepare a by-law to raise \$10,000 debentures for the new Beale street school.

Westboro, Ont.

A new \$15,000 school is to be erected here.

Welland, Ont.

The Collegiate Institute Board may submit a by-law to the ratepayers to provide funds for a new assembly hall and gymnasium.

The Welland Presbyterian Church will spend \$10,500 in improvements this year.

Windsor, Ont.

Tenders addressed to N. Tossier, secretary, Department of Public Works, Ottawa, will be received until April 25th for interior fittings for the post office here. Plans, etc., on application to W. Curtis, caretaker, Public Building, this place, to T. A. Hastings, clerk of works, postal sta-

tion "F," Toronto, and at the above mentioned Department.

Winnipeg, Man.

Plans are proposed for a big curling rink for the Thistle and Builders' Exchange Club.

Westminster Church will start their building, corner Maryland and Buell streets, this year. J. M. Mitchell is interested.

The Presbytery Board authorized the expenditure of \$25,000 for a new Presbyterian Mission church on Dufferin avenue.

Knox Church have a scheme, embracing new church buildings to cost \$200,000, to be erected within the next two years.

New Rifle ranges, barracks and permanent camp buildings will be erected by the Dominion Government.

J. H. G. Russell has been selected as the local architect for the new Y. M. C. A. Noted in last issue.

Permit has been issued for a new church for the Swedish Lutheran congregation, \$30,000. Pender street east.

Preliminary sketches of a north end branch of the Y. M. C. A. are being considered.

The building committee's recommendation for the erection of two collegiates was passed. Estimated expenditure \$225,000.

Building permit has been issued to Orpheum Theatre Company, theatre, east side of Fort street, between Portage and Graham avenues, \$175,000.

Excavation work has been started at the site of the \$75,000 Christian Science Church to be built on the corner of River avenue and Nassau streets. Wallace & Aikins have the contract and Jordan & Over are preparing the plans.

Building permit was issued to Lindsay A. Wardell, brick church on the corner of Dundurn and Marguerite streets for the Roman Catholic corporation, \$8,000.

AWARDED.

Fort William, Ont.

The contract for altering St. Luke's was awarded to George Read. Cost, \$5,000.

Hamilton, Ont.

James Bain & Son, iron work at police station, \$995.

Lethbridge, Alta.

Contract for the erection of the new immigration building has been let to Smith Bros & Wilson.

Montreal, Que.

The general contract for the erection of the Alexandria Street School for the Board of Protestant School Commissioners has been awarded to Byers & Anglin. A. F. Dunlop, architect, Lindsay Building. Estimated cost, \$130,000.

Peterborough, Ont.

Mr. MacGregor's tender was accepted for the heating of the county buildings in town.

Regina, Sask.

Smith Bros. & Wilson have secured the contract for the erection of the new convent school to be erected here for the Order of Our Lady of the Missions, \$30,000. W. W. Hilton, architect.

Starbuck, Man.

Contract for the school here has been let to G. Johnston for all but heating, which is not let. E. D. Tuttle, architect, 204 Bannatyne avenue, Winnipeg, Man.

Toronto, Ont.

The Toronto Furnace & Crematory Com-

pany will install the steam heating plant in St. Lawrence Hall for \$907, the lowest tender submitted. Bids ranged from \$907 to \$998.

Victoria, B.C.

The contract for supplying the Province of British Columbia with several thousand school desks of various heights, to meet requirements of the current year has been awarded to E. G. Parnell & Company, of Vancouver, at \$5,200.

Winnipeg, Man.

The contract for the alterations of Riverview Presbyterian Church were awarded to J. Morrison, \$2,600.

A contract was awarded to the Munroe Steel & Iron Works for the construction of an iron fence for Machray School site at an estimate cost of \$647. The tender of Thomson & Homer, at \$11,300, for the heating and ventilating plant in the Lord Roberts School was accepted, system of temperature control optional.

Residences

Arcola, Sask.

The town council are considering the building of 25 houses, the town to guarantee the builder 10 per cent.

Little Britain, Ont.

Tenders are being called until April 20th by G. W. Hall, Box 204, for the erection of a brick parsonage, also frame stable.

Montreal, Que.

Tenders will be called for on or about April 31st, 1910, for 12 semi-detached villas to be erected in Outremont. Jas. E. Adamson, architect.

Tenders have been received for the erection of a residence on Ontario avenue. Hogle & Davis, architects, 85 St. Francois Xavier street.

Plans and specifications are being prepared for two cottages to be erected on Westmount avenue and for two cottages on Belmont avenue for J. H. Hand. Wright & Son, architects, 204 St. James street.

Plans and specifications are being prepared by Wright & Son, architects, for a large modern apartment house to be erected on St. Matthew street for a Montreal building syndicate. This building is to be practically fireproof throughout.

Tenders will be received until April 22 for the erection of a residence on Belvidere road, Westmount for Mr. Lionel J. Smith. Hutchison, Wood & Miller, architects, Royal Insurance Building.

Tenders for the erection of a residence on Sydenham avenue, Westmount, for Mr. F. Macfarlane will be received up till April 21st. Hutchison, Wood & Miller, architects.

Jos. Sawyer, architect, 407 Guy street, is preparing plans for an apartment house on Mountain street.

The Duluth rink with the property on which it is situated, has been sold to Ald. N. Leclaire, who will erect forty-five flats on the southwest corner of Duluth and St. Urban streets.

Ottawa, Ont.

A building permit has been taken by F. L. Campbell for an apartment house, \$10,000.

Recent building permits include:—J. A. Grierson, 4 brick veneer houses on Preston street, \$6,000; William Weston, double brick veneer house, Percy street, \$2,500; C. H. Stata, 4 brick veneer dwellings, Fourth avenue, \$13,400 for four; A. Gougeon, alterations to 4 dwellings, LeBreton

street, \$2,000; D. O'Byrne, brick veneer dwelling, Gladstone avenue, \$3,500; C. P. Meredith, brick dwelling, Laurier avenue east, \$8,000; Geo. Crain, alterations to shop and apartments, Nepean street, \$3,500; Charles Hopewell, solid brick factory, Lyon street, \$10,000; Mrs. Louisa Blais, double brick veneer dwelling, Clarence street, \$3,000; P. Hanrahan, brick veneer dwelling, College avenue, \$2,500; James Moir, brick veneer dwelling, Centre street, \$3,000; C. A. Douglas, solid brick double house, Laurier west, \$5,000, double brick veneer dwelling, Gloucester street, \$4,000; R. H. Miller and J. Brisson, solid brick shop and offices, Albert street, \$11,000; R. A. Nesbitt, double brick veneer, dwelling, Arlington avenue, \$3,500; Alfred Day, double brick veneer dwelling, Third avenue, \$3,500; E. J. Marion, brick veneer dwelling, Riverdale avenue, \$2,000; Abraham Payne, brick veneer dwelling, Preston street, \$2,000; Thos. Clarey, double solid brick dwelling, Centre street, \$4,500; J. A. Bowman, brick veneer dwelling, Percy street, \$2,500.

Regina, Sask.

McCallum, Hill & Company propose to erect twenty houses in this city.

J. B. Shaw will start the erection of an apartment building at once. Storey & Van Egmond, architects.

Saskatoon, Sask.

Storey & Van Egmond are preparing plans for residences for J. R. Bunn, of Milestone, and Geo. McCraney, M.P., of Rosthern.

Vancouver, B.C.

Permits for apartment houses were obtained as follows. Florence Wheeler, Eveleigh street, \$14,500; J. H. Bartholomew, 1455 Eighth avenue west, \$35,000; C. Tweedale, 343 Hastings street east, \$26,000.

Plans have been prepared by Paul M. Clemens, 219 McDermott avenue, for Albert Johnson for the 3 storey and basement apartment block on Furby street. Excavation has been started. Estimated expenditure, \$45,000.

Winnipeg, Man.

Building permits have been issued for apartment blocks to Watson & Simmers, corner of Spence and Balmoral place, \$100,000, C. S. Bridgman, architect; A. Johnson, Sargent and Notre Dame streets, \$45,000; H. Peterson, Portage and Ellice avenues, \$28,000. Also residence, C. S. Simpson, Ruskin road, \$22,600.

Tenders addressed to W. Bruce, architect, will be received until April 21st for erection of residence, Ashburn street, for J. R. McKenzie. Plans at office of the above, 222 McDermot avenue.

K. B. Skagford is planning to construct thirty residences in Norwood this summer. The houses will cost in the neighborhood of \$60,000.

J. T. Bergmann will build a residence costing about \$4,600. P. M. Clemens, architect.

T. C. Keenleyside has sold the southwest corner of Hugo and Fleet streets to a local contractor, who will put up ten modern houses this year.

Patrick Callaghan has purchased two lots on Bannerman avenue on which he will build at once.

Sir Daniel McMillan will build a residence corner Kinksway and Wellington crescent costing \$48,000.

F. T. W. Alexander has purchased a building site on Wellington crescent.

Recent building permits include:—W. Crowe & Sons, house, north side Merriem,

\$3,200; J. W. Parker, house, north side Beresford, \$2,000; W. J. McLaughlin, one house, east side of Arlington, \$4,000; Henderson Bros. & Cohen, house, west side Home, \$2,100; A. H. Fraser, house, north side Jubilee, between Helen and John, \$3,500; S. E. Hart, west side Hargrave, house, \$5,000; A. Galbraith, house, west side Banning, \$5,000; R. G. Mainland, house, west side Stiles, \$2,000; A. W. Trickey, house, north side McAdam, \$3,000; J. F. Kemp, house, west side Lipton, between Portage and Livinia, \$2,000.

AWARDED.

Montreal, Que.

The contract for all trades in connection with alterations to a residence on St. Famille street for Dr. England, has been awarded to William Evely, carpenter and joiner, 449 Bleury street. MacVicar & Heriot, architects, 104 Union avenue.

The contract has been awarded to John Allan, general contractor, 300 Atwater avenue, for alterations to summer residence of Mr. Holt, Lakeside, Que. Peden & McLaren, architects, 20 St. Alexis street.

General contract for residence to be erected for Ernest Latter, Esq., on Cote St. Luc road, Montreal, has been awarded to F. M. Hartman, Southam Building, corner Guy street, Montreal. Jas. E. Adamson, architect, Montreal.

General contract for two semi-detached villas to be erected on west side of Rockland avenue, Outremont, Que., for J. F. McLean, Esq., has been awarded to Sparrow & McNeil, Coristine Building. Jas. E. Adamson, architect, Coristine Building, Montreal.

Business Buildings and Industrial Plants

Brandon, Man.

Plans are being prepared for another hotel for Jas. McLeod, owner of the Royal.

The contract for the two new storeys to be added to the Empire hotel will be let shortly. E. J. Peltier, owner; A. A. Evans, lessee.

Plans prepared by F. R. Evans, 166 Pacific avenue, Winnipeg, for a 5 storey office building of reinforced concrete, brick and stone, 60 feet on Rosser, 75 feet on Ninth street, call for an expenditure of about \$65,000. Tenders for construction will be called shortly.

It is stated that Clement Bros. will erect another business block on property rear of Bank of Montreal; dimensions, frontage, 50 feet by 68 feet depth, 3 storeys.

The two extensions to the Brandon hardware block have been decided upon. Estimated cost, about \$81,000. J. B. Curran, manager. E. W. Durst, contractor; W. S. Richards, supervisor of construction. It is stated that C. Unicorn will build a three storey block between 11th and 12th streets.

Calgary, Alta.

The Calgary Milling Company's elevator was destroyed by fire on the 14th inst. Total estimated loss, \$300,000. It is stated that the company will rebuild at once.

Daysland, Alta.

The following will build: Chas. Smith, W. Latimer, S. A. Tofthagen and the Canadian Club.

Edmonton, Alta.

J. Hutchins, of Great West Saddlery Company, Winnipeg, has considered plans for the erection of the large factory and warehouse to be erected here next year.

Forward, Sask.

It is understood that Wm. A. Nichol & Company have decided to erect in the immediate future a hotel, \$7,000.

Fort William, Ont.

The Northern Automobile Company, capital \$100,000, held its annual meeting on the 11th inst. Tenders have been called for the new garage, which is expected to be completed by July. President, A. Sellers; secretary-treasurer, N. M. Patterson.

Hawkestone, Ont.

The store of Leigh Bros. was destroyed by fire on the 15th inst. Total loss, about \$7,000.

Lethbridge, Alta.

J. W. Turpin will have a large business block erected here. Hayr Bros. will also have a business block put up this spring.

McAdam Junction, N.B.

Extensive improvements are to be made to C. P. R. station here.

Moose Jaw, Sask.

Corner of River street and Ninth avenue is being demolished to make way for the erection of Hopkins & Lathan's new building.

Montreal, Que.

The sash and door factory of H. Fauteau, Fauteau avenue, was damaged to the extent of about \$9,000 on the 16th inst.

The property, corner of Craig street and St. George streets, it is stated, has been purchased by L. Cohen & Company as a site in the future for an 8 storey building.

It is stated that a new company has been formed to merge Freemans, Limited, and the St. Regis Hotel Company for the purpose of forming a chain of restaurants similar to those operated in the United States by the Childs Company. The capital of the new company will be larger than the two hotel companies. It is the intention of the new company to secure the property and buildings now occupied by Freemans, Limited, on St. James street, and extend the facilities of the present restaurant.

Plans and specifications have been prepared by T. Pringle & Son, Limited, architects, Coristine Building, for extensions to the Toronto warehouse building of the Canadian Rubber Company of Montreal, Limited.

The extensive additions to the Molson Brewery premises on Notre Dame street east, by the erection of a cold storage plant, mentioned in the "Contract Record" of February 16th, are held in abeyance pending the passing of a bill by the Quebec Legislature, that will give the Molson Company power to expropriate the land that is required for this extension. As the matter stands now the city has the right to extend Papineau avenue from Notre Dame street to the C. P. R. tracks and should this be done it would cut into the property on which the firm purposes to erect their plant.

Plans for the new buildings for Montreal Street Railway are being prepared and the architects, Marchand & Haskell, expect to call for tenders shortly.

Selected bids are being received for the construction of the new office and factory building for the Holland Varnish Company. T. Pringle & Son, architects, Coristine Building.

Oxford, N.S.

Oxford Foundry & Machine Company, Limited, are making preparations for the

foundation of a fine up-to-date office building, 28 x 46 feet.

Orillia, Ont.

It is stated that T. A. Main will construct a large new block on Main street, \$20,000, and also that J. B. Tudhope, president Carriage Factories, Limited, has asked for about 75 houses for his employees, work for which will be in the hands of local builders.

Ottawa, Ont.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, Ottawa, will be received until May 2nd for the construction and erection of a station building at Lake Superior Junction, Ont. Plans, etc., at office of G. Grant, chief engineer, and S. E. Poulin, district engineer, St. Boniface, Man.

Quebec, Que.

The Crown Rubber Shoe Company is planning to start a factory in Limoilou.

The following building permits have been issued recently: S. Savard, proprietor, M. Leclerc, contractor, erection of building on Demers street, \$10,000; J. A. Bouchard, proprietor, Ed. Bouchard, contractor, erection of brick building on Caron and Queen streets, \$10,000.

The erection of an eight storey building, cost \$200,000, will be built by the Quebec Railway, Light, Heat & Power Company on the site recently purchased by the company. Mr. C. A. E. Carr, general manager of the company, accompanied by Mr. B. P. Lemay, architect, will at once leave for New York, where they will inspect some of the large buildings in that city. It is hoped to begin active work next May. The building will be one of the most imposing and up-to-date structures in the city. Directors, R. Forget, Senator Mackay and others. Noted in issue of March 9th.

Regina, Sask.

The B. F. Nelson Manufacturing Company, of Minneapolis, will likely erect a warehouse or factory here.

Geo. R. Rastall, of the Brush & Overland Company, states his company will build an automobile factory here.

H. J. Hardie, of the Toronto Type Foundry, states his company will erect warehouse and office building here this year.

The Bank of Commerce will have a stone building erected.

Smith Falls, Ont.

Tenders were called until April 20th for the various trades required in the erection of warehouse and office building corner of Herbert and Elizabeth streets for Robertson, Nicolle & Company. Arthur Ellis, architect, Kingston.

Saskatoon, Sask.

The Royal Bank have purchased a building site.

Mason Bros., proprietors Royal Hotel, are to build a new hotel of 50 rooms. C. T. Stacey, of the Western Hotel, will also build. The Flanagan Hotel will also probably be extended.

The Saskatchewan Cartage & Warehouse Company contemplate the erection of another building.

Stewart, B.C.

It is reported that J. H. Houston and others have secured valuable water frontage and that a Terminal Transfer & Transportation Company is in process of formation, with the idea of erecting large wharves and warehouses.

South Bay, N.B.

The Canada Woodenware Company,

limited, formerly of Hampton, capital \$50,000, will establish a factory here.

Willsonburg, Ont.

Premises occupied by W. C. Burns and Peering Company's agency, were destroyed by fire on the 12th inst. Total estimated loss, \$5000.

Toronto, Ont.

A building permit has been issued to J. Nicholls, for 5 storey brick warehouse, 18 King street west, \$34,000.

The foundry of Reid & Brown was badly damaged on the 17th inst. Total estimated damage, \$10,000.

Vancouver B.C.

A building permit has been issued for the new mill at the foot of Birch street or Mr. John Hanbury. Cost, \$80,000.

A permit has been taken out by the Metropolitan Building Company for a 10 storey brick and stone building on Hastings street west. Architect, H. S. Helyer, 32 Hastings street; superintendent of construction, W. W. Parson, \$400,000.

It is stated that the city and G. N. R. have reached an agreement re the terminal station, which will be used by N. P., T. P., and C. N. R. also. Work is to start within 90 days after plans have been approved, and completed in 5 years. Total cost, estimated, \$1,500,000. Matter to be finally approved by electorate, to whom it will be submitted in about 6 weeks.

Victoria, B.C.

H. S. Griffiths has prepared plans for the 3 storey building to be erected forweeney & McConnell, quality printers, Langley street.

A building permit has been issued to the Westholme Lumber Company for their warehouse on Government street, \$44,000.

Plans have been approved for the extension of the shirt and overall factory, Wharf street, managed by Turner Beeton company. Tenders are being invited by the architect, W. Ridgway Wilson, for the construction of an addition to the present factory, situated on the corner of Wharf and Baston streets.

Woodstock, N.B.

The site for the new C. P. R. station has been purchased adjoining Connell's foundry. Estimated expenditure, including other projects, \$100,000.

Winnipeg, Man.

Building permit was granted Douglas Company, warehouse, west side Adelaide street, between Notre Dame and McDermott avenue, 25,000.

A permit has been issued to Henry Birks & Sons, for alterations to old Y. M. C. A. Building, \$20,000.

Building permit has been issued to Telegram Printing Company, office building, east side Adelaide street, between Notre Dame and McDermott avenue, \$22,000.

The Northern Crown Bank (R. Campbell, general manager, will make alterations to its premises here, costing \$65,000.

Seventeen acres south of the Manitoba Rolling Mills have been sold to an American firm, who, it is understood, will erect a steel works on the site. G. A. Gareau effected the sale.

Marlatt & Clark Company, of Fort Atkinson, Wis., announces that they will establish a factory for the manufacture of creamery machinery here this year.

D. W. Bellhouse is the architect for the block to be erected for the Henderson Manufacturing Company. Noted in March 3th.

W. E. Cook, of Amherst, N.S., is said

to have purchased the old Sterling block on Fort street and will erect a big fur factory to cost \$45,000.

It is said that the O'Brien Terrace, opposite T. Eaton's, on Hargrave, will be converted into stores. The Western Loan & Mortgage Corporation effected sale.

The Bank of Hamilton will erect a north end branch, corner of Main street and Burrows avenue, this summer, two storey building, of brick and stone, \$20,000.

It is stated that the Schlitz Breweries, of Milwaukee, will establish a branch brewery in this vicinity, possibly east of St. Boniface. Estimated expenditure, \$200,000.

The C. P. R. will construct and equip stockyards to extend as far as McPhillips street. Controller McArthur is interested. F. W. Peters, 2nd vice-president C. P. R.

It is stated that Hon. Adam Beck, London, Ont., has accepted plans new box factory here.

AWARDED.

Brandon, Man.

The Brandon Construction Company, Limited, have been awarded the contract for the erection of an eight-storey business block for A. E. McKenzie Company, Limited. Reinforced concrete construction, using C. A. P. Turner's system, of Minneapolis; front, pressed brick and cut stone, curtain walls of brick. Probable cost, \$90,000.

Edmonton, Alta.

The following is a list of tenders for Canada Permanent Building: Mr. Broughton, Edmonton, \$55,950; Mr. McSparran, Edmonton, \$51,448; Wm. Cannell, Edmonton, \$57,300; Messrs. Sharp & Son, Winnipeg, \$62,680; Messrs. Preasy & Batson, Edmonton, 52,350. Roland W. Lines, 57 Jasper west, architect. Noted in last issue.

Lethbridge, Alta.

The contract for the C. P. R. station has been let to McDermid & Company, of Winnipeg.

Montreal, Que.

General contract for cigar factory on St. Lawrence boulevard for Jose Granda, Limited, has been let to Sparrow & McNeil, Coristine Building. Jas. E. Adamson, architect, 630-631 Coristine Building, Montreal.

The contract for the office fixtures for the Workman Building has been awarded to Randolph & Company. MacDuff & Lemieux, architects, Merchants Bank Building, Montreal.

The contracts for alterations to the premises of 138 Peel street for R. J. Inglis, have been awarded as follows: Masonry and brick, Shearer, Brown & Willis; steel work, Phoenix Bridge Company; plastering, R. D. Clark; painting, R. E. Jones; plumbing and heating, Ogilvie Bros. MacVicar & Heriot, architects, 104 Union avenue.

Byers & Anglin have been awarded the general contract for the construction of the extensive additions planned by the A. E. Rea Company, Montreal. The contract for this work was signed on April 16th. A. F. Dunlop, architect, Lindsay Building.

The general contract for the erection of the new building for the Montreal Steel Company, Limited, has been awarded to C. E. Deakin, general contractor. T. Pringle & Son, architects, Coristine Building.

Ottawa Ont.

The Metropolitan Building Company have awarded contracts as follows for their 10 storey block, work on which will

start after April 10th: John Coughlan & Sons, steel fabrication; Ross & Howard, cast iron bases; E. E. Davis & Company, steel erection; Wells Construction Company, preparation of site, concrete work and stone; Canada Foundry Company, ornamental iron; Barr & Anderson, steam heating; Dorel & Killing, plumbing; Sears & Company, bricklaying; Raftery & Company, expanded metal and plastering; Western Sheet Metal Works, sheet metal and roofing; Cope & Son, electrical work; Robert Stewart, Ontario, hardwood finishing; British Columbia Plate Glass & Importing Company, painting and glazing; A. & P. Steven, Glasgow, elevators. Total, \$325,000. The contract for the model stone carving and general enrichment work will be awarded during the next few days.

Regina, Sask.

McGregor & Black have been awarded the contract for the immense new warehouse of the International Harvester Company in this city.

Saskatoon, Sask.

Jas. Colton secured the contract to build J. D. Ferguson's 3 storey block.

Contract has been given to the Trussed Concrete Steel Company, of Winnipeg, Man., for the erection of a flour mill for the Saskatchewan Milling Company, \$75,000. Work expected to be completed by July.

Toronto, Ont.

The contracts for office and bank fittings for the Manufacturer's Life Building, corner King and Yonge streets, and Metropolitan Bank, corner Queen and Lansdowne, have been awarded respectively to Waterloo Office & Furniture Company, Waterloo, Ont.

Winnipeg, Man.

The Carter-Halls-Aldinger have signed contract for erection of garage for Western Canada Motor Car Company, to go up on Garry street.

Wallaceburg, Ont.

Gilbert Little has the contract to build a new annex to the Tecumseh house; 30 x 36, 3 storeys high.

Power Plants, Electricity and Telephones

Fernie, B.C.

A \$6,000 by-law for electric light extensions will probably be submitted.

Galt, Ont.

The offer of the Town Council of \$16,000 for the poles and wires of the Galt Gas Light Company has been formally accepted.

Ingersoll, Ont.

The arbitrators acting for the corporation and the Electric Power & Light Company have put their valuation at \$37,225. A by-law to provide for the acquiring of the plant will be submitted at an early date.

Kingston, Ont.

It is proposed by the towns of Eastern Ontario, from Trenton to Kingston, to discuss the power problem as to the feasibility of combining on either the Trenton Electric Company or Hydro-Electric Commission.

London, Ont.

The site for the Niagara power substation has been bought on corner of Kitchen avenue and Cabell street. Plans are being prepared by City Architect Nutter and work commenced at once.

Montreal, Que.

The Montreal Light & Power Company have notified the Board of Control that they will lay underground conduits for the purpose of burying their wires on certain streets in the east end of the city.

Ottawa, Ont.

The Hamilton, Waterloo & Guelph Railway Company's bill and the Toronto Eastern Railway Company's bill were passed.

Quebec, Que.

Plans of the Quebec Railway, Light, Heat & Power Company, as stated by the president, R. Forget, will include double tracks in the city and out as far as Ste. Anne de Beaupre, and also \$15,000 on the Kent House as a place of amusement.

Stratford, Ont.

The power by-law for \$85,000 has been passed.

Vancouver, B.C.

City Electrician McCrossan will show to the council the need of a new and separate building for his department.

Victoria, B.C.

Tenders addressed to W. W. Northcott, purchasing agent, will be received until April 25th for the installation of a complete system of cluster street lights. Plans at office of the above.

Winnipeg, Man.

It is stated that DeForrest has selected a site for his long distance wireless telephone station. J. H. Smith, Canadian manager, Ederton Building.

Tenders for the equipment of the McPhillips street substation will be called shortly.

Tenders addressed to Chairman, Board of Control, will be received until May 16th for conduits, etc. See advertisement in this issue.

AWARDED.**Edmonton, Alta.**

Tenders were considered for the motor equipment and air brakes for the new cars recently ordered from the Ottawa Car Company. The contract for motor equipment was awarded to the Canadian General Electric Company, at \$2,600 each and that for air brakes to the Canadian Westinghouse Company for \$440 per set f. o. b. Edmonton. The tenders of the Northern Electric & Manufacturing Company, Calgary, and the Wire & Cable Company, Montreal, were the same, each \$1,300 lower than any of the others. The contract was awarded to the former at \$13,727.89. Tenders for crucible steel and messenger wire for the telephone department were received as follows: Northern Electric & Manufacturing Company, Calgary; Gorman, Clancey & Grindley, Edmonton; Dominion Wire Manufacturing Company, Montreal; Canadian General Electric Company, Calgary. The last two tenders did not comply with the specifications. The tender of the Northern Electric & Manufacturing Company, Calgary, at \$652.60 being the lowest, was accepted. For the underground and aerial cable for the telephone department, tenders were received as follows: Gorman, Clancey & Grindley, Edmonton; Northern Electric Manufacturing Company, Calgary; Wire & Cable Company, Montreal; John A. Roebling & Sons, New York; Waterbury Company, New York; Standard Underground Cable Company, Pittsburgh.

Montreal, Que.

The Canadian Light & Power Company have awarded to the Canadian General Development Company the contract for improvements to the Beauharnois Canal, be-

tween St. Timothee and Valleyfield. Fraser Brace & Company, of New York, have been awarded the contract for improvements to the mouth of the canal at Valleyfield. Estimated cost of whole, \$750,000.

Nelson, B.C.

The contract for its new track, including roadbed, track, switches, pole system and trolley wires, was let to L. G. Brandt, of Nelson by the directors of the Nelson Street Railway Company. Construction has been commenced and will be carried on under the supervision of the city engineer.

St. Thomas, Ont.

Walter Mitchell, of Port Stanley, will supply 600 poles for the Hydro-Electric transmission line at 2,900.

Toronto, Ont.

For pole line supplies, the tender of the Canadian H. W. Johns-Manville Company was accepted at \$1,157. Other bids were \$1,225, \$1,425, \$1,450. Wire required for the Hydro-Electric system will be supplied by the Northern Electric & Manufacturing Company, at 16.5 cents a pound by rail and 16.45 cents by boat.

Tenders for laying conduits under the crossings in connection with the installation of the Toronto Hydro-Electric System, were as follows: \$12,903.66, \$11,387.08, \$14,023.48. The lowest tenderer, the Safety Insulated Wire & Cable Company, of New York, received the contract.

Miscellaneous**Edmonds, B.C.**

Until April 21st \$16,500 school and \$13,000 waterworks debentures of the corporation of Burnaby are offered for sale by C. T. Saunders.

Fergus, Ont.

Tenders will be received by Thos. Wilson until April 30th for erection of brick woodshed with metallic roof. Plans at News-Record office.

Huntsville, Ont.

By-law to raise \$12,000 in 20-year debentures for the extension and improvement of the sidewalks and roads, was carried.

Hamilton, Ont.

Recent building permits include: James Bryers, brick dwelling, Tisdale street, for W. McDougall, \$4,000; James Bryers, brick dwelling, Delaware avenue, for J. Smith, \$5,000; Rastriek & Sons, three brick dwellings on Greig street, for T. Fanning, \$4,500; Stewart McPhie, brick dwelling, Hess street, for Robert Fearman, \$5,000; Stewart McPhie, brick church and rectory, Victoria avenue, for trustees of the Trinity Lutheran church, \$3,000; Stewart McPhie, brick dwelling on Hess street, for George Robertson, \$4,000; E. B. Patterson, brick dwelling, Huron street, for R. Guy, \$2,000; K. G. Wilson, brick dwelling, Wentworth street and Rutherford avenue, \$2,500; H. Dunham, two brick dwellings on Madison avenue, for G. Greenway, \$2,000; Stewart & Witton, frame building, Viewpoint avenue, mountain top, for the trustees of St. Joseph's Orphanage, \$3,000; Stewart & Witton, brick addition to Nurses' Home, Barton street and Euclid avenue, for the city corporation, \$18,000; A. W. Peene, brick store building, James street, for C. J. Myles, to cost \$5,000; Stewart McPhie, brick and stone registry office building, corner John and Jackson streets, for the Wentworth county and city corporation, to cost \$30,000; C. Carver and W. Phillips, brick dwelling on Mervle avenue, near Main street, for Mrs. F. French, \$3,000.

Kingston, Ont.

Tenders addressed to W. W. Sands, city clerk, will be received until April 22nd for one hose wagon, one extension ladder, 1,400 lbs. bluestone, 400 zincs and 250 coppers.

Montreal, Que.

The Transportation Building Company have recently become incorporated with a capital of \$750,000, special power being granted to this company to acquire the option to lease the lot 85 on the official plan of Central Ward, Montreal, granted by the Seminary of Montreal. Mr. Arnold Wainwright, of the Grand Trunk Railway Company, is one of the incorporators.

Recent building permits include: Albert Bleau, Mt. Royal avenue, house containing three dwellings, \$6,000; A. Ladouceur, 11 Boucher, house containing five dwellings, \$3,500; O. Briere, 1816 St. Urbain, house containing three dwellings, \$3,000; A. Paquin, 113 City Hall avenue, house containing two dwellings and store, \$8,000; J. A. E. Plante, 551 Clark, two houses containing six dwellings, \$7,000; J. A. Hogue, 964 Sanguinet street, house containing three dwellings, \$1,600; Boileau & DeMontier, six houses containing eighteen dwellings, \$24,000; E. G. Dagneau, St. Urbain, two houses containing four dwellings, \$4,000; O. Letourneau, M.D., house containing three dwellings, \$4,000; L. Hamslen, Cartier Square, two houses containing six dwellings, \$6,000; Mrs. J. E. Cormier, Mance street, two houses containing six dwellings, \$14,000; A. Malo, Bordeaux street, two houses containing four dwellings, \$2,500; C. Guilmette, St. Andre C. Johnson, two houses containing six dwellings, \$5,000; Lamarre Presses, Knox street, three houses containing eighteen dwellings, \$8,500; Hall & Sons, Longue Pointe, one house containing one store, \$1,850; A. Ledue, Nicolet street, one house containing three dwellings, \$1,600; Commercial Ecole d'Hochelaga, 16 Desery street, one educational building, \$48,000; Z. & J. St. Pierre, 951 Tupper street, one house containing three dwellings, \$16,000; Alfred Pelletier, 132 Bordeaux street, two houses containing four dwellings, \$3,000; A. Jean, 256 Bourbonniere street, one house containing two dwellings, \$1,500; Corbell Freres, 192 Clark street, one house containing two dwellings, \$2,750; Mederic Desautels, 183 Labelle, one house containing two dwellings, \$4,000; W. Demontigny, 235 McCord street, one house containing two dwellings and one store, \$4,000; E. Laliberte, 2472 Esplanade avenue, one house containing two dwellings and one store, \$5,000; A. J. Darling, 104 St. Mark, one house containing one dwelling, \$8,000; C. J. McCuaig, 735 Sherbrooke street, one house, \$30,000; J. Crevier, 559 Laurier, \$3,000; Mrs. D. W. Ogilvie, 11 St. Sacrament street, one house, \$12,000; Ideal Savings & Loan Company, 290 St. Catherine street west, two houses containing four dwellings, \$4,000; J. S. C. Martin, 650 Bourbonniere street, four houses containing twelve dwellings, \$12,000; J. A. Drapeau, 38 Goshais, two houses containing six dwellings, \$4,800; Institute des Petites Filles de St. Joseph, 45 Notre Dame des Lourdes, \$100,000.

Ottawa, Ont.

Recent building permits include: Joseph Forget, brick veneer apartment house, St. Patrick street, \$4,500; F. L. Campbell, brick veneer apartment house, Preston street, \$10,000; J. D. Wilson, brick veneer double house, Rupert street, \$3,000; F. X. Laderoute, brick veneer houses, four in row, Gloucester street, \$5,000; F. Heney,

(Continued on page 30)

Tenders and For Sale Department

To Contractors

Sealed separate or bulk bids will be received by the undersigned up to 12 o'clock noon of MONDAY, 25TH APRIL, 1910, for all the work and material required in the erection of a new wing to be added to the Royal Victoria Hospital, Barrie, Ontario.

Copy of plans and specifications may be obtained at the Hospital or at the office of the architect.

The lowest or any tender will not necessarily be accepted.

F. S. BAKER, Architect,
Traders Bank Bldg., Toronto.

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The City of Calgary

Tenders will be received by the City Commissioners up to and including APRIL 22ND, 1910, at 4 o'clock p.m., for supplying the City of Calgary with the following material:

Salt Glazed, Vitrified Clay Sewer Pipe, according to specifications to be furnished by the City Engineer. Tender to state price, f.o.b. Calgary.

A marked cheque for \$100 to accompany each tender.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,
City Clerk.

Dated at Calgary March 17th, 1910. 16

City of Port Arthur

Pavement Construction

Sealed tenders addressed to the undersigned and endorsed on envelope, "Tenders for Pavement Construction," will be received up to 12 o'clock noon of

Saturday, April 30th, 1910

for approximately 50,000 square yards of Sheet Asphalt or Asphalt Block Pavements on concrete foundation.

Plans, profiles, specifications and forms of tender are on file in the City Engineer's office, and specifications and forms of tender may be obtained from the City Engineer and any further necessary information.

A marked cheque for 10 per cent. of the estimated cost of the paving must accompany tender.

The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

J. McTEIGUE,
City Clerk.

Corporation Offices, Port Arthur,
April 7th. 1910. 16

City of Brantford

Tenders for Reinforced Concrete Bridge

Sealed tenders addressed to Ald. Joseph Minshall, in care of the City Clerk, Brantford, Ontario, will be received till 12 o'clock noon on

Friday, April 22nd, 1910

for a reinforced concrete bridge across the Canal on Market street. The bridge will consist of one 60 foot arch span and approaches, one 46 foot girder span, one 42 foot girder span and two 36 foot girder spans, all of reinforced concrete. Length of bridge, 246 feet. Width, 64 feet.

Plans and specifications may be seen and instructions to bidders and forms of tender obtained at the office of the City Engineer. Each tender must be accompanied by a marked cheque for \$1,000 payable to the order of the City Treasurer.

Copies of the plans and specifications may be seen at the offices of the "Contract Record," Confederation Life Building, Toronto, and at B34 Board of Trade Building, Montreal.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer.

City Engineer's Office,
Brantford, April 5th, 1910. 16

Department of Railways and Canals, Canada

Trent Canal

Ontario-Rice Lake Division
Section No. 4

Notice to Contractors

Sealed tenders addressed to the undersigned, and endorsed "Tender for Trent Canal," will be received until 16 o'clock on THURSDAY, THE 5TH MAY, 1910, for the works connected with the construction of Section No. 4, Ontario-Rice Lake Division of the Canal.

Plans, specifications and the form of the contract to be entered into, can be seen on and after this date at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared, or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$20,000.00 made payable to the order of the Honourable the Minister of Railways and Canals must accompany each tender, which sum will be forfeited, if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security for the due fulfillment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 7th April, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16

Department of Railways and Canals, Canada

Trent Canal

Ontario-Rice Lake Division
Section No. 6

Notice to Contractors

Sealed tenders addressed to the undersigned, and endorsed "Tender for Trent Canal," will be received until 16 o'clock on TUESDAY, THE 26TH APRIL, 1910, for the works connected with the construction on Section No. 6, Ontario-Rice Lake Division of the Canal.

Plans, specifications and the form of contract to be entered into, can be seen on and after this date at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Superintending Engineer, Trent Canal, Peterboro, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared, or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation and the place of residence of each member of the firm.

An accepted bank cheque for the sum of \$10,000. made payable to the order of the Honourable the Minister of Railways and Canals, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent will be returned to the respective parties whose tenders are not accepted.

The cheque of the successful tenderer will be held as security or part security for the due fulfillment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 5th April, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16

Department of Railways and Canals, Canada

Sault Ste Marie Canal

Notice to Contractors

Sealed tenders addressed to the undersigned and endorsed "Tender for Removing Range Beacon, and widening the Channel at the Upper Entrance," will be received at this office until 16 o'clock on THURSDAY, THE 28TH APRIL, 1910.

Plans, specifications and the form of the contract to be entered into, can be seen on and after the 8th April, 1910, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Engineer in Charge, Sault Ste. Marie, Ont., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$500.00 made payable to the order of the Minister of Railway and Canals, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfillment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 8th April, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 16

Marked Tenders

will be received up to SATURDAY NOON, APRIL 24TH, for one Steel Bridge and Concrete Abutments, also one Reinforced Concrete Arch and Abutments, near Hensall, Ont. Plans and particulars here or at office of Fred Hesse, Township Clerk, Zurich, Ont.

Lowest or any tender not necessarily accepted.

F. W. FARNCOMB, C.E.,

16 64 Bank of Toronto Bldg., London, Ont.

Tenders for School

Sealed tenders will be received up to 6 p.m. on APRIL 28TH, for the erection of a Six-Room Combination School, to be built at Flesherton for the Township of Artemesia School Board.

Plans and specifications can be seen at my office, Flesherton, or at the office of Forster & Clark, architects, Owen Sound.

The lowest or any tender not necessarily accepted.

W. J. BELLAMY,

Secretary School Board.

April 20th, 1910.

16

Extensions to Schools

Sealed tenders, addressed to M. E. B. Cutcliffe, Chairman of the Buildings and Grounds Committee of the Public School Board, care of the undersigned at his office, City Hall, Brantford, will be received up to noon on WEDNESDAY, APRIL 27TH, for extensions to King Edward and Ryerson Public Schools.

Tenders must be accompanied by an accepted cheque, of not less than five per cent. of the amount of said tender.

Plans, specifications and all information can be had at the office of George W. Hall, architect, 321 Colborne Street,

A. K. BUNNELL,

Secretary.

16

City of Winnipeg Electrical Distribution System

Tenders for Conduit and Sub-Stations

Sealed tenders on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope "City of Winnipeg Electrical Distribution System—Tender for" will be received at the offices of the undersigned up to 11 a.m., on MONDAY, 16TH MAY, 1910, for the following items:—

No. 51. Conduit.

No. 52. Construction Conduit Runs, 1910.

No. 53. Sub-station Transformer and Switching Apparatus.

Copies of the plans, specifications, and forms of tender will be obtained at the Power Engineer's Office, Carnegie Library Building, Winnipeg.

These specifications may also be examined at the offices of Messrs. Smith, Kerry & Chace, Confederation Life Building, Toronto, Ont.

Each tender must be accompanied by a certified cheque, as set forth in the "Instructions to Bidders" which cheque will become forfeit to the Corporation in the event of the successful tenderer refusing or neglecting to sign a satisfactory contract when called upon so to do.

The City reserves the right to reject any or all tenders, or to accept any bid which shall appear advantageous.

M. PETERSON,

Secretary.

Office of the Board of Control,
Winnipeg, April 14th, 1910.

17

City of Brandon

Sealed tenders will be received by the City Clerk, Brandon, Manitoba, "Endorsed Tender for Road Roller," until 12 o'clock noon on MONDAY, THE 25TH DAY OF APRIL, inst., for a Steam or Gasoline Road Roller, weight 12 tons.

Proposals must contain full specifications. Roller to be delivered f.o.b. Brandon, freight and duty paid.

The lowest or any tender not necessarily accepted.

R. E. SPEAKMAN,

City Engineer.

Brandon, April 9, 1910.

16

Town of Sault Ste. Marie, Ont.

Notice to Contractors

Sealed tenders will be received by the Town Clerk, C. J. Pim, addressed to T. E. Simpson, Mayor, Sault Ste. Marie, Ont., endorsed "Tender for Cement Walks," up till noon on MONDAY, MAY 2ND, 1910, for the furnishing of all materials for, and the construction of approximately One Hundred and Thirty-Eight Thousand (138,000) square feet of Cement Concrete Sidewalk.

Specifications and instructions to bidders to be seen at the office of the Town Engineer, Town Hall, Sault Ste. Marie, Ont., on and after April 15th, 1910.

The lowest or any tender not necessarily accepted.

T. E. SIMPSON, Esq.,

Mayor.

W. F. GRANT, C.E.,

Town Engineer.

17

The City of Calgary

Tenders will be received by the Commissioners of the City of Calgary up to and including the 22ND DAY OF APRIL, 1910, at 4 o'clock p.m., for the construction of the following works, according to plans and specifications to be furnished by the City Engineer:

Five miles of sewer, including pipe,

Three miles of water mains, city supplying pipe.

A marked cheque for \$500 to accompany each tender.

A bond of maintenance for one year signed by a satisfactory surety company to be delivered when work is completed.

The lowest or any tender not necessarily accepted.

H. E. GILLIS,

City Clerk.

Dated at Calgary, 17th March, 1910.

16

City of Vancouver

Tenders for

Garbage Destructor Plant

Tenders will be received by the undersigned up to 3.00 p.m., TUESDAY, THE 31ST OF MAY, 1910, for the installation of a Garbage Destructor Plant at the Bridge street yard, on the south side of False Creek in the City of Vancouver, British Columbia. The plant must be capable of destroying not less than seventy tons of mixed garbage per day of twenty-four hours.

Tenderers will be required to submit plans and specifications with their proposals and furnish a satisfactory bond and guarantee that the destructor will fulfill all the provisions of the specifications.

The tendered price is to include the erection of the stack and all necessary buildings.

A deposit of an amount equal to 5 per cent. of the contract price must be made with each tender by marked cheque payable to the City Treasurer.

The lowest or any tenders not necessarily accepted.

W. McQUEEN,

City Clerk.

19

PLANT FOR SALE

One No. 3 Gates crusher, complete.
Three revolving stone screens.
110 elevator buckets.
One 70 h.p. loco fire box boiler.
One 30 h.p. loco fire box boiler, on wheels.
One 25 h.p. loco fire box boiler, on skids.
One 12 h.p. "Champion" boiler and engine.
One single drum Buffalo horse power.
One double drum horse power.
26 pairs 18 inch car wheels with axles, 3 foot 6 inch gauge, with boxings.
A lot of derrick castings and irons.
Wire guys.
One piece of shaft, 3 7 16 inch by 13 feet 9 inches.
One piece of shaft, 2 15 16 inch by 12 feet.
One D S D Steam Hoist.
Some belt pulleys.

J. C. INGLIS,

Hageraville, Ont.

16.

Town of Weyburn Province of Saskatchewan

WATER WORKS AND SEWERAGE WORKS

Sealed tenders will be received by the Secretary Treasurer of the Town of Weyburn, until 8 p.m. on WEDNESDAY, APRIL 27TH, 1910, for the following works:—

Contract "A"—Pipelining on the Sewerage System.

Contract "B1"—Water Works Pump House.

Contract "B2"—Power House.

Contract "F"—Mechanical Water Filters.

Contract "G"—Water Works Pumping Machinery.

Contract "S"—Sewer Pipes.

Contract "W"—Furnishing Wooden Stave Pipes.

Contract "X"—Sewage Disposal Works.

Plans and specifications may be seen at the office of the Chief Engineer, Toronto and Winnipeg, and at the Town Hall, Weyburn.

K. H. SMITH, Esq., M.D.,

Mayor,

Weyburn, Sask.

GEO. ROSS, Esq.,

Secretary-Treasurer,

Weyburn, Sask.

WILLIS CHIPMAN, C.E.,

Chief Engineer,

Winnipeg and Toronto,

16

St. Augustine's Seminary

Tenders Wanted

Sealed tenders will be received, separate or in bulk, by the undersigned until 12 o'clock noon on WEDNESDAY, APRIL 27TH, for the Masonry, Reinforced Concrete Construction, Terra Cotta and Artificial Stone Work required in the erection of St. Augustine's Seminary on the south side of the Kingston Road, near Toronto.

Plans and specifications may be seen at the office of the architect, and also at the office of Rowan & Connor, consulting engineers, 36 Toronto Street.

Each tender must be accompanied by a marked cheque equal to five per cent. of the amount of tender, and security to the extent of one third of the amount of contract will be required for the faithful performance of the contract.

The lowest or any tender not necessarily accepted.

ARTHUR W. HOLMES, Architect.

10 Bloor St. East.

16

Positions Wanted

Advertisements under this heading cost one word per insertion. \$1 No test extra.

ARCHITECT'S MANAGING ASSISTANT 16 years, first class experience (London and Glasgow), used to taking full charge, drawing, etc. well up in books, office blocks, domestic, etc. Further particulars—Hunter, 53 Thornwood Drive, Glasgow, Scotland.

16

Tenders for Sewer and Water Pipe

Tenders will be received by the City of Fernie, B. C., up to MAY 6TH, for supplying the city with the following material: Five miles Sewer Pipe, $2\frac{1}{2}$ miles Water Pipe, with appurtenances, according to specifications of the city engineer.

The lowest or any tender not necessarily accepted.

R. POTTER, ESQ., City Engineer.
G. H. BOULTON, ESQ., City Clerk.

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE—Eighty-eight (88) pieces of Lackawanna Steel Sheet Piling, twenty-two (22) feet long, twelve and three-quarter (12 $\frac{3}{4}$) inches wide, three-eighths ($\frac{3}{8}$) inch thick, WM. LESSLIE, Walkerville, Ont. 18

Miscellaneous

(Continued from page 27)

brick store, Sparks street, \$3,000; A. J. A. Coburn, brick veneer dwelling, Russell avenue, \$3,000; Mark Wilson, brick veneer dwelling, Hamilton avenue, \$2,500; Donald Fraser, five detached dwellings, Forest street, \$3,150 for all; Martin Rosenthal, solid brick dwelling, Clewom avenue, \$5,000; C. E. McDongal, brick veneer addition to dwelling, Besserer street, \$2,500; Geo. Spratt, brick veneer dwellings, Spadina avenue, \$2,000; Albert Blyth, brick veneer dwelling, Park avenue, \$4,300.

Niagara, Ont.

Tenders addressed to the Secretary of the Militia and Council Headquarters, Ottawa, will be received until April 27th for the construction of an earth stop butt for the new rifle range here. Eugene Fiset, colonel.

Regina, Sask.

By-laws have been given their preliminary readings providing for an expenditure of \$415,000, distributed as follows: Sewers, pavements, \$115,000; sidewalks, \$10,000; children's shelter, \$10,000. These will be presented to the ratepayers for ratification at an early date.

St. Thomas, Ont.

The by-laws to loan the Norsworthy Company \$10,000 to manufacture furnaces, and the Nursery Shoe Company \$15,000 to start a shoe factory, both passed.

Toronto, Ont.

Recent building permits include: R. A. Nisbitt, 2 sty. and attic brick dwelling, S.E. cor. Dunvegan & Heat, \$6,200; T. Gibson, 2 1-2 sty. brick dwelling, on Roxborough St. E., \$8,000; Wm. Prince, 1 pr. semi-det. 2 sty. brick dw., Gladstone, \$4,000; W. A. Levy, 2 1-2 sty. brick dwelling, near Forest Hill, \$7,000; G. L. Thompson, 3 att. & E pr. 2 sty. brick dw., on 256 to 264 Beatrice, \$10,000; G. Henry, 2 sty. brick dwelling, Rusholme, \$5,000; R. Dale, 2 sty. brick dwelling, on 28 Castle Frank Ave., \$4,000; B. H. Fraser, 10 att. 2 sty. brick dwellings, Logan, \$13,000; Ed. Carmichael, 1 pr. semi-det. 2 sty. brick dw., Fairview, \$4,000; H. Ransome, 1 pr. semi-det. 2 sty. brick dw., on E. S. Lansdowne, \$4,000; Miss M. Macdouball, 2 sty. brick dwelling, on Foxbar road, \$6,000; H. Francis, 1 pr. semi-det. 2 1-2 sty. brick dwellings, \$4,600; R. H. Bullen, 3 sty. brick apartments, Maitland, \$6,000; Geo. Bridgen, 2 1-2 sty. brick dwelling, Dunvegan, \$7,000; Fred. Nicholls, 5 sty. brick warehouse, on 218 King St. W., \$34,000; W. J.

Greenaway, 2 1-2 sty. brick dwelling, near Dunn, on King, \$5,000; J. Hind, 2 sty. brick dwelling, near Queen, on Herbert, \$4,000; Malloy & Bryans, 1 pr. semi-det. & attic brick dwellings near Oundas, on Ritchie \$5,000; A. W. Phillips, 3 sty. brick dwelling, near Clendonwin, on Evelyn, \$4,500; O. Hoover, 2 1-2 sty. brick dwelling, near Avenue road, on N.S. Lynwood, \$5,000; Ely Switzer, 1 pr. semi-det. 2 sty. brick dwellings, Crawford, \$4,000; W. A. Forster, 3 att. 2 sty. brick dwellings, on 99-103 Anne, \$6,900; H. P. Hillman, 1 pr. semi-det. 2 sty. brick dwellings, Aberdeen, \$5,000; Geo. Birdsall, 2 det. 1-2 sty. brick dwellings, \$8,000; T. J. Brown, 3 pr. semi-det. 2 sty. brick dwellings, Dundas, \$12,000; W. H. Parker, 1 pr. semi-det. 2 sty. and attic brick dwellings on Logan, \$4,500; Jas. Stewart, 1 pr. semi-det. 2 sty. and attic brick dwellings, Crawford, \$4,600; H. E. Simpson, 1 pair semi-det. 2 1-2 sty. brick dwellings, Walter, \$6,200; W. Allen, 2 det. 2 1-2 sty. brick dwellings, Wright, \$6,000; H. H. Halls, 2 sty. and attic brick dwelling, on corner Ridout and Indian crescent, \$4,500; H. M. King, 2 prs. semi-det. 2 1-2 sty. brick dwellings on 120-126 Sunnyside, \$9,000; V. Gianelli, alterations to hotel, on Queen and Gladstone, \$8,000; Wm. Maffey, 1 pr. semi-det. 2 sty. brick stores and dwellings, Broadview, \$4,600; F. G. Smith 2 det. 2 1-2 sty. brick dwellings, Rose Hill Ave., \$6,000; W. W. Holtz, 3 det. 2 sty. roughcast dwellings, brick fronts, on 19-21-23 Dingwall, \$4,500; N. C. McEachern, 1 pr. semi-det. 2 sty. brick dwellings, on 54-56 Wineva, \$4,000; C. A. Jones, 1 pr. semi-det. 2 sty. brick dwellings, Fairview, \$4,000; J. J. Tracey, 1 pr. semi-det. 2 sty. brick dwellings, Lansdowne, \$4,000; J. J. Walsh, 2 det. 2 1-2 sty. brick dwellings, on 118-120 Dowling, \$6,400; D. E. Moore, 3 att. 2 sty. brick dwellings, on N.S. Wallace, \$6,000; Robertson Bros., 4 sty. brick addition to factory, on 109-111 Queen St. E., \$5,000; T. A. Duggan, 2 sty. and attic brick dwelling, on S.S. Wellesley, \$5,000; C. D. Smith, 2 pr. semi-det. 2 1-2 sty. brick dwellings, Woodlawn, \$12,000; E. M. Ochldrick, 2 sty. brick apartments, corner High Park and Indian road, \$10,000; H. Denison, 2 sty. brick dwelling, on 135 Springhurst, \$4,000; Grant & Ward, 1 pr. semi-det. 2 sty. brick dwelling on 33-35 Parkway, \$5,000; J. J. Walsh, J. pr. semi-det. 2 1-2 sty. brick dwellings, on 1490-2 King St. W., \$6,000; Geo. Phillips, 3 att. 2 1-2 sty. brick dwellings, NW. corner Winchester and Sackville, \$7,000; Mr. Oliphant, 1 pr. semi-det. 2 sty. brick dwellings, on Walter street, \$4,000; T. W. Murray, 3 pr. semi-det. 2 sty. brick dwellings, Grafton Ave., \$12,000.

Victoria, B.C.

Building permits have been issued to C. M. Cookson for the erection of a three storey brick building on Pandora avenue, \$8,000; Switzer, two storey six room dwelling on Battery street, \$3,400; W. Warburton, for a one storey six roomed dwelling at the corner of Cook and Pendergast streets, \$2,600.

Vancouver, B.C.

Tenders are being called until May 31st for the installation of a garbage destructor plant. See advertisement in this issue.

Recent building permits include: T. H. McKay Company, Limited, frame sash and door factory, 2466 Glen drive, \$12,500; S. Tamura, alterations, Granville street, \$5,000; Oliver & Wilson, two frame dwellings, 214 and 204 Twelfth avenue, \$5,000; Mr. Mutch, 2636 Yukon street, \$4,500 G. Tyson, 2029 Turner street, \$2,500; J. S. Chisholm, 1957 Seventh avenue east, \$5,200; W. W. Welsh, Pender street, \$2,000; M. J. Henry, Westminster road and Fif-

teenth, \$3,500; R. F. McKenzie, 1330 Lakewood drive, \$2,000; D. S. Baynes, 1569 Twelfth avenue, \$3,000; S. Chalwin, Point Grey road, \$5,500; M. T. Morrison, 1122 Semlin drive, \$2,200; F. Baylis, 1620 yew street, \$2,500; W. Hunter, 757 Twelfth avenue, \$2,000; Whicker & Ives, 254 Fourteenth avenue, \$2,000; Wicker & Ives, 2173 Sixth avenue west, two houses, \$4,000; S. P. Gilbert, 549 Fourteenth avenue east, \$2,000; N. J. Davis, 1234 Twelfth avenue east, \$2,000; Mrs. Wright, 1566 Eleventh avenue east, \$2,000.

Recent building permits include: M. & A. Tucker, Vernon street, \$2,000; J. Morley, Seventh avenue, \$4,500; W. C. McKinn, 215 Sixteenth avenue east, \$3,000; S. Armour, 1968 Sixth avenue west, \$2,000; H. B. Walsh, 1816 Arbutus street, \$2,000; Dr. Symington, 2305 Eighth avenue west, \$3,500; Coffin & McLennan, 1035 Eleventh avenue west, \$3,500; Hopps, 123 Twelfth avenue west, \$3,600; Annie Morrison, 2837 Third avenue west, \$2,000; Miss Maud Schumunger 2337 First avenue, \$6,800; M. B. King, 1534 Harwood street, \$7,500; John Taylor, 1329 Walnut street, \$2,500; J. Skeffington, 1223 Victoria drive, \$2,450; S. Falck, 2063 Third avenue west, \$6,600; Mrs. Powell, 2820 Spruce street, \$2,626; W. J. Herrington, 1106 Thirteenth avenue west, \$12,000; W. W. Brehaut, 1228 Maple street, \$4,000; F. Bayliss, 1118 Arbutus street, \$4,000; Mrs. Cleator, 2931 Scott street, \$3,000; George Simons, Hastings street east, \$13,000; G. C. Ossenger, 2616 Clark drive, two houses, \$3,100; W. W. Ross, 1816 Alberni street, \$3,000; L. P. Newton, 1054 Pender street, \$4,000; M. G. Oliver, 1255 Fourteenth avenue west, \$2,500; S. MacLennan, 2033 Semlin drive, three houses, \$7,500; G. Wilbur Smith, frame dwelling 2335 Ontario street, \$3,000; Dominion Government, alterations, Pender street, \$10,000; Chas. Phillips, frame dwelling, 2476 Fifth avenue, \$2,500; W. C. Fisher, frame dwelling (4) 2349 Keith street, \$6,400.

Waldron, Sask.

Tenders are being called until May 2nd for purchase of \$5,000 5 per cent. 15-year debentures.

Winnipeg, Man.

Recent building permits include: J. F. Parker, four dwellings, Aubrey street, \$8,000; J. Thom, Rosedale avenue, dwelling, between Nassau and Pembina streets, \$7,500; W. J. Armstrong, dwelling, Horne street, \$2,500; J. D. Ormsby, dwelling, Campbell street, \$5,000; W. McIntosh, dwelling, Home street, \$4,200; Simpson and King, dwelling, Horne street, \$7,000; J. Eggertson, dwelling, Lipton street, \$5,000; F. C. Woodcock, house, west side Nassau, \$2,250; Arni Egertson, store, south side Sargent, \$4,500; W. J. Hood, house, east side Chestnut, between Buell and Ida, \$15,000; W. E. Webb, house, north side Elgin, \$3,000; Harry Fisher, dwelling, Casey, \$3,600; H. Dilts, dwelling, Jessie; J. G. Chapman, dwelling, McMillan, between Aynsley and Lilac, \$3,000; Cooper and Bodman, dwelling, corner McPhillips avenue, \$2,000; C. P. R. warehouse, southeast corner McPhillips and Jarvis, \$3,000; W. W. Chislett, dwelling, Jubilee, \$3,500; D. Boyce Sprague, dwelling, McMillan, \$12,500; Mrs. W. C. Perry, dwelling, Mac street, \$3,300; T. D. Lawrason, brick dwelling on Cottage avenue, near Aberdeen avenue, \$2,000.

AWARDED.

Hamilton, Ont.

Hamilton Stamp & Stencil Works for enamel street signs, blue background 3 1-2 inch white letters as per sample, at 32 1-4 cents. Approximate number required, 1,400.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

PUBLISHED EACH WEDNESDAY BY

HUGH C. MACLEAN, LIMITED

HUGH C. MACLEAN, Winnipeg, President

T. S. YOUNG, Business Mgr. JAS. FISHER, Advt. Mgr.

HOME OFFICE - Confederation Life Building, TORONTO
Telephone Main 2362

F. W. SCHERBARTH, Representative

MONTREAL Telephone Main 2299 B34 Board of Trade
HERBERT B. MUIR, RepresentativeWINNIPEG - Telephone 224 404 Travellers' Bldg.
R. F. HILL, J. R. HOOPER, RepresentativesVANCOUVER Tel. 2010 26 Crowe & Wilson Chambers
J. V. McNAULTY, RepresentativeLONDON, ENG. - 3 Regent St., S.W.
W. A. MOUNTSTEPHEN, Representative

SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24 Toronto April 20, 1910 No. 16

Building Statistics and Trade Conditions

The building statistics published in this issue should strengthen the confidence of all who are in any way interested in the field of building and development throughout Canada.

General commercial conditions could hardly be better than at present and the prospects are excellent. The situation in regard to labor is not wholly developed, but if there is any tendency it is towards improvement. A few demands for increases have been mentioned already and more have been intimated. Whether this will be the sum total will depend, of course, largely upon the amount of labor available. It is to be hoped that contractors will not have to accept all kinds of men regardless of qualifications and fitness.

There is a stiffening movement in all lines of building materials. Common brick is scarce, with Toronto prices ranging from \$9.50 to \$10.50. The situation will be relieved, temporarily at least, when fresh supplies come in next month. For red and buff pressed, prices are \$17 at works and \$18 delivered. A scarcity of sewer brick is noted. City Engineer Rust reports delay on section 5 of the trunk sewer owing to this cause. There is a good demand all round for lumber. At Winnipeg, pine and fir products are quoted at \$2 or \$3 a thousand higher than was asked at the beginning of the year. Supply dealers in the latter city are working overtime. Their chief concern, also, at present, is a shortage of brick. The same complaint is made at other points, notably at Fort William, Brandon and Calgary.

Cement is quoted at Toronto at \$1.75 a barrel, and in 1,000 barrel lots, \$1.60. For barrel lots in bags, delivered, the price is \$1.90, bags extra. The Montreal quotation for car lots, f.o.b. Montreal, is \$1.30 to \$1.40 per barrel of 350 pounds, bags extra.

To those who are still lacking in confidence—and they are always to be found—we would point to the reports contributed by city officials and others and reprinted in this issue. After reading these a man can come to but one of two conclusions: either that 1910 is going to be a record-breaker or that the aforementioned city officials and others are void of all moral worth and responsibility.

Completion of Work Within Time Limit

One of the penalties of a busy season is the increasing tendency to delay in the progress of work under way. Complaints are not infrequent of contractors on street work allowing construction to drag long after the time set in the contract for completion. There is a penalty existing in most contracts, but contractors often request an extension of time and a waiver of the penalty which leads to vigorous objection. Any contractor of experience knows that it is not always possible to avert delays, which are caused by belated supplies or other interferences.

It is not uncommon for officials to demand the completion of the work in a shorter time than is practicable, with an understanding that no particular objection will be raised if the work is not done within the limit. Too much chance is being taken in allowing contracts to be dragged out interminably, and it is apt to cause a great deal of trouble. Every possible step to hasten the work should be taken, and everything done to anticipate needs. This will give those who are delayed an opportunity to show their good faith to the uttermost in the work, and should help materially in convincing boards of their right to ask for the desired extension of time.

Provide Against Possibility of Increased Cost

Now that the active building season has started there comes the probability that there will be numerous minor increases in cost of materials and to some extent upon labor, the latter being undetermined as yet. Architects and builders will do well to remember this fact in making estimates upon new work, for it is an uncomfortable fact that an owner will admit numerous changes in plans, but seldom will admit an increase in the cost of the proposed structure. Estimates should therefore be based with some leeway to allow for possible increases, without causing the figure to show materially in excess of the original price.

Brick manufacturers in conjunction with the labor unions of Minneapolis, Minn., have succeeded in preventing contractors from taking advantage of the cheaper prices at which convict-made bricks are offered, and in consequence about 2,500,000 prison-made brick are awaiting their fate at the city workhouse.

1910 Promises to be Record Building Year

Statistics for Three Months Show an Appreciable Gain over First Quarter of 1909—An Approximate Increase of 65 per cent.

While the building statistics for the first three months of the year reflect the least activity of any quarter, the accompanying comparative figures are of interest in that in most cases they indicate appreciable advances over the similar period of 1909, which was considered an exceptionally good year. In some cases, of course, a heavy increase in percentage may indicate only a relatively small volume of business, but on the whole the advances mark what may be termed by our Canadian standard,

lines and the conditions of their respective business admit of no cursory comparison.

Notable increases are made at Regina, Sask., 386 per cent., and Saskatoon, Sask., 785 per cent. Regina is particularly active this season and is sparing no effort to direct the attention of capitalists to its many advantages. As stated in a recent issue, a scarcity of labor is anticipated in this city. This is at present the only cloud on the horizon. Regina is certainly worth watch-

Town or City	Mar. 1909.	Mar. 1910.	1st quart., 1909.	1st quarter 1910.	Approx Increase % 1st quarter.
Vancouver, B. C.	\$ 800,250	\$1,808,766	\$1,575,535	\$3,320,872	111
Toronto, Ont.	1,703,840	1,583,165	2,936,900	3,125,693	6.4
Winnipeg, Man.	861,200	2,526,350	1,070,000	3,031,950	183
Montreal, Que.	376,275	676,804	731,725	1,093,244	49
Victoria, B.C.	121,640	243,010	322,300	525,005	63
Regina, Sask.	72,730	329,650	78,795	382,490	386
Ottawa, Ont.	144,125	219,350	234,965	374,200	59
Hamilton, Ont.	172,350	289,390	195,900	346,040	77
Edmonton, Alta.	179,395	264,435	312,035	337,555	8
Saskatoon, Sask.	29,400	250,275	35,100	310,525	785
London, Ont.	69,095	139,700	164,280	221,832	35
Lethbridge, Alta.	77,035	133,220	116,965	201,305	72
Fort William, Ont.	56,000	91,575	388,675	161,190	59*
Strathcona, Alta.	13,700	113,575	13,700	115,025	740
St. John, N.B.	9,350	48,250	18,650	94,750	408
Halifax, N.S.	109,490	43,800	147,505	88,975	40*
Moose Jaw, Sask.	7,950	58,825	7,950	69,875	778
Sherbrooke, Que. ....	.....	.....	50,000	60,000	20
North Vancouver, B.C. ....	.....	11,800	9,000	48,750	442
Windsor, Ont.	40,125	27,225	62,700	37,975	39*
Brandon, Man.	5,000	27,060	6,000	29,385	390
Stratford, Ont.	9,561	13,310	14,486	21,570	49
Sydney, N.S.	3,540	17,935	9,040	20,910	131
Kingston, Ont.	15,000	14,850	31,200	20,875	33
Peterborough, Ont.	5,965	10,327	9,160	17,477	91
Lindsay, Ont.	2,200	5,600	3,300	12,800	288
Port Arthur, Ont.	1,200	5,360	1,700	5,360	215
Collingwood, Ont.	3,500	4,600	4,200	4,800	14

*Decrease.

natural growth. In most of the large cities, a feature of the season is the number of large projects under way and contemplated.

The accompanying statistics are arranged in the order of magnitude for the first three months of 1910. The records made by Vancouver and Winnipeg are excellent. Vancouver's position at the head of the list with a total approaching three and a half millions and an approximate increase of 111 per cent., will be an especial source of gratification to many people allied with building and contracting interests who have been making a special effort to develop this territory during recent years, and it is a significant indication of what may be expected in the busier part of the season. Compared with the figures established by Winnipeg, Toronto's increase of 6.4 per cent. appears to small advantage. The east and the west, however, are progressing along somewhat different

ing. Ottawa and Hamilton's increase of 59 per cent. and 77 per cent. respectively, furnish incontestable evidence that progress is not confined exclusively to western Canada. The accompanying reports substantiate the optimistic character of our review, which is further supported by a percentage gain for Canada of 65.

Conditions and Prospects throughout Canada

Vancouver, B.C.—S. H. Jarrett, building inspector: "There is every prospect of a very busy year in this city. I feel confident that Vancouver will lead the continent in the per capita value of buildings."

Toronto, Ont.—P. L. Fraser, secretary Builders' Exchange: "The feature of the building situation in Toronto this season is the increased amount of work in larger structures and important buildings. In the smaller class of work there is as much activity as last year. At present there is nothing in sight likely to hold up building operations so far as materials

are concerned, excepting perhaps brick, which promises to be more or less scarce all the season. Little trouble is apprehended from labor sources. The bricklayers, stonemasons and plasterers have agreements which will carry them through the year. The carpenters have been offered an increase of about 6 per cent. and this increase is likely to mark the prevailing rate for the season. The Master Painters' Association, which supports the open shop principle, have received demands for an increased rate, but it is not likely that the union will obtain an agreement. There is noteworthy activity in real estate. This is likely to have a stimulating effect upon building."

Winnipeg, Man.—Our Winnipeg correspondent writes: "1910 is the greatest year that western contractors have ever experienced. In this city, more than at any other western point, excepting perhaps Vancouver, the expansion is particularly noticeable. Building prospects materialize and other projects arise in a manner that gives undeniable proof of a new era of prosperity. Labor troubles thus far have been singularly absent. The latest discussion in trade union circles is the possibility of increased wages for the painters. The present minimum scale is 30 cents an hour, and the men

Montreal, Que.—Alcide Chausse, building inspector: "Building prospects are very good. A number of important projects will be carried out this year and architects generally are busy preparing plans for industrial and office buildings, apartment houses, residences, etc."

Regina, Sask.—H. C. Lawson, secretary Board of Trade: "The percentage of increase in building from month to month is a good estimate of a city's prospects. It will be seen that the increase for the first quarter in 1910 over the similar period of 1909 is no less than 386 per cent. That for March, 1910, over March, 1909, is 350 per cent. A large proportion of the permits taken out this year were for high class dwellings and substantial business blocks. Out of 51 permits issued, 38 were for residences. With a continuation of the present conditions 1910 will be a record-breaker for Regina."

Edmonton, Alta.—John D. MacKinnon, building inspector: "Prospects in every line of building and development are particularly good. 1910 should be a very busy year."

Saskatoon, Sask.—Our western correspondent writes: "Building permits continue to mount up steadily in this city. The increase for the first three months of 1910 over the same period of 1909 is typical of the progress being made in this part of the country. Some of the more optimistic ones think that the total for the year will reach three million dollars. When the proposed university, new schools and projected commercial and residential buildings are considered, this large figure will be pretty well accounted for. An important feature of the situation is the large number of substantial residences projected and under way."

Fort William, Ont.—S. Maenamara, building inspector: "The Union Depot at the moment heads the list of work in hand. \$250,000 will be expended on this building by completion. There are in course of erection a large number of private residences, at double the estimated cost for the same class of building over the corresponding period of last year. The architects have plans for some very fine residential property ranging in value from \$20,000 down. The prospective work for this summer includes the Seaman-Kent building at an estimated expenditure of \$150,000, the International Harvester Company's building, \$250,000, a large addition to the C.P.R. machine shops, two bridges, docks and slips, also a theatre, hotel, large automobile garage and several business blocks. Altogether the prospect looks exceptionally good and it is anticipated there will be a very busy season in and around the city."

North Vancouver, B.C.—Thomas Shepherd, city clerk: "The present season will doubtless far exceed any previous year in

regard to building operations. It is noteworthy that a large number of investors are establishing their homes in this city. The demand for houses available for tenancy is far in excess of the supply. North Vancouver possesses enviable advantages for residential purposes and we are anticipating a record year."

Windsor, Ont.—Mr. G. W. Freeman, secretary Builders' and Contractors' Association: "The building business never before gave so much promise as it does now. We thought last year was good, but the prospects for 1910 are away ahead of those for 1909 at the same period. Windsor is on the eve of a building boom. A sufficient number of mechanics is not available for the work in hand." are asking for a minimum of 40 cents. This increase sounds rather unreasonable. Most of the contractors have signed up with the carpenters, masons and other trades on the schedules which prevailed last fall."

Brandon, Man.—Our western correspondent writes: "If the earliness of the season and the size and class of the projected buildings and those in course of construction can be taken as a fair criterion, it is safe to say that 1910 will eclipse any other year in the history of the city, at any rate, as far as the building industry is concerned. Many important projects are contemplated. Important additions will be built to several factories and warehouses. The Hanbury Manufacturing Company announce that they will double the capacity of their whole establishment, including factories, mills, warehouses and offices, and install a great quantity of new machinery. Clement Bros. have started the erection of a modern business block. Several large commercial buildings will be erected on Tenth street. The city will probably build a new fire hall this year."

Stratford, Ont.—P. H. Myers, building inspector: "We expect this to be a good year. A good quantity of material is on hand and some pretty fair contracts have already been let. Prospects are good."

Sydney, N.S.—D. Campbell, building inspector: "The outlook for the building trade in this locality is very promising. Building permits during the first week of April included those for the St. Andrew's Church, to cost \$42,000, and a new fire station, to cost \$14,900."

North Bay, Ont.—N. W. Flannery, town clerk: "Prospects for the building season are very good. Plans have been prepared for several business blocks and the erection of a great number of private residences is contemplated."

Goderich, Ont.—L. L. Knox, town clerk: "We are looking forward to a very busy year. Among the buildings under way or contemplated may be mentioned the new public school, to cost \$25,000; the 500,000 bushel concrete annex for the Goderich Elevator & Transit Company, and the 500,000 bushel elevator for the Western Canada Flour Mills Company. In addition to these works, the Government will spend \$80,000 on harbor improvements and \$10,000 on the extension to the postoffice. A large amount of residence work is projected. The Ontario West Shore Electric Railway, from Goderich to Kincardine, is now under construction."

Port Arthur, Ont.—J. McTeigue, city clerk: "As there were no regulations governing permits outside the fire limits, until March 29, 1910, our building statistics are not of very much value for purposes of comparison. The fire limits comprise but a small area of the city, and the greater amount of building was carried on outside these limits."

Red Deer, Alta.—A. T. Stephenson, building inspector: "There is every indication of increased activity this season. The Canadian Pacific Railway Company have called for tenders for a new \$20,000 depot. The Canadian Bank of Commerce have plans out for a new bank building, and a number of modern houses are to be built this summer. The town is building cement sidewalks along the principal business streets."

Square Garments, Limited (overall and shirt manufacturers), have purchased lots on which they are going to build a factory employing about 30 hands. The Vanslyke Plow Manufacturing Company have rented premises to commence operations, and will probably build a factory later. The Alberta Grain Company purpose building a warehouse. The public school board is remodelling the old school for a high school building."

Collingwood, Ont.—J. H. Duncan, town clerk: "The prospects for 1910 appear very bright. The Shipbuilding Company have extensive plans on hand. They have a contract for a large steel freighter which will bring about 2,000 people into the town. A considerable amount of work that was undertaken last fall is now being finished."

Virden, Man.—From a builder's and contractor's standpoint, 1910 promises to be the best year in the history of the town. Dealers in supplies report numerous inquiries. A season of unprecedented building activity is anticipated in this vicinity.

Woodstock, Ont.—John Morrison, city clerk: "Prospects for 1910 are good. We have two new ward schools under contract and there is talk of erecting a new city hall. The average amount of private building is under way."

Chilliwack, B.C.—J. H. Ashwell, city clerk: "Building conditions are very brisk this year and the prospects exceedingly bright on account of the extension of two railways and tram line into this city."

Dartmouth, N.S.—R. Eccles, secretary Board of Trade: "There are no building operations being carried out on a large scale in this vicinity. About 40 houses were erected in this town last year, and that is about the number likely to be erected during 1910. We have no building statistics, as permits are not required."

Kamloops, B.C.—J. J. Carmen, city clerk: "The value of buildings erected during 1909 was about \$70,000. Two buildings already started during 1910 are worth about \$45,000. We are looking for a noteworthy increase during 1910."

New Westminster, B.C.—W. A. Duncan, city clerk: "Building conditions and prospects for the present year are exceptionally good. A feature of the situation here is the activity in real estate. A building by-law is now in preparation. When this comes into force proper building statistics will be available."

Hints on Constructing Cement Sidewalks

The following hints have been taken from a paper by Mr. N. E. Murray, presented at the last annual convention of the Illinois Society of Engineers and Surveyors:

Before constructing cement walks on a foundation that has been travelled over for several months, "pick up" the entire surface, flood and retamp it. The reason for this is obvious. On filling of this character the foot travel generally follows one well defined line, usually in the centre, which becomes solid and well packed and will not "settle" under additional weight; while the filling to either side of the centre, on being given additional weight, usually settles sufficiently to cause a crack lengthwise through the walk, unless the entire surface is loosened and retamped to a uniform density before the concrete is put on.

A successful contractor states that in cold weather he mixes the concrete as dry as it is possible to have it, and then puts in the base in two courses, tamping each course separately—in this way obtaining a more uniform density in the concretes, and as a result has never had to record a "failure" in his work. Better results will be obtained and fewer walks with loose and cracked wearing surfaces would be seen if workmen could be made to understand that a wearing sur-

face will not adhere to, or form a bond with, a base covered with loam or dirt which they have "tracked" over it either through carelessness or in order to save a few steps.

Clean cut joints between the slabs and expansion joints adjoining the curbs at streets and alley returns, and at frequent intervals in long stretches of walk, are absolutely necessary if broken curb stones and broken slabs in the walks are to be avoided. Expansion joints at street and alley returns can be eliminated by constructing the curbing with a "recess" into which the sidewalk slab may be laid.

The Selection of Wall Paper

Walls are not so extensively covered with paper now as they formerly were, but wall paper is still a favorite with many home builders, and holds a leading place in the industrial activities of the world. Its selection is, of course, largely a matter of personal taste, but there are certain rules which should never be ignored by the purchaser. "Beautiful Homes" gives these valuable hints, secured from a wall paper expert:

Large figured papers should never be used on low-ceilinged rooms. Plain colors and self-toned stripes increase the apparent height of a room, and for this reason are preferable in low-ceilinged apartments. Red or dark green papers should never be applied in a dark room. These colors absorb light, and add to the natural gloominess of the room in which they serve as decorations. Light blue or pink are attractive in a room which is flooded by sunlight, but they soon fade, thus making papering very expensive, if the home owner desires to have his walls look fresh at all times.

Where pictures are to be hung, a plain background should always be selected, and a garish paper should never be placed in a room that must be occupied by an invalid. Deep borders and ornate friezes should be avoided in small rooms. A common error is to purchase wall paper of a gaudy and novel type, which often spoils the appearance of the furniture.

Paint Required for a Given Surface

In deciding upon the amount of paint required for a given surface, the makers of paints usually advise two coats of ready mixed paint for 200 square feet of surface to the gallon. This is only approximately correct, however, because much depends on the character of the surface to be treated, and the consistency of the paint to be used. Some paints will go much farther than others. It is estimated by some experts that 18 pounds of white lead will be required to make paint to cover 200 square feet of surface. This would indicate 18 pounds of lead to a gallon of paint.

The 1910 catalogue of the J. I. Case Threshing Machine Company, Inc., Racine, Wis., contains a complete description and illustration of the up-to-date products of this concern, notable among which are the "Case" road rollers. The advantages of these machines are their compactness and simplicity in construction. They are equipped with short wheel-base to allow of short turning. Equal power is applied to both rear rollers by means of the spring differential gear. The rolling surface is 7 feet 1 inch wide. Detailed description may be found in the Case Road Roller Catalogue, which may be obtained on application to the company. Another line of special interest is the "Case" sprinkling attachment, for use in connection with the company's four-wheeled engine tender. This has been found most convenient for use in building macadam streets and roads and for other purposes, in that the wide tires do not cut into the unfinished surface of the pavement.

Methods of Laying Concrete Under Water

Detailed Description of Extensive Operations on Quebec Canal System —Construction of Five Miles of Concrete Wall Without Unwatering*

(Concluded from last issue.)

Mixing and Depositing Plant—Plate B gives the general arrangement and details of the mixing plant. The plant is shown in place and ready for operation. It will be noticed that the scow is a narrow one, and that the overhang platform carrying the mixer and receiver hopper is partly counterbalanced by the stone and sand bin. The bin had both a sand and stone compartment, the material being taken from the barges alongside by a clam operated by a stiff leg derrick placed at the other end of the scow.

Concrete Ingredients and Mixing—The clause of the specification governing the above was as follows:

"Concrete Ingredients—The concrete shall be made in the proportions of one barrel of cement, three barrels of sand, and six barrels of crushed stone, or in such other proportions as may be ordered by the engineer in charge. The sand (provided by the contractor) shall be coarse grained, sharp, and silicious, free from earthy or vegetable matter. A sample of the same which the contractor wishes to provide must be furnished to the superintending engineer before any is brought on the work. The stone ballast (provided by the contractor) shall be crushed hard grey limestone, or "banc-rouge," crushed to pass through a two-inch ring. The run of the crusher shall be used, and the crushed material must be transported and stored so that no earthy or foreign matter of any kind is intermixed. All dirty or unsuitable materials shall be removed from the site of the work as soon as ordered by the engineer in charge."

"Concrete Mixing—The concrete shall be mixed by machine only, except at isolated points, where hand-mixing may be allowed. A Smith mixer, or other approved rotary mixer, shall be used, and each batch of concrete, of the proportions stated in paragraph 5, shall be turned for at least two minutes at the regular speed of the mixer, and continuously, until it is required for the work. No concrete shall be allowed to stand until the initial set has started before it is placed in the wall, and any loss of concrete caused by the setting of the cement owing to slowness of handling, or by spilling due to careless handling, is to be borne by the contractors, who shall also pay for the cement used in each batch of concrete thus lost, etc."

This proportion was usually adhered to, except that a slight variation was made with any change in the sand or the stone provided. The usual mix was about 30 cubic feet of stone, measured loose, 13 cubic feet of sand, and $4\frac{1}{2}$ to 5 bags of cement. This rarely exceeded a yard of concrete when settled in the work.

The sand was usually from the Lake of the Two Mountains, one grade, A, being largely retained on the 50 and 80 sieves, the other, B, being considerably coarser. The latter was chiefly used. The crushed stone used was what is called Potsdam quartz, or Laurentian sandstone. It is hard, creamy white, gritty stone, apparently somewhat porous, but possessing an ideal surface for cement to cling to. The contractors for the work opened up a special quarry at Ile Perrot, where they erected an extensive storage bin, with automatic chutes, and were thus enabled to land the material on the work without delays and at a minimum of expense.

Barges holding about 200 tons were employed to carry the stone, and the barges could be filled from the bin direct in about twelve minutes. The haul was about 24 miles. The run of the crusher was always used, as is demanded by all

of the Lachine Canal specifications for crushed stone for concrete ballast, the maximum size being about 2 inches. Our experience is that, with probably one exception—viz., a hard, brittle limestone—the run of the crusher, without screening, gives a broken stone that will make the best concrete.

The maximum size of the stone specified is two inches. At times, however, with the Potsdam quartz, flat pieces, longer than two inches, passed through the crusher, and at first were rejected, but after an examination of the wall, it was found that these larger size stones gave a good bond to the mass, especially when worked near the front and at an angle to the wall. The benefit of these long pieces was seen when the wall was examined during the unwatering the following April. At the water-line where any wash occurred the larger stones projected into the mass sufficiently to permit the ballast from becoming loosened and falling down. In fact, these projecting pieces could not be moved, even with a hammer blow.

Cement—Selecting the cement proved a little more difficult than in ordinary work. A number of good Canadian brands were on hand, as usually the Lachine Canal carries a stock of from twenty to thirty thousand barrels in the sheds, but some of the brands gave more even setting results than others. In the laboratory tests these cements all set in about the same time, but varied on the work. This was largely due to the fact that the temperature of the water was changing, being warmer towards summer and colder as the autumn approached. The cement was provided by the department, but the contractors demanded a medium quick-setting cement in order that they might remove the face moulds every three days.

On one occasion, pending the letting of a new cement contract, some English cement was used. This was a first-class cement, but slower setting than the Canadian, and it was found at the end of three days that the concrete was still soft, and the mould could not be moved for a week. All of the cement used, about seventy thousand barrels, was first tested in the Lachine Canal laboratory, in accordance with the standard contract specification, and it was also tested with the sand used and under conditions approaching those of the work. Progressive tests were made with the sand as the various barges were unloaded.

Results of the Work—An examination of the work, after unwatering the canal on the April following the first season's operations, showed satisfactory results, and several points are worth noting. First, that the placing of the concrete had been continued too late in the fall (to October 24th), and as a result of the condition of the water (its low temperature) the concrete of this section, compared with the other concrete, was found to be quite weak. The concrete placed in September had set up hard, and withstood the action of the ice when the water was let out of the canal in April, but the wall placed late in October had grooves cut into it by the ice sliding down, and on this account cost the contractors a considerable sum to refinish the surface.

Second, while some portions of the wall near the water-line had been acted upon by the wash of the waves from passing steamers, and looked rough, it was very hard and firm. The projecting stone from the ballast, particularly those pieces longer than two inches, had secured such a grip in the wall that it was impossible to dislodge them.

The lower portion of the face was quite smooth, but the slope made by each section of concrete laid, as the scow was moved ahead, was discernable. It showed that sections of over eight feet before moving the plant, were too long. The top surface, usually flooded for a portion of the time after being finished, showed no signs of scumming, but a portion finished late in October one year, followed by rather severe cold in November, was found, after the snow had melted in the following spring, to have peeled to some extent. The warm sun of April, when the canal was unwatered, had the effect of hardening up any portions of the wall that had been delayed in hard set by the coldness of the water.

Laitance, or scumming, of the concrete surface, as described in a paper read before the society last year, has not been found to any extent on this work, either in the locks, basins, or in the general foundation work.

The information thus gained was made use of during the second season of the work. The scow was moved ahead about every eight feet and additional precautions taken to prevent the steamers creating such heavy wave action by making them slow down at a greater distance from the plant. The work was discontinued earlier in October, instead of waiting till the water had become too cold.

On examining the second season's operations on the following April, good results were found all along the wall, and the finish at the bottom was remarkably smooth. The ice had no injurious effect. The stone ballast was exposed in portions of the face, but only slight repairs were required. The action of the ice is one reason for making the concrete facing on the Lachine Canal so thick. About one mile of the concrete facing on the north side was laid with a view to stopping a heavy leakage through the bank. The result was entirely successful.

On the Kaiser Wilhelm Canal, where concrete had been placed on the bank in the dry, "it was noticed, even during the construction of the works, that many of the slabs had hardened only at the surface, and that a year afterwards the lower part was still soft and pasty. This was due to the fact that they were laid upon turf and other soil where there was a discharge of organic acids, which had a tendency to unite with the chalk of the cement in such a way as to make soft soap."

The conditions of the Lachine Canal were not such as to create the difficulty above described. There are no peaty

banks, although peat and marl abound in the ground back of the north bank.

A peculiar result was noticed at one portion of the wall. A cavity existed under one of the moulds which was missed by the diver. Through this the richer portions of the concrete ran out, and covered about 6 or 8 feet of the bottom of the canal to the thickness of a foot or upwards with a regular mortar. When the section was examined during the following April (1909), the above condition was found, and, strange to say, the mortar was almost in a plastic state, although the portions of the wall above, below, and opposite this point were hard. This mortar hardened up as it became exposed to the air during April, but still was unlike the rest of the wall. The inference from the above, and the rusty color of the mortar, was that, having lost the protection of the face boards, the mortar had, before setting, become affected by some of the discharges into the canal from the mill above and its setting retarded. The other portions of the wall had not been affected, as the forms protected them until the concrete had been set.

Whatever the organic matter was in these discharges from the mills, it had no injurious effects on the walls, although portions of them near the factories are highly discolored.

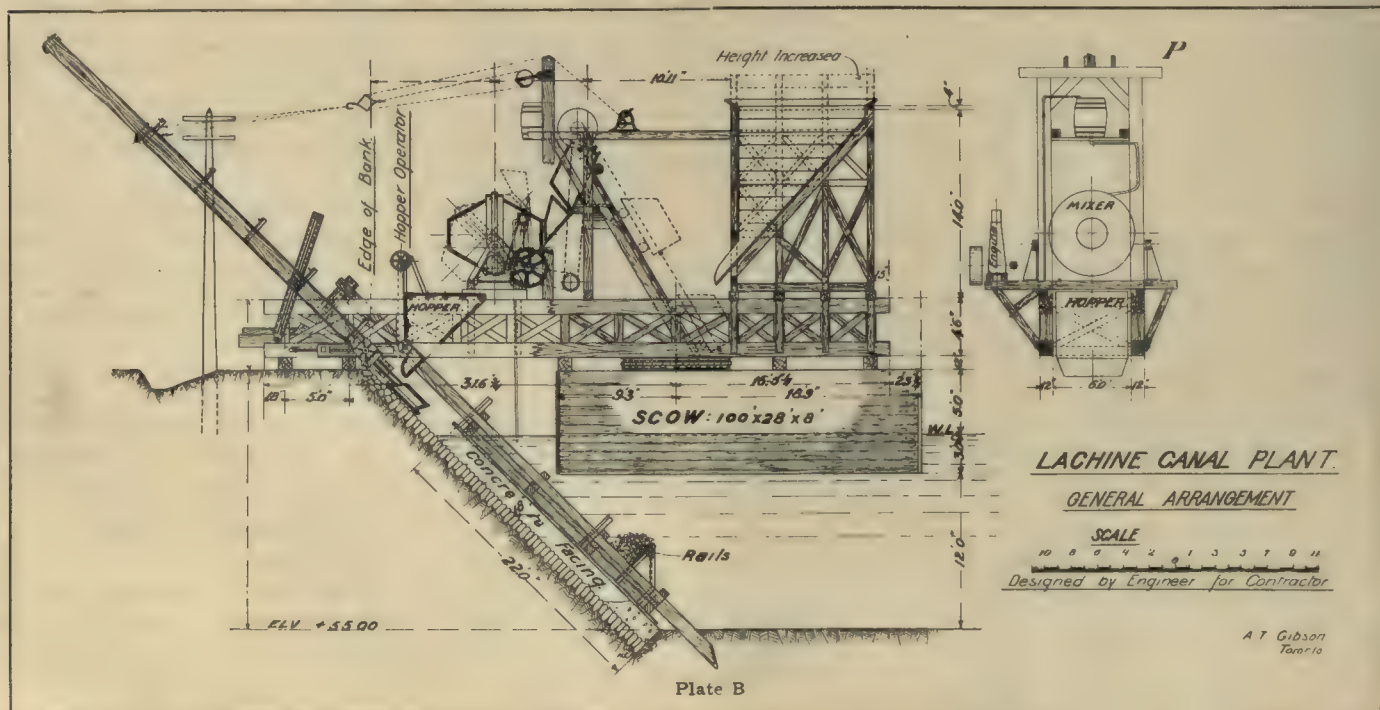
The Cost of Operating the Plant—An analysis of the cost of the work, to be of value to an engineer, must cover the details of the operating gangs required for each part of the plant, and give the results, the combined units accomplished, in a given time. The cost of materials, sand, stone, coal, oil, etc., will depend more or less on local circumstances, and need not be considered here.

The general experience is that a large plant requires a number of extra men, not usually provided for when the plant is designed. It must also be remembered that the time spent in getting ready and laying up, if the operations go over more than one season, must not be overlooked, as in many cases this is an expensive item, and unusually so with a floating plant in this country.

The gangs employed on this plant were as follows:

Lifting Scow—One foreman, four cranesmen, one diver and two assistants.

Mixing and Depositing Plant—One hoist runner, one fireman, three trimmers for stone and sand barges, one mixer operator, one man measuring and feeding materials to car, one car operator, two men handling cement from barge to



scow, one man opening cement bags, one man feeding cement to car, one operator for ram, one man operating door of bucket, and one man collecting empty cement bags.

Men Employed on Bank and Scows—One carpenter and four helpers for adjusting beam runs and rollers for moving arm of ram, one man levelling concrete surface, one foreman on barges for sand, stone, and cement, and ten men on latter.

Supervising Staff—One general superintendent, one master mechanic, two assistant mechanics, one carpenter foreman. These were all high grade men in their class, and were kept employed on the work about eleven hours each day.

The transportation plant consisted of two tugs, eight or nine barges, including covered-in barges or scows for cement storage, and a barge for coal. The cost of this part of the outfit would be probably charged up to the cost of supplies, etc., and need not be considered here. A small repair gang was generally required, and kept on call for repairing the floating plant. This latter item is one that should be carefully considered and allowed for on similar plants. Some contractors, the author has observed, neglect this, but it was not so with the contractors for this work. One good carpenter and three or four helpers should be provided for the maintenance of a plant of this kind, even if new at the start.

The capacity of the plant averaged about 200 cubic yards per day of ten hours. This was sufficient to fill in behind

the contractors on the site, and, with the author, was enabled to follow out daily the operations of the plant and the results attained.

Large Masonry Bridge

A bridge which is stated to have one of the longest masonry spans in the world has been built across the River Isonzo on the Wocheinerbahn, the new railway in Austria connecting the interior of the country with Trieste. The bridge has the following dimensions: Span, 268.9 feet; rise, 71.6 feet; radius of intrados, 172 feet; radius of extrados, 190 feet; depth of arch ring at crown, 6.9 feet; width at crown, 18.4 feet; depth of skewback, 11.5 feet; width at skewback, 26.2 feet. The bridge is provided with two viaduct approaches; the northern one is made up of one 39.4-foot and two 32.8-foot arches, while the southern one is made up of three 39.4-foot arches, two 32.8-foot arches, and one 29.5-foot arch. The bridge as a whole has a uniform grade of 0.3 per cent. The material used was limestone from the quarries near Nabresina, which has a mean compressive strength of 17,000 pounds per square inch when tested in 2½-inch cubes. The mortar used in the joints, which were uniformly about ½-inch wide, was made of one part Portland cement and three parts clean sand. The calculated "maximum" pressures in the arch were 397 pounds per square inch at the crown, 568 pounds at the skewback, and 724 pounds at the joint of highest pressure. The total amount of stone masonry and concrete in the main span was 14,200 cubic yards.

R.A.I.C. Successful

Mr. Alcide Chausse, secretary of the Royal Architectural Institute of Canada, has just been notified that the society's exhibit at the International Congress of Municipal Improvement, held recently in Barcelona, Spain, was awarded an honorary diploma. The exhibit included contributions from the City Improvement Guild, of Toronto, the Architects' Association, of Quebec, and from several landscape architects.

Hints to Non-Advertisers

The man who does not advertise because his grandfather did not, ought to wear knee breeches and a queue.

The man who does not advertise because it costs money, should cease paying rent for the same reason.

The man who does not advertise because he tried it and failed, should throw away his cigar because the light went out.

The man who does not advertise because he doesn't know how himself, ought to stop eating because he can't cook.

The man who does not advertise because somebody said it did not pay, ought not to believe that the world is round, because the ancients said it was flat.

The Power and Mining Machinery Company, Milwaukee, Wis., who make a specialty of completely equipped plants for crushing and handling rock for all purposes, have issued their catalogue No. 4, which covers in a most satisfactory manner the interesting features of design and construction of the company's various products. Noteworthy among the latter is the McCully Gyratory Rock Crusher, a detailed description of which is contained in this catalogue. The illustrations throughout are interesting and informative. The company also manufactures cement making machinery, power transmitting machinery, etc., and are prepared to design and build any equipment required for special work.

It is understood that terms have at last been arranged upon which the Exshaw Cement Company, of Calgary, Alta., will join the merger.



Finished Concrete Walls

about one length and a third of the forms used—that is, about 130 feet, lineal, of finished wall surface each day. The record is about as follows:

1907, from June 5th to October 24th	20,000 cubic yards
1908, from May 15th to October 17th	30,000 cubic yards
1909, from May 12th to June 2st (finish)	6,000 cubic yards

Total..... 56,000 cubic yards

The time from the 1st of May in each year till the date of beginning work was spent in getting the plant in commission. This bears out the remarks previously made regarding the cost of getting ready and laying up floating plants.

On the completion of the work on the Lachine Canal the plant was removed to the Soulanges Canal, where the contractors had secured a contract for a similar piece of work. The slope of the walls, however, in the latter case, was flatter than those on the Lachine Canal, but with some slight changes, the author is informed, highly satisfactory work was done.

The author is indebted to Mr. A. T. Gibson, Toronto, member of this Society, the engineer for the contractors, and to Messrs. Haney, Miller, Quinlan & Robertson for permission to use the original drawings of the plant.

The work was carried on under the supervision of the Department of Railways and Canals, through Mr. E. Marcceau, the superintending engineer of the Quebec canals, and the author, as engineer in charge of the Lachine Canal.

Mr. Angus W. Robertson was the direct representative of

Commercial Aspect of Concrete in Canada

Growth of Canadian Cement Industry—Practical Observations for the Contractor—Importance of Judicious Selection of Materials and Accurate Figuring

By GUSTAVE KAHN, Sales Manager, Trussed Concrete Steel Co., of Canada, Limited

That concrete as a building material has passed the experimental stage in modern construction is evidenced by the rapidly increasing number of structures to be found in the civilized world.

Writers of history tell us that concrete, either plain or reinforced, is not a new material and, in support of this statement, point to structures of ancient as well as mediæval days. Be that as it may, our own immediate knowledge of the material is comparatively new; but, new or old, the data to be had relative to the material and its value as a structural material, is to-day just as complete and just as reliable as the data to be had on any other material.

History divides all epochs pertaining to civilization into different ages, and so we may safely conclude that the history of construction should be divided into ages. We have had the age in which stone was used; we have had the age in which wood was used; we have had the steel age; and we are now passing through what, in time, will come to be known as the concrete age.

Victor Hugo has said in his writings that in early history structures of all classes were intended to record the happenings of the day; in other words, to record history. In order for a material to be adopted for structural purposes, its main requisite was quality to withstand the ravages of time.

To-day we look for more. In order that a structural material satisfy the required demands, it must have the enduring qualities required in earlier days, and also must have the virtue of being easily handled in order that it may be commercially economical in its application. This, then, is the primary reason why concrete will naturally come to be known as the building material of the age. There is no known material that will better withstand the ravages of time; furthermore, there is no known material that can be handled more economically.

The Canadian Cement Industry

That Canada is keeping pace with other countries in concrete construction is evidenced by the growth of the entire industry in Canada. Unquestionably the best indication of the industry's growth is recorded by the cement manufactured in, and imported into Canada. Looking into this record we find that during the year 1900 there were manufactured here 292,124 barrels of cement. During the same year there were imported 374,966 barrels of cement. This shows that the total consumption for the year in Canada was 667,090 barrels, of which only 44 per cent. was manufactured here.

During 1909 there were manufactured in Canada 4,089,191 barrels. There were imported 156,456 barrels. The total consumption for the year was 4,245,647 barrels, with the splendid showing that a total of over 95 per cent. was of home manufacture.

The fact that concrete work in Canada compares favorably with concrete work in other countries indicates that the cement manufactured here compares favorably with that of foreign manufacture.

Assuming that, as an average, $1\frac{1}{4}$ barrels of cement are used to each cubic yard of concrete, we have for the year's work 3,396,500 cubic yards, representing an approximate expenditure of \$30,500,000 for the year.

We can congratulate ourselves upon the fact that more

than eighty per cent. of all the materials entering into this work was produced in Canada; and I believe that the growth of the industry is such that we are justified in demanding government recognition of the industry.

Review of Last Year's Concrete Structural Work

It is of special interest to note that practically all of the important structural work carried out in Canada last year was either entirely or partially carried out in concrete, plain or reinforced. This statement may be rather broad, but can easily be proven. A hasty review of the situation may not be out of place at this time. To make the review systematic let us begin at the Pacific coast.

The largest building in Victoria for the year, known as the Pemberton Building, is reinforced concrete throughout. All of the larger buildings in Vancouver for the year are either entirely reinforced concrete or are steel skeletons with concrete floors.

Coming on to Calgary, there were erected last year in this city two large reinforced concrete buildings, and in addition steel frame buildings with concrete floors.

Edmonton has been backward, the use of concrete there having been limited to pavements, foundations and concrete floors. Regina, on the other hand, was one of the leaders in this class of construction. The most notable example there are the Saskatchewan Parliament Buildings, almost entirely of reinforced concrete.

Winnipeg was easily the leader. There may be found the Transcontinental Railway shops, almost entirely of concrete. The Fort Garry Terminal Station has a steel frame and concrete floors. The Maltese Cross Rubber Company building is a very large reinforced concrete warehouse. The Government Examining Warehouse is of steel frame with concrete floors. And so on. We learn that Winnipeg alone was responsible last year for about 30 large concrete buildings, not counting the smaller work to be found everywhere. Then there was the large power plant for the city of Winnipeg at Lac du Bonnet, constructed almost entirely of concrete.

We next come to Port Arthur and Fort William. The largest grain elevators in these towns were erected last year in reinforced concrete.

Coming still further east, in and around London may be found any number of good examples of concrete buildings and bridges.

At Hamilton, nearly every building of importance erected during the past year was either entirely or partially of reinforced concrete.

Toronto was a little behind, though it also shows its quota of good work for the year. The fight in Toronto last year in connection with the large trunk sewer there, now in course of construction, should be of special interest. The engineers for the work designed it originally in concrete. The brick industry made a very strenuous fight and succeeded in delaying the award of the contract. Through them the City Engineering Department was compelled to investigate concrete for sewer construction in general, and only after a very thorough investigation were they permitted to adopt concrete.

During 1909, in Peterborough, there were erected a large water works dam and power house. They also started there, last fall, the most important concrete arch bridge yet attempted in Canada.

Belleville and Kingston are well represented in this year's

* Read at the 2nd Annual Convention of the Canadian Cement and Concrete Association.

work, and Ottawa shows five new reinforced concrete buildings as well as a large concrete grand stand built on the fair grounds.

In giving the number of reinforced concrete buildings, the numerous smaller buildings, such as concrete block houses, erected in this material have not been included.

In Montreal was erected the largest reinforced concrete building put up in Canada during 1909. The structure to which I refer is known as the Jacobs Building. It has a frontage of 237 feet and a depth of 133 feet. At present it is seven storeys high, but eventually this will be increased to ten storeys. Other examples are the Wilder Building, a 10-storey warehouse, and the Ogilvie Building, a large steel skeleton frame with concrete floors. In addition to these, Montreal has a number of smaller buildings erected in concrete during the past year. And so we may pass on to the Atlantic Ocean, and find evidence to substantiate the claims made earlier in this paper.

Practical Observations for the Contractor

The commercial success or failure of the contractor in concrete work is entirely a matter of ability in handling the work efficiently. No greater mistake can be made by the contractor than to attempt to make money on concrete work by scamping the job. Only the best materials obtainable should be used. It is true you may place a certain amount of stone, sand and cement into a mixer, mix it and place it in position to harden or solidify; and a satisfactory piece of concrete may be the result; but if it is, it is merely a matter of chance. On the other hand, if proper precautions are taken, if the stone is clean and of proper quality and size, the sand clean and of consistent quality, the cement sound and of recognized quality, the proper proportions of materials carefully mixed together, the total just as carefully placed in position, there can be no question as to the result. It is a foregone conclusion, not a matter of chance. And so if the contractor is working on reinforced concrete work it is necessary to exercise the same precautions. It is not sufficient to place steel into a bed of concrete and then run chances of the amount, the quality or shape of steel being right. There is only one proper way, and that is to analyze or diagnose the case. Be sure that all possible conditions have been considered, such as the known load that the structure is to sustain and the greatest possible load that it may be called upon to sustain. Analyze the stresses these loads will produce on the concrete as well as on the steel and make sure that the quality and quantity of the concrete, as well as those of the steel, are sufficient to take care of this load. Make sure that the concrete will be called upon to take care of only the stresses it is known it can resist. (Compression). Be sure that the distribution of the steel throughout the mass is in accordance with the stresses distributed throughout the mass. In other words, be sure that all compression, all tensile, as well as all shearing stresses are provided for. Then exercise the proper precautions in combining the proper materials, and the final result spells success.

Essential to Figure Costs Accurately

No contractor can become a permanently successful business man unless he does good work, and at the same time makes money. It therefore only follows that a successful concrete contractor must do good concrete work, and must make money.

According to my former statements, if all necessary precautions are taken in designing, planning, inspecting and performing the work, the final result regarding quality of work cannot be questioned. The only thing that remains to be considered from a business point of view, is how to make money. To this there is only one answer. Learn to figure costs. Do not undertake a contract unless you can see that the price to be obtained will provide a profit. It may seem strange but it is true, that the differences of opinions regarding cost

among contractors are just as great as the differences of opinions among lawyers, regarding matters of law, or among doctors pertaining to matters of medicine. Only careful study and long experience will perfect the contractor's judgment in this regard.

There are always, or should be, certain positively known facts. These are the cost of the required material, the cost of transporting these materials to the site and the overhead charges, or cost of looking after the routine business in connection. Then comes the cost, or probable cost, of equipment required, and last, but by no means least—rather the greatest—the cost or probable cost, of the required labor. If the plans are prepared properly, the cost of the materials is usually only a matter of plain addition and multiplication. Right here, I would ask you to observe that this statement is modified. The plans must be properly prepared, and that means a lot. For plans to be properly prepared, they must show the most economical known way to accomplish certain results. By this is meant that every particle of material shown on the plan must, when incorporated in the work, perform a certain needed function in such a manner that the full strength of the material used is developed; and further, that only materials especially suited for certain functions are to be employed for the said duties.

Careful Selection of Materials

The statement has often and truly been made that every dollar judiciously spent in planning work will save two dollars in carrying out the same. This principle also holds true in the careful selection of the materials to be used. Usually, the low unit cost of raw material is not a criterion of careful planning. For instance, if all the materials required in a structure cost the contractor \$10 and the labor required to place this material into the structure cost an additional \$10, the resultant total cost being \$20; and if differently prepared materials will cost \$12 and the required labor in the latter case \$6, the second material is unquestionably more economical, and the engineer who prepared the plans specifying these materials has proven his right to his title. The overhead charges in any business are usually the result of business system; the better the system employed, the lower the cost of the result of paying. The cost of labor is usually reduced in direct ratio to the care exercised in planning the work, selecting the materials and selecting the equipment for handling.

A Summary of Practical Pointers

To be successful as a contractor in concrete work, plan the work in a careful manner and select carefully the materials to be employed in the work. Do not employ the materials whose first cost is the lowest but the materials that are most economical in place, and which, when properly prepared, reduce the chance of error to a minimum. Simplify field labor as much as possible and, above all things, refrain from taking contracts so low that when the work is finished and the bills are paid nothing remains to recompense you for the energies expended in carrying the work to completion.

We are all working, or should be working, for a common cause, the success of the cement and concrete industry. Remember that every bad piece of concrete work injures not only the contractor who performed the work, but the entire industry; so for this selfish reason, if for no other, it is up to us to assist one another in handling successfully all our contracts. In our own interest we cannot afford to knock our fellow concrete contractor. We must boost him.

The Hanbury Manufacturing Company, whose head office is at Winnipeg, announce that they will at once double the capacity of their whole establishment factories, mills, warehouses and offices, which will result in hundreds of extra hands being employed and thousands of dollars worth of new machinery being installed. The company expects to have these improvements completed by June 1st.

Conclusive Experiments with Cement Tile

Particulars of Careful Tests and Practical Information of Much Interest to Cement Users—Cost of Hand Made Tile*

By Professor W. H. Day, Guelph, Ont.

Since the Ontario Agricultural College began college extension work on the subject of farm drainage some five years ago there have been numerous enquiries for information on the subject of cement tile. People usually wanted to know two things, first, whether the cement tile could be made cheaper than the clay tile, and secondly, whether they would be durable. When these enquiries first began to come in there were not, so far as I am aware, any extensive or conclusive data as to the durability of cement drain tile, nor was there any grave question about their durability. There was a general impression, however, that they should prove durable, judging from the manifold conditions in which concrete had proven its usefulness. Therefore, at first we concerned ourselves with the cost of manufacturing cement tile by hand, for the point made by most of the enquirers was that they were thinking of procuring moulds and making their own tile.

For use in our experiments on the cost of manufacture, the London Concrete Machinery Company furnished us with one of their two-piece cement tile machines, since taken off the market. And the experimentation was undertaken by Mr. A. M. Shaw, one of our students, who had had considerable experience in cement work with his father, the late Mr. Robert Shaw, of Niagara Falls, Ont., who for several years did much of the road contracting in his locality. During the months of April and May, 1908, experiments were conducted in making cement tile.

While writing the report of these experiments in the latter part of the year, we learned of the controversy over the durability of cement drain tile, and we must confess that the idea of cement being soluble was a new one to us. After reading the attack on cement and the answer to it, we counselled our farmers to go slowly in the adoption of cement tile, believing that the uncertainty, in our own minds at least, about their durability was sufficient to warrant such action. At the same time, however, we decided to conduct some tests in order to learn for ourselves something about the solubility of cement, and to deduce from the information thus obtained some idea of the probable durability of cement tile. These experiments were begun in February, 1909, and have been continued until the present.

Besides the points already mentioned, the porosity of cement tile received some attention during our experiments.

The Cost of Making Cement Tile by Hand

The tile made by the London two-piece machine were hexagonal on the outside, being about three-quarters of an inch thick in the thinnest part and considerably thicker at the corners. Mr. Shaw found that, mixing his own material he could make a shade over 500 complete three-inch tile in a day when everything was once in order. The material had to be mixed quite dry in order that the moulds might clean, so dry, indeed, that it was impossible to tamp it close enough to make a compact tile. By oiling the moulds it was found that the material might be mixed much wetter, but still not wet enough to make what we consider a good tile. We also thought that considerably more material was used in these tile than would be necessary for a round tile; and besides, the amount of handling required for two-piece tile was double that for one-piece. These features led us to doubt whether

this type of machine would ever be popular with the farmers. On consultation with the company we found that they had arrived at the same conclusions, and that they were withdrawing the machine from the market. These circumstances at first led us to think that the work done on this phase of the problem was of little practical value, and we discouraged the extensive publication of the results, although we placed them in our annual report, just as a matter of record. On second thought, however, we have changed our minds somewhat, for the following reasons: The rate of manufacture determined must represent fairly well what might be expected with a round-tile machine of similar dimensions—the round tile would be slower to tamp but there would be only half as many pieces to handle. And as a matter of fact we have since learned of a hand machine for round tile, recently invented, on which one man can make about 500 tile a day, thus establishing that the rate of manufacture determined in our experiments is in all probability a fairly representative one.

We found further that 6 cubic feet of sand and 1 bag of cement (approximately a cubic foot) would make 78 complete 3-inch tile. But a round tile ½-inch thick requires only 55 per cent. as much material as the one made on the London two-piece machine, hence the material mentioned above would make $100/55 \times 78$, or 142 tile, providing they were tamped to the same compactness. As they could be made wetter, they would likely be somewhat more compact. This, however, would be counterbalanced by the use of another half-bag of cement, making the proportions 4 of sand to 1 of cement (6 to 1 is too poor for really strong tile), so that we may fairly assume from our figures that from 6 cubic feet of sand and 1½ bags of cement there can be made 142 three-inch tile, say 140 in round numbers. This gives us a means of arriving at an estimate of the cost of making 3-inch tile, ½-inch thick, by hand, when the price of material is known. In Guelph we pay \$1 a yard for sand and \$1.90 for cement. At these prices

6 cubic feet of sand cost	\$0.22
1½ bags of cement cost	.71
Total price of material for 140 tile	.93
Total price of material for 500 tile	3.32
Wages of man for one day	2.00
Total cost of 500 tile	5.32
Total cost of 1,000 tile	10.64

In this estimate no allowance is made for hauling the material, as this can be offset against the hauling of clay tile, if it is desired to make a comparison between the cost of the two kinds.

The prices used in the estimate may be high in some localities, but knowing that 6 feet of sand and 1½ bags of cement will make 140 tile, and that a good man can make about 500 tile a day on certain types of machine, the cost of manufacture may be figured out to suit cost of materials in various localities. Or again, if type of machine is such that a man can make only 400 instead of 500 in a day, the cost of the tile can readily be calculated.

Next we come to the solubility tests.

EXPERIMENT ONE

Sample—A piece of cement tile weighing 43.256 grams after being dried to constant weight at 215 degrees F. This

*Read at the 2nd Annual Convention of the Canadian Cement and Concrete Association.

tile was made by the "dry process" in April, 1908, in proportions 6 of sand to 1 of cement. For a few days after being made it was watered daily, and then it was submerged in water for a period of six weeks, after which it was removed and transferred to a storage cellar, where it remained until solubility experiments began. Tile quite porous.

Treatment—After the small piece had been dried to constant weight it was placed in distilled water for four days, then removed, dried, weighed, and again placed in fresh distilled water. This was repeated 16 times, the total period of solution being 143 days and the total loss in that time was .113 grams. The total cement in the sample was 7.1794 grams, hence at this rate the cement would all dissolve in 27.7 years.

The experiment was next performed with water from the artesian wells at the College. This water is high in total solids, about 460 to 480 parts per million, made up chiefly of bicarbonate of calcium, bicarbonate of magnesium, or the compound bicarbonate of calcium and magnesium. There is also a small amount of chlorine in it. The sample was tested five times in this water, the total period of solution being 47 days and the total loss in weight .090 grams. At this rate it would take only 10 years to dissolve all the cement in the sample.

EXPERIMENT TWO

Sample—A piece of tile, proportion 6 to 1, made on London two-piece machine, May, 1908, watered daily for a week after making, stood in cellar till November, 1909, mixed much wetter than sample used in experiment one, so wet indeed that the moulds would not clean well. Dry weight, 43.213 grams.

Treatment—Same as sample in experiment one, only the number of tests in distilled water numbered 8 instead of 16, the total period in the water being 73 days. During the period the sample lost .025 grams, at which rate it would take 57.4 years to dissolve all the cement in it. When put in the well water the loss in 47 days was .090 grams, which rate would use up all the cement in 10.3 years.

EXPERIMENT THREE

Sample—A piece of wet mixed tile, made the same time as number 2 and watered and stored in the same way. Dry weight, 36.2795 grams.

Treatment—Distilled water for 73 days, well water for 47 days

Result—This sample lost only slightly in distilled water, and gained .0333 grams in well water. At this rate it would last for ever.

EXPERIMENT FOUR

Sample—A piece of tile, proportions 4 of sand to 1 of cement, made by Mr. George Holden, of St. Marys, on the London automatic cement tile machine. Watered daily for a week after being made, and then stored in our laboratory until October, 1909. Dry weight, 20.4792 grams.

Treatment—Same as in 2 and 3.

Result—Loss in distilled water in 73 days, .0387 grams. At this rate the sample would last 26.5 years.

In well water the total loss was .130 grams in 47 days, at which rate the sample would last only 5.1 years.

EXPERIMENT FIVE

Sample—A piece of tile, proportions 4 of sand to 1 of cement, made by same maker as No. 4, cured and stored in the same way. Dry weight, 35.781 grams.

Treatment—Same as others.

Result—In 73 days in distilled water the loss was .0175 grams, at which rate the sample would last 102.2 years. In 47 days in well water the sample gained .0165 grams in weight, and thus would never disintegrate.

EXPERIMENT SIX

Sample—A piece of clay tile, about average quality, possibly burned a little slack. Dry weight, 36,660 grams.

Treatment—In distilled water 48 days, weighed 5 times; in well water 47 days, weighed 5 times.

Result—Loss in distilled water, 159 grams, at which rate the sample would last only 4.1 years. Loss in well water, .081 grams, at which rate the sample would last 58.3 years.

In estimating the time that samples would last it has been assumed that they would be subject to solution 365 days in the year and that the rate of solution would be uniform. The first of these conditions certainly would not hold in practice. During a large portion of the year, possibly half, tiles are dry and not subject to solution, and consequently would last twice as long as the periods mentioned, provided the rate of solution during the other half of the year was constant.

Three other experiments were performed which probably come nearer natural conditions than the previous experiments do. Three half tiles were placed in running well water on May 6th, 1909, where they have been ever since. At the end of six months they were dried, weighed and replaced in the water. Then last week they were dried and weighed again. The results are as follows:

EXPERIMENT SEVEN

Sample—A half tile, proportion 6 to 1, made on London two-piece machine, dry process, May 1908, watered for a week, stored in cellar. Dry weight, 1797.5 grams.

Treatment—In running well water for 10½ months, weighed at 6 months, and at 10½ months.

Result—Tile gained in weight each time. Total gain, 3.4 gram.

EXPERIMENT EIGHT

Sample—Same as in 7. Dry weight, 1910.25 grams.

Treatment—Same as 7.

Result—No change in weight in first six months, a gain of 4. grams in next 4½ months.

Thus these two samples would never disintegrate at this rate.

EXPERIMENT NINE

Sample—A half tile, proportions 6 to 1, made on London two-piece machine, made very wet, so much so indeed that tile would not hold shape, and moulds would not clean. Allowed to dry, getting a few showers of rain, and then stored in cellar. Dry weight, 2001.0 grams.

Treatment—Same as in 7 and 8.

Result—Tile lost 1.90 grams first six months and 2.70 grams next 4½ months. At this rate the sample would last 63.4 years.

It is worthy of note with regard to these three samples, that those made by the dry process, and therefore very porous, were the ones to gain in weight, while that made by the wet was the one to lose.

The behavior of these three large samples contrasts so strongly with that of the small samples as to indicate that experiments with small pieces are apt to be very far from actual conditions. For instance, the rate of solution for the piece of clay tile would indicate that that sample would all dissolve in less than two generations. And in much less time than that the tile would be so weak as to give way under soil conditions. Experience has shown that such does not occur, and hence we must conclude that the conditions are so artificial that it is not safe to base arguments as to durability upon such tests.

Porosity

With regard to the porosity, we find that it varies with the proportions of cement, with kind of sand used, and also with the method of making. The more cement used, the finer the sand or the wetter the mix, the less porous the tile. But even the most compact ones tested were much more porous than clay tile.

Tests of Materials Used for Sewer Inverts

Conveying Useful Information as to Relative Durability of Materials and Cases Where Increased Cost is Justified—Examples from Modern Practice*

BY E. S. RANKIN, Engineer of Sewers and Drainage, Newark, N. J.

In examining brick sewers built 20 to 30 years ago it frequently happens that the bricks in the invert are found nearly or quite worn through. This is particularly noticeable in sewers with a fairly steep grade and carrying a considerable amount of street wash. I have in mind particularly one sewer about 6,000 feet in length, built in 1873, where practically the entire invert has had to be renewed, a troublesome and expensive operation. The following quotation is taken from Folwell's "Sewerage": "A 5½-foot two-ring brick sewer in Baltimore, 25 years old, was recently found with its invert in one place cut completely through for a width of 12 to 15 inches, and badly worn for a height of 2 feet. In Omaha's brick sewers, the wear, which is usually 18 to 24 inches wide, became 2 to 3 inches deep in 12 years."

Brick-Lined Concrete Sewers

In order to avoid this trouble it has been our custom, for a number of years past, to line the lower third or quarter of the sewer with vitrified paving brick. The only test required for these paving brick in our specifications is that they shall not absorb more than 2 per cent. of their weight in water after being thoroughly dried and then immersed for 24 hours. Is this test a criterion of their wearing qualities in the sewer? And is the life of the sewer increased sufficiently to warrant the extra cost? Within the past few years we have also built a number of concrete sewers, lining their inverts also with paving brick. The writer has heard the statement made that on some of the very steep grades in Duluth, sewers were found in which the brick was nearly worn away, but the cement joints were left with almost their original thickness. If this is the case, is a vitrified lining necessary in concrete sewers? Another question along the same line is the relative wearing qualities of a concrete as compared with a vitrified pipe. The following experiment was made in the hope of throwing some light on the above questions.

The several samples selected were first tested for absorption and then placed on a rubbing bed such as is used in stone yards for smoothing blocks of stone. They were all given a uniform weight of 20 pounds and were left on the bed for 30 minutes. The velocity of the bed on the line on which the samples were placed was 21 feet per second.

The results are shown in the accompanying table. Nos. 1 to 4 were vitrified shale paving brick selected for their variation in absorption. No. 5 was a small shale brick made for use in sewers. Nos. 6, 7 and 8 are different makes of building brick also selected for their variation in absorption. Nos. 9, 10 and 12 were made from the mortar and concrete being used in the construction of a sewer at the time the experiment was made and were tested when 18 days old. No. 11 was a section of concrete pipe furnished by the Lock Joint Pipe Company, of New York, and was approximately one year old. No. 13 was a tile used by the same company for lining their pipe where required by engineers. Nos. 14 and 15 were both samples of vitrified salt-glazed sewer pipe.

The second column of the table, percentage lost by abrasion, was obtained by dividing the weight lost on the bed by the original weight, assuming each sample to be of a uniform size, 2 x 4 x 8 inches. The last column assumes arbitrarily the life of the softest sample, No. 8, to be 10 years, and calculating the others from this.

Tests of Brick on a Rubbing Bed

No.	Material	Per cent. gained by absorption	Per cent. lost by abrasion	Ratio of abs't'n to abr's'n	Life of invert years.
1	Vitrified shale brick ...	1.36	2.00	1:1.47	324
2	Vitrified shale brick ...	2.15	3.35	1:1.56	193
3	Vitrified shale brick ...	3.60	3.42	1: .95	189
4	Vitrified shale brick ...	4.28	5.92	1:1.38	109
5	Shale sewer brick	13.18	27.31	1:2.07	24
6	Building brick	7.39	20.41	1:2.76	31
7	Building brick	10.19	44.74	1:4.39	15
8	Building brick	18.91	64.74	1:3.42	10
9	1:2 Cement mortar ..	11.86	4.41	1: .37	147
10	1:2:4 Gravel concrete	6.65	3.82	1: .57	169
11	1:2:4 Gravel concrete	5.10	3.35	1: .66	193
12	1:2:5 Stone concrete.	7.40	8.62	1:1.16	75
13	Vitrified tile	1.34	4.47	1:3.34	145
14	Vitrified pipe	4.47	6.11	1:1.37	109
15	Vitrified pipe	1.72	4.55	1:2.65	142

While this experiment is not to be considered by any means as giving absolute results, it appears to show:

First, that for similar materials, although there is a considerable variation in the ratio, the abrasion in every case with the exception of No. 12 increases with the absorption, and hence the absorption test gives a fair idea of the wearing quality of the material.

Second, the additional cost necessary to line the invert of a brick sewer with paving brick is certainly warranted, although the 2 per cent. test required by the Newark specifications seems unnecessarily severe.

Third, the concrete samples compare favorably with the paving brick and it would, therefore, seem unnecessary to line a concrete sewer. The behavior of the mortar sample also bears out the statement as to ordinary brick wearing away faster than the cement joints. I am unable to account for the low figure shown by the stone concrete. The sample was made at the same time as Nos. 9 and 10, with New Jersey trap rock.

Fourth, the pipe is apparently not quite as durable as good concrete pipe and the use of the lining tile is superfluous.

Mr. Fuller, of the firm of Fuller & Herring, New York, will probably submit his report within the next week in regard to the subject of establishing a filtration plant for the city of Montreal.

The Canada Paint Company, Montreal, have issued a circular announcing a new price list and catalogue which will take effect upon the second of May. Liquid paints and kindred lines will be advanced 10c. a gallon, and all articles, in which linseed oil figures as a component part, also increased in value.

* Read before the American Society of Municipal Improvements.

Canadian City Engineers

Mr. Mason H. Baker, St. Thomas, Ont.

The new assistant city engineer of St. Thomas, Ont., Mr. Mason H. Baker, is to be congratulated upon obtaining a responsible post with excellent prospects at such an early stage of his career. Mr. Baker is essentially of the younger generation of engineers. St. Thomas is his native city and he lived there until he entered the School



Mr. Mason H. Baker, who was recently appointed Assistant City Engineer of St. Thomas, Ont.

of Practical Science, from which he graduated in civil engineering in 1906. A year later he completed his post graduate course and obtained the degree of B.A.Sc. Since that time Mr. Baker has seen useful service with the Public Works Department of Saskatchewan, and later with the John S. Metcalf Engineering Company on the construction of the G. T. P. elevator at Midland. During the past year Mr. Baker has been engaged in the survey of Dominion lands in the Peace river district. He is duly qualified as an Ontario and Dominion land surveyor. The present city engineer, Mr. Jas. Bell, whose ability is widely recognized in professional circles, is retiring at the end of the present year in order to devote his whole time to private practice.

Comparative Tests of Clay and Cement Products

It is doubtful if any comparative tests of clay and cement products for the purpose of ascertaining their relative values, are of much merit because of their entire unfairness to clay products, says a writer in "Brick." This unfairness consists:

First, in the fact that the samples of clay tested are a finished product, standard in character and taken from a stock representing a uniform and stable product.

Second, the samples of cement products tested are usually made especially for the occasion under the most favorable conditions and in the most careful manner, and are not representative of the ordinary material in practical use and cannot represent a product of standard or stable character uniform in quality. There is a new concrete system bobbing up every day, and, of course, it hops up on some convenient fence, flaps its wings, squeezes out an adolescent crew or two and forthwith

"challenges" the clay people to a battle royal, a test forsooth! And what does a laboratory test amount to after all? The cement is carefully selected, the stone and everything else minutely measured and mixed. O yes, those tests loom up remarkably well for all the concrete systems. The real test is made by a colored gentleman and a wheelbarrow. That's the concrete work that people have to stand for. A real live fire is the test that is worth something. Go back a bit and see how well those wonderful concrete buildings (that exist so largely in the imagination of certain unprejudiced experts) stood the test at Baltimore and at San Francisco! Poorly done as was much of the old tile work in both those cities, its record is virgin white compared to the performance of some of those other wonderful systems there illustrated. If the clay people answer every challenge made them and go to the trouble of a test every day or two they'll soon have no time to carry on the work of properly fireproofing the majority of the fireproof buildings now being erected.

Mr. Gordon E. Perry

General Manager, National Iron Works, Limited

Many of our readers will be interested in an introduction to Mr. Gordon E. Perry, who has been appointed general manager of the National Iron Works, Ltd., Toronto, a concern which is entering the contracting field under the most favorable conditions. One of the most up-to-date plants of the kind on the continent has been erected on the now famous Ashbridge's Bay site, where the manufacture of cast iron pipe for various purposes has already been commenced on a large scale.

Mr. Perry was born at Dundas, Ont., but has spent



Mr. Gordon E. Perry, General Manager, National Iron Works, Limited.

the greater part of his life in Toronto, where he was educated. In 1900 he entered the employ of the Canada Foundry Co. Ltd., then on Berkeley St. Toronto. Here he remained for some time at the works, afterwards being promoted to the sales staff and finally being appointed special agent and manager of the company's Ontario district office, a position which he retained until 1909, when he severed the connection to become associated with the National Iron Works. Though still a young man Mr. Perry has had a wide and varied experience in the iron business. With such advantages he is admirably adapted for the position he now holds.

Rough Face Brick in Architectural Work

Practical Brickmaker Reviews the Situation and Offers Some Noteworthy Suggestions — Interesting Pointers for the Manufacturer

At one time the wave of dry-pressed products swept over the country, and with the variety of color there was given the architect a mechanically perfect block of burned clay, and we regret to say that many architects made use of it, to the architectural elimination of the mortar joint, which is an important feature of any brick wall, says a brickmaker writing in a recent issue of the "Architect and Engineer." Bricks are bricks and must be laid in mortar; therefore if a truthful brick wall is to be built, the mortar joint should be a part of it. We fear that there is a present tendency to go to the other extreme and consider mortar as the building material, in which bricks are to be laid. There are extremists in everything and perhaps they add something to the betterment and beauty of the world. We do not know. But somehow we cannot help saying "amen" to the wish that some of the architectural freaks had died in infancy.

We not only gave the architect a great variety of colors, but we gave him variation in size. To the Standards we added "Romans" and "Normans." The colors, the several sizes, together with the possibility of different bonds, gave the architect opportunities he had never known before. Our cities, architecturally, took on a new light and life and color of which we had never dreamed.

We did our part toward a more beautiful city and the architect his, but the brickmaker and the architect alike failed to consider the most essential element in building architecture, the effect of time, the problem of "growing old beautifully."

Is this a lost art in architecture? Did the ancients understand how to build for all time? They lived longer than we do and had better opportunity to study the effect of time. Or was it because their materials were nearer nature than ours—everything hand-made? We can not say, but we know that our beautiful buildings became streaked with dirt and hideous in a decade. It was no longer a question of "undertones of pink," but of the original surface color.

The manufacturers of light colors began to mottle the bricks — "mottled," "speckled," "iron-spot," etc., to break up the color and in an effort to make the bricks dirtproof. It was about this time that the influence of stiff-mud bricks began to be felt in the market. Also enamelled bricks were under serious consideration by many manufacturers, but architects would not have enamelled bricks as a general facing material.

The demand for a material which would not show dirt became insistent. There was a notable adoption of darker colors and rougher shades, and paving brick became a feature in the market. The latter certainly does not show dirt, and aside from that, surely deserves a place in our building scheme, but it could not fill the place of the brighter colors.

There was an attempt by the dry press brick manufacturers to introduce rock-faced bricks, but it failed because the architects would have nothing of it. It was a noble building material debased into an imitation of another noble building material. Possibly a more extended use of rock-faced bricks would have led us sooner to recognize the merits of rough-faced products.

Texture an Important Consideration

Texture is wherein we have failed to meet the requirements of the architects, and texture is a very im-

portant element. Why put burlap on our walls? As well use a smooth paper printed to imitate burlap.

A printed or painted cloth on the floor would soon hide its color and design in dirt, while a rough-coated tapestry will hold the design and color to the last rag, and if it be a Persian rag it will still command a high price in America. It is the tapestry idea that we need in brick—not the color effect, but the texture.

We have heard the cry of "fad" against the rough effects that are now coming out, but they are not fads. They have come to stay and multiply.

What we are after are effects of light and shadow, and not visible roughness—at least not visible at the distance from which the wall is viewed. We wish to break up the smooth, brilliant colored surface and give softness, and in doing this we bring out the depth of the color and its true life by the contrast of light on the high points and shadows in the depressions. Quoting from a German article: "Smoothness in brick surfaces eliminates the play of the light and shadows which is essential to the enlivenment of the surface and prevents softening of the too strong colors on the one hand and the animation of the gloomy on the other hand." If manufacturers will keep this in mind there will be produced fewer of those freak products, whose only excuse for existence is that of roughness. Such rough effects, whose only merit is roughness, may please us for to-day, and we bear with them to-morrow, but on the third day we would relegate them to the ash heap if we could.

The wire-cut face brick—we mean a stiff-mud brick with a wire-cut face—has developed wonderfully in this country, and a number of factories are making it almost exclusively. The same brick is being experimented upon in Germany, but with no marked success up to the present time.

The wire-cut face is especially pleasing. There is nothing mechanical about it. The wire dragging through the clay roughens up the surface in a series of ragged corrugations, and no two bricks have the same light and shadow effects. At first a great deal was said about the dirt that such a surface would accumulate. The product has been on the market about six years, and the first buildings constructed show no evidence of getting dirty, and it is believed the bricks will hold their color-effect longer than a smooth-face brick. The softening and blending effect of time which should enhance the beauty of the wall will deal kindly with this product.

Some little time ago trouble developed between the Carpenters' Union and the Master Builders at Hamilton, Ont. A compromise is likely to be arrived at as the builders hold the stronger position. The carpenters wanted an increased wage scale to go into effect on May 1st, but the builders have been hiring non-union men and there are at present in the city a great many first class carpenters who are not affiliated with either of the local unions. They are willing to work for the minimum wage of 35 cents an hour, while the union men want 37½ cents. Many of the non-union men have been taking contracts for themselves and working Saturday afternoon and evenings on them.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Beith, Que.

Tenders addressed to Andrew Coffey, mayor, will be received until May 10th for the building of about 8 miles of macadamized road in the Municipality of Elgin. Specifications, etc., on application to the above mentioned.

Bridgeburg, Ont.

It is stated that contract will be let the latter part of this month for sewer system, cost \$30,000. Engineer, Geo. Ross, of Welland.

Daphin, Man.

A bylaw has been passed to issue \$175,000 waterworks debentures.

Dunnville, Ont.

J. W. Holmes, clerk, sends us the following list of tenders for pumping plant for sewer system being established here: Pumping Station — Excelsior Constructing & Paving Company, Limited, Toronto, Ont., for the completion of that part of the contract consisting of a rectangular excavation 16 feet 8 inches by 20 feet and 24 feet deep, \$5,385; furnishing and laying (about) 3,300 feet of 3-inch galvanized iron pipe, \$1,776. Ejection Plant — Westinghouse Company, air pump, \$160; reservoir, small, \$100. Hill & Company, air compressor, \$690. Mussen's, Limited, air compressor, \$430; reservoir, large, \$145. Total, \$841.

Galt, Ont.

On May 13th a bylaw will be voted on to issue \$5,000 4 1-2 per cent. waterworks debentures. Joseph McCartney.

Halifax, N.S.

Among the improvements arranged for the coming summer are water service extension on Morris street and sewer work in west end.

Haileybury, Ont.

On May 2nd the ratepayers will vote on bylaws to issue \$25,000 30-year 5 per cent. waterworks debentures, and \$10,000 15-year 5 per cent. street improvement debentures. Theo. H. Connor, town clerk.

Islington, Ont.

Tenders addressed to J. A. L. Macpherson, clerk, will be received until May 2nd for construction and completion of sewage disposal works for main sewerage at New Toronto. Plans, etc., at office of above or at office of the engineers, Murray & McAllister, Continental Life Building, Toronto.

Ladner, B.C.

Tenders will be received up to May 13th by the council for \$135,000 waterworks debentures. N. A. McDiarmid, C.M.C.

Montreal Que.

Tenders will be received until May 4th for the construction of a main sewer from Nolan and Nicolet streets, passing through the C. P. R. property and along Tenth avenue to Masson street. John B. Barlow, city surveyor.

City Surveyor Barlow's report to the

Board of Control recommends an expenditure of \$502,690 for the laying of permanent sidewalks.

Maisonneuve, Que.

\$600,000 has been appropriated by the Council for academizing street grading, sewers, etc., and it is expected that this work will be carried out this present season.

Moose Jaw, Sask.

The following tenders have been received for concrete sidewalks: Ontario Concrete Paving Company, Toronto, \$17,490; R. L. Frost, Moose Jaw, \$18,656; Forest City Paving Company, Regina, \$19,472; Western Pavers, Limited, Winnipeg, \$20,210; Navin Bros., Moose Jaw, \$20,988; Clark & Jones, Owen Sound, \$23,028. For curb and gutter: Ontario Concrete Paving Company, Toronto, \$6,480; Navin Bros., Moose Jaw, \$8,100; B. L. Frost, Moose Jaw, \$8,100; Clark & Jones, Owen Sound, \$8,100; Western Pavers, Limited, Winnipeg, \$8,505; Forest City Paving Company, Regina, \$8,775; National Paving Company, Winnipeg, \$13,500. Details of contract, 13,500 lineal feet of curb and gutter, and 116,500 square feet of sidewalk.

Following is a list of the bids received for material for and construction of 33,300 square yards of pavement: (1) Bitulithic and Contracting, Limited, Winnipeg—Bitulithic pavement, wearing surface, 2 inch to 2 3-4 inches thick, \$103,152; 3 inch creosote block pavement, wearing surface, 1 1-2 inches, \$94,931; 3 inch creosote block pavement, \$116,472. (2) Rudolph S. Blome Company, Chicago—Granatoid pavement 1 1-2 inch wearing surface, \$105,184. (3) National Paving & Contracting Company, Winnipeg—Natural Asphalt sheet pavement, wearing surface, 1 1-2 inch, \$94,931. (4) Forest City Paving Company, Regina—Creosote wood block pavement, wearing surface, 3 inch, \$103,230. (5) Navin Bros., Moose Jaw—3 inch asphalt block pavement, \$120,750; 2 1-2 inch block, \$107,763. (6) The Kettle River Company, Minneapolis—Creosoted wood block pavement, thickness of wearing surface, 3 inch, 3 1-2 inch and 4 inch—3 inch block, 14 x treatment, \$103,400; 3 inch blocks, 16 x treatment, \$106,064; 3 1-2 inch blocks, 14 x treatment, \$111,725; 3 1-2 inch blocks, 16 x treatment, \$114,389; 4 inch blocks, 16 x treatment, \$124,379. (7) Fielding & Shepley, St. Paul—Creosoted wood block pavement, 3 1-2 wearing surface, \$117,070. (8) McKay Construction Company, Regina—Westrumite pavement, 2 inch wearing surface, \$89,244.

Nanaimo, B.C.

The by-law to borrow \$20,000 for the purpose of constructing a concrete dam at No. 1 reservoir was carried.

Ottawa, Ont.

Tenders addressed to the chairman of Board of Control will be received until April 28th for asphalt pavement on Wellington street from south limit of Queen street to west limit of Broad street. Specifications on application to City Engineer Ker.

An agreement has been reached (but not officially ratified) between Ottawa and

Aylmer for the installation of septic tanks in the latter town, for the purification of its raw sewage. Cost of tank, \$5,000. Mayor Hopewell and City Engineer Ker represented Ottawa; Mayor Wright and Mr. T. P. Foran, Aylmer.

Paisley, Ont.

Tenders addressed to J. C. McIntyre, town clerk, of Elderslie, will be received until May 2nd for the manufacture and delivery of cement culvert pipes of various sizes.

Prince Rupert, B.C.

Messrs. Lynch, McKay and Douglas, the citizens' committee have been authorized to go on with the \$4,000 sewer extension on Sixth avenue and the \$13,000 waterworks extension in sections 1, 6 and 7. H. H. Douglas, secretary; A. W. Agnew, engineer.

Quebec, Que.

T. Gallagher, water works engineer, is calling for tenders until May 10th for 250 tons of cast iron pipe.

Stratford Ont.

Tenders for pavements were as follows: Armoured concrete, \$1.41 per square yard, Todd & Company; tralithic, \$1.56 per square yard, J. Conn; granite block, \$3.90 per square yard, Hassan Paving Company; compressed concrete, \$1.79 per square yard, Hassan Paving Company; Apposite, \$1.77 per square yard, Hassan Paving Company; concrete macadam, \$1.25 per square yard, Fielder & Company; asphalt block, 3 inch block, \$2.56 per square yard, Fielder & Company; asphalt block, 2 1-2 inch block, \$2.29 per square yard, Fielder & Company; asphalt block, 3 inch block, \$2.56 per square yard, R. Bangham; asphalt block, 2 1-2 inch block, \$2.30 per square yard, R. Bangham; vitrified brick, \$2.59 per square yard, Fielder & Company; vitrified brick, \$2.30 per square yard, Crowley & McDonnell; vitrified brick, \$2.37 per square yard, Gibb Construction Company; vitrified brick (cement filler), \$2.22 per square yard, Gibb Construction Company; Westrumite, \$1.97 per square yard, Westrumite Company; bitulithic, \$2.25 per square yard, Warren Bituminous Company; creosote block, 3 inch, \$2.32 per square yard, Hyde, jr.; creosote block, 4 inch, \$2.47 per square yard, Hyde, jr. These prices as based on Nat Elger's tender for excavation, 34 cents, and Secord & Sons' tender for concrete base, 51 cents. For concrete curbs and gutters—concrete curbing, 18 inch, Crowley, 37 1-2 cents; Fielder, 60 cents; L. Malcolm, 38 cents; Conn, 41 cents; Todd & Company, 33 cents; Gibb 32 cents. Concrete gutter, 16 inches wide—Crowley, 19 cents; Fielder, 23 cents; L. Malcolm, 15 cents; Conn, 24 cents; Gibb, 17 cents. Concrete gutter, 14 inches wide—Crowley, 17 cents; Fielder, 21 cents; L. Malcolm, 13 cents; Conn, 22 cents; Gibb, 15 cents. Combined 6 inch curb and 14 inch gutter—Crowley, 38 cents; Fielder, 43 cents; L. Malcolm, 18 cents; Conn, 40 cents; Gibb, 35 cents.

St. Boniface, Man.

This municipality has an extensive programme of local improvements consisting

of sewers, pavements and sidewalks. The principal item of former is trunk sewer from southeast corner of Exhibition grounds to Red river; estimated cost, \$128,000.

Toronto, Ont.

City Engineer Rust has been instructed to call for tenders for supply and laying of 2,000 feet of pipe. Extension of intake pipe estimated at \$38,000.

The amended plans for the sewage outfall works at New Toronto have been approved by the Provincial Board of Health, and call for an expenditure of about \$20,000. Plans for certain sewers at Thorold were not approved, there being no provision for the treatment of the sewage. The sewage purification plans for Wingham and those for waterworks for Latchford were approved. Plans for the west end sewage disposal for Ottawa were also approved.

Vancouver, B.C.

Tenders addressed to W. McQueen, city clerk, will be received until May 3rd for construction of wood block pavement on Robson street. Plans, etc., at office of City Engineer, City Hall.

Westmount, Que.

Tenders addressed to A. D. Shibley, City Clerk, will be received until April 30th for supply of crushed limestone and granite; sand and gravel; vitrified sewer pipes and farm tile; cement; sewer brick, granite setts, scoria and other paving blocks; tar and pitch for paving purposes; lumber, required by the Road Department for year commencing May 1st. Specifications at office of City Engineer.

Winnipeg, Man.

Tenders for excavation of about 8,000 yards of trenching on city streets will be received until April 30th. Plans at 705 Builders' Exchange.

AWARDED.

Campbellton, N.B.

The Council let contracts for the ensuing year as follows: Bar lead, lead pipe, wrought iron pipe and fittings, and brass goods, Jas. Roberston Company, Limited, St. John, N.B.; excavations for water service, Wm. J. Christie, Campbellton, N.B.

Guelph, Ont.

Contract for laying cement macadam foundations for pavements has been awarded to Fielder Paving Company, of Chatham.

Moos Jaw, Sask.

H. G. McVean has been awarded the contract for laying 7,000 lineal feet of sewer pipe, including manholes, catch basins, etc. P. Kilkenny bid at \$9,522.

Montreal West, Que.

The contract for the construction of roadways and sidewalks to the extent of \$30,000 has been awarded to R. T. Smith & Company, Westmount.

Saskatoon, Sask.

J. H. Trusdale, city clerk, writes that the contracts for excavating and pipe laying have been awarded as follows: Sections 1, 2 and 4 were awarded to the Saskatoon Construction & Engineering Company, \$64,485; section 3 to William Cooke, contractor, Saskatoon, \$27,330.

The following list of tenders for labor in connection with the new sewage disposal and waterworks has been received for sections 1, 2, 3 and 4, and bulk, respectively: William Cooke, \$14,874, \$29,875, \$27,330, \$22,639, \$94,700; Saskatoon Construction Company, \$14,052, \$28,825, \$29,823, \$91,437; John Craig, \$20,889, \$56,391, \$35,825, \$24,712, \$112,385; William Newman Com-

pany, Limited, \$23,300, \$43,800, \$30,400, \$33,300, \$135,600; James Priel, section 1, \$15,340. The tender of the Saskatoon Construction Company was accepted for sections 1, 2, and 4, while for the 3rd section the contract went to Wm. Cooke. Other tenders: For the coal and oil warehouse, V. Simmons, \$3,335; G. N. Hughes, \$2,168; Jas. Allan, \$2,247; deferred. Standpipe base, Saskatoon Construction & Engineering Company, \$2,677, accepted.

Toronto, Ont.

Contracts have been awarded by Board of Control for pipe required for 1910, as follows: The National Iron Works, 3-inch iron pipe at \$4.35 per length; 4-inch at \$4.88; 6-inch at \$6.97. The Canada Foundry, 8-inch iron pipe at \$10.50; 10-inch at \$14.80; 12-inch at \$19.85.

Ryan & Reilly, Philadelphia, were awarded the contract for the construction of the siphon under the Don in connection with the high level intercepting sewer. A local firm, Miller, Cummings & Robertson, tendered at \$4,900.

Contracts for balance of construction of high level intercepting sewer (not including siphons) have been awarded as follows: Logan avenue to Leslie street, 3,409 feet in length, sewers 9 feet and 6 feet 3 inches, John Wagner, Cleveland, Ohio, \$31,52 per foot; Don to Logan avenue, 2,093 feet in length, sewer 8 feet 9 inches, J. H. McKnight Construction Company, this city, \$30.85; Leslie street to Morley avenue, 3,246 feet in length, sewer 9 feet 6 inches, W. J. Gawne, Cleveland, \$23.70; Morley avenue to disposal tanks, 1,216 feet in length, sewer 7 feet 10 inches, Wm. Layman, Nicholson & John, Cleveland, \$19.35.

The following contracts for pavements have been awarded: (1) Asphalt Pavements—Austin avenue, Pape to Marjory, Barber Asphalt Company, \$2,033; Castle avenue, Spadina to Kendal, City Engineer, \$1,723; Chesley avenue, Brook to east end, City Engineer, \$1,076; Claremont street, Queen to Arthur, Construction and Paving Company, \$9,841; Marlborough avenue, Avenue road to Sidney street, City Engineer, \$1,778; Nassau street, Bathurst to Lipincott, Constructing and Paving Company, \$1,190; Oak street, Parliament to River, Barber Asphalt Company, \$9,326; Salem avenue, Fernbank to Hallam, City Engineer, \$1,709; St. Clarens avenue, College to Bloor, Godson Contracting Company, \$11,650; Woodlawn avenue, Woodlawn to Fairham, Godson Company, \$1,798. (2) Vitrified Block Pavements—Renfrew Place, McCaul to east end, Foreott Contracting Company, \$667; Greenwood ave., Queen to G. T. R., Godson Contracting Co., \$76,775. (3) Bitulithic Pavements—City Engineer gets Russell Hill road, St. Clair to Heath, \$4,937; Macpherson avenue, Yonge to 1,330 feet west, \$6,392; Concord avenue, College to Dewson, \$5,188; Warren Bituminous Paving Company, Gorevale avenue, Queen to Arthur, \$11,000. (4) Asphalt Blocks—College street, Manning to Dovercourt, Barber Asphalt Company, \$43,914.

The following contracts for pavements have been awarded per foot: Sidewalks, concrete—Austin avenue, both sides, Pape avenue to Marjory avenue, Gardner Contracting Company, 59 cts.; Amelia street and Hillcrest Place, Sumach street to 582 feet east, E. Reeve, 64 cts.; Barrett avenue, both sides, Conduit street to Chelsea avenue, Excelsior Paving & Contracting Company, \$1.10; College street, north side, Palmerston to Manning, A. J. Pemberthy, \$1.00; Follis avenue, north side, Manning to Clinton, City Engineer, 70 cts.; Frederick street, east side, King to Front, City Engineer, 78 cts.; High Park Garden, both

sides, Howard Park avenue to Indian road; Grant Contracting Company, 90 cts.; High Park avenue, west side, Humberside to Conduit, Foreott Contracting Company, 65 cts.; Hillcrest avenue, east side, Amelia to 133 feet north, E. Reeves, 77 cts.; Hillcrest Park, north and west sides, E. Reeves, 39 cts.; Huron street, west side, College to lane south, Foreott Contracting Company, 65 cts.; Jameson avenue, west side, King to Queen, Grant Contracting Company, 65 cts.; John street, east side, Queen to Grang cts.; John street, east side, Queen to Grange avenue, E. Reeves, 62 cts.; King street, north side, Dufferin to Dunn, Grant Contracting Company, 75 cts.; Logan avenue, east side, First to Gerrard, City Engineer, 70 cts.; Laburnam avenue, west side, Jameson to Dowling, Thompson Contracting Company, 68 cts.; Lovatt Place, north side, Sumach to east end, E. Reeve, 50 cts.; Markham Place, south side, Markham to west end, City Engineer, \$1.00; Margueretta street, west side, Dundas to College, Grant Contracting Company, 66 cts.; Ontario street, east side, Winchester to Wellesley, Gardner Construction Company, 65 cts.; Queen street, north side, John street to St. Patrick Square, Gardner Company, 17 1-2 cts.; Princess street, west side, King to Front, City Engineer, 78 cts.; Russell Hill road, both sides, St. Clair to Heath, City Engineer, 75 cts.; Sumach street, both sides, King to Queen, E. Reeve, 62 cts.; Shanley avenue, north side, Dovercourt to Westmoreland, Foreott Contracting Company, 67 1-2 cts.; Wright avenue, north side, Sunnyside to Keele, Grant Contracting Company, \$1.02; Walker avenue, south side, 769 feet west of Yonge to 492 feet west, City Engineer, 56 cts.

Vancouver, B.C.

Contractor Ledingham was given a contract to construct 15 miles of concrete sidewalk at 13 cents per foot. Other tenders were: Palmer Bros. & Henning, 13 1-3 cents; McEachern & Richardson, 13 1-2 cents.

Wetaskiwin, Alta.

John Hawke was given the contract for back-filling on sewer work here at 4 3-4 cents a foot.

Winnipeg, Man.

The Canadian Fairbanks Company, this city, has been awarded the contract for supply of hydrants to be installed this year at \$37 each. T. H. McAvity, of St. John, N.B., that for valves.

The following tenders for sewers and block pavements were awarded by the Board of Control: Sewer on Rosedale avenue, \$1,506.70; sewer on Meade street, \$171.70; awarded to the city engineer of construction. Thomas Jackson & Son received the contracts for the following three stretches of block paving: Livinia avenue, \$2,380.18; Ellice avenue, \$2,377.14; Lent avenue, \$4,164.

The following contracts have been awarded. Sewer—Harbison avenue, Thomas Jackson & Son, \$4,387.90. Water main—Harbison avenue, engineer of construction, \$849.27. Water main—Tweed avenue, engineer of construction, \$6,745. Sewer—Tweed avenue, from Stadacona to Roland street, Thomas Jackson, \$2,852.40. Granolithic sidewalk, south side of Assiniboine, from west line of lot 244 to east line lot 247, engineer of construction, \$221.10. The following works were placed on the order form for immediate construction: Sewers, Jessie avenue, from Amelia to Guelph street, \$5,100; McMillan avenue, from Aynsley to Lilac street, \$1,425. Water main, McMillan avenue, from Aynsley to Lilac street, \$750.

Woodstock, N.B.

Contract for sidewalk was awarded to the Silica Barytic Stone Company, 8 3-4 cents for walks, 12 1-2 cents for crossings.

Railroads, Bridges and Wharves**Chatham, N.B.**

Tenders are being called until May 10th for railway from Nelson to this place. See advertisement in this issue.

Guelph, Ont.

Tenders are being called by W. Panton, county clerk, Milton, Ont., for construction of reinforced concrete arch, etc. Barber & Young, consulting engineers. See advertisement in this issue.

Kingston, Ont.

Kingston & Pembroke Railway will carry out a number of improvements on the line this summer, the total cost of which will amount to over \$32,000.

Ottawa, Ont.

Messrs. Farley, engineers, report that a number of bridges in Carleton County may have to be reconstructed.

Peterborough, Ont.

The C. P. R., it is reported, has bought considerable property along the waterfront.

Park Head, Ont.

Tenders are being called until April 30th for the erection of a bridge on the Sauble river, concession 8, township Amabel. Plans, etc., at residence of S. Doubt, and also at Councillor Ashley, Wiarton.

Quebec, Que.

The bridge over the Chaudiere at Scott, formerly a part of Ste. Marie de la Beauce, has been declared unsafe.

Regina, Sask.

Tenders will be received until April 29th for building reinforced concrete bridge abutments over the Qu'Appelle river. F. J. Robinson, Deputy Minister, Department of Public Works.

Revelstoke, B.C.

It is stated that the capacity of the C. P. R. shops will shortly be increased and necessary additions to the buildings be erected.

Saskatoon, Sask.

The C. N. R. has decided to double the capacity of freight sheds and to erect sheds also on the west side of the river.

Tenders will be received until April 29th for laying 2,160 square yards of asphalt block paving and creosoted plank subfloor on the traffic bridge at Saskatoon. F. J. Robinson, Deputy Minister of Public Works, Regina.

Township of McGillivray, Ont.

Tenders will be received by J. Drummond, township clerk, or M. Miller, reeve, until May 2nd for the erection of four cement bridges. Specifications at former's residence.

Toronto, Ont.

The T. & N. O. Railway are calling for tenders until May 11th for sectionmen's houses at Gillies Depot, Uno Park and Charlton. See advertisement in this issue.

It is stated that in order to secure an entrance independent from either the G. T. R. or C. P. R., the T. & N. O. will construct its own line from Nipissing Junction to North Bay.

Vice-president D. McNicoll of the C. P. R. states that construction work will shortly commence on the branch line from Islington to Mimico, five miles.

Victoria, B.C.

Tenders addressed to R. A. Bainbridge,

divisional engineer, will be received until April 30th for clearing of the right of way Comox extension, Esquimalt & Nanaimo Railroad between Union Bay and Oyster river. Specifications, etc., at office of above. H. E. Heasley, superintendent.

Woodstock, Ont.

Tenders are being called until May 7th for erection of one 125 foot steel bridge, etc. F. J. Ure, county engineer. See advertisement in this issue.

Winnipeg, Man.

Tenders for bridge over Assiniboine will be received until May 7th by H. Tillman, secretary-treasurer, Ellice municipality, at whose office plans, etc., may be seen, also at Department of Public Works.

Tenders are called until May 2nd for ditching work between Fort William and Winnipeg. Frank Lee, division engineer.

AWARDED.**Brantford, Ont.**

The City Council let the contract for a reinforced concrete bridge over the canal at South Market street to J. Y. Harper, St. Thomas, \$42,468.

London, Ont.

F. W. Farnecomb, consulting engineer, has let to D. Whitherspoon, Ailsa Craig, on behalf of the Council of Lobo, a contract for concrete abutments, at \$4.70 a cubic yard, and reinforced doors for two steel bridges, at 20 cents a square foot.

Ottawa, Ont.

The tenders for iron railing on viaduct were as follows: Trudel & McAdam, \$897; the International Marine & Signal Company, \$750; T. Lawson & Son, Limited, \$140; and J. J. Enright, \$132.

As a mistake was made by J. J. Enright in figuring for the railing for the Wellington street viaduct, the contract for the work has been awarded to the International Marine Signal Company.

Regina, Sask.

The contract for the pile work and construction of the reinforced concrete abutments for the Albert street subway has been awarded to the Parsons Construction Company of this city, at about \$75,000.

The excavation work for the Albert street subway will be done by the Canadian Pacific Railway, whose tender was accepted.

Toronto, Ont.

Peter Nicholson, of North Bay, has been awarded the contract for construction of bridge abutments at mile post 48.91, and construction of substructure for steel trestle over Wabigoon river at mile post 119.13.

Wells & Gray, 315 Confederation Life Building, were awarded the contract for the piers and abutments in the Wilton avenue bridge, \$26,900.

Vancouver, B.C.

The sub-contract for the 20-mile section of the Princeton-Abbotsford line has been awarded to Martin, Welch & Company.

Winnipeg, Man.

The C. N. R. have awarded contracts as follows: Extension of Oak Point line, Cowan Construction Company; extension of line west and northwest from Prince Albert. C. J. Murray; Thunder Hill branch, McMillan Bros.

The contract for the McPhillips street subway was let by the C. P. R. to John Gunn. Contract, \$75,000, calls for completion about July 15. The work will require the excavation of about 35,000 cubic yards of earth and will need some 6,000 cubic yards of concrete.

Public Buildings, Churches, Schools, etc.**Aylesford, N.S.**

Tenders are being called until April 30 for the building of Methodist church here. Plans, etc., on application to J. F. McMahon, care of F. E. Harris & Company, Limited.

Calgary, Alta.

An effort is being made by some prominent people here to organize a large denominational university in this city.

The city council will be asked to submit to the ratepayers a by-law for \$50,000 to pay for the construction of a permanent horse show building.

Dufferin, Man.

The ratepayers will vote on a bylaw on May 4th to issue \$2,500 school debentures. F. W. Kirby, secretary-treasurer.

Dunnville, Ont.

The ratepayers carried the by-law to spend \$30,000 for a new high school building.

Edmonton, Ont.

The Hauges branch of the Lutheran Church have decided to build a college in Alberta, and a committee of that church are now looking for a desirable location. Ryley and Kingman have offered free sites. Tofteld and Edmonton will also make offers and it is understood that Camrose will offer a choice of two free sites as an inducement to locate the college there.

Emo, Ont.

Tenders addressed to W. W. Schweitzer, secretary-treasurer S. S. No. 5, Lash, will be received until May 5th for the erection of a 2 storey school house, 34 x 40 feet, with basement. Plans, etc., at office of the architect, Mr. Wastell, Fort Frances, or at office of the above mentioned.

Erindale, Ont.

Tenders are wanted at once for erection and completion of St. Peter's Church. Plans, etc., at Edwards & Saunders, architect, 18 Toronto Street, Toronto.

Fernie, B.C.

The congregation of Christ church (Anglican) are contemplating erecting a handsome edifice in the near future.

Fort William, Ont.

Competitive preliminary plans for the proposed library will be received until May 16th under "nom de plume" only, by John Whitehurst, chairman, property committee, 113 Dease street.

Hull, Que.

A committee, composed of M. Mousseau, Dr. Betishe, F. A. Labelle, Rev. Father Duhaud and others, has been appointed to confer with the city council as to the erection of a hospital.

Kaslo, B.C.

Instructions have been issued by the department of public works for the preparation of plans for the new government offices here, it being the intention of the government to invite tenders for this structure at an early date. Estimates for such, \$20,000. E. Criddle, government architect.

Kipling, Sask.

J. Sprout, secretary-treasurer, school board, writes that no tenders were received for erection of school. Arrangements have been made with A. F. Nesbitt, architect, to build.

Kildonan, Man.

Kildonan school board intend to carry out the educational requirements of the district, notwithstanding the by-law sub-

mitted to the ratepayers last month was defeated. A site has been secured and a contract price for the erection of the building has been fixed at \$8,000.

London, Ont.

The building committee of the Western Fair have recommended the erection of a new building for cement exhibitors.

The ratepayers of School Section No. 22 have authorized the expenditure of \$6,000 to increase the accommodation in the building. Noted in last issue.

Midland, Ont.

The Roman Catholics of Midland will erect a new and much larger church this summer on present site.

Moose Jaw, Sask.

Tenders are being called until May 7th for the erection of Land Title Building here. Architects, Storey & Van Egmond, Regina. See advertisement in this issue.

Montreal, Que.

The authorities of the French Maternity Hospital expect shortly to erect a large new hospital building.

A building permit has been issued to Protestant Commissioners for school, Peel street, \$178,000; School Commissioners of Hochelago, 16 Desery, one school, \$48,000.

Mr. W. E. Doran, architect, 180 St. James street, is preparing plans for a new hospital building to be erected at Chatham, N.B., for the Sisters of the Hotel Dieu.

It is stated that the Prince of Wales Fusiliers will erect an armory building at the southeast corner of Esplanade avenue and Rachel street at a cost of \$120,000.

The School Commissioners of Maisonneuve will erect two new school buildings, one on Latourneau street and one on Second avenue. Plans are being prepared by Mr. C. A. Reeves.

The School Commissioners of Ville St. Paul have decided to rebuild the recently destroyed Academy School Building, upon a new site. They also plan the erection of a new Academy for girls. It has been decided to offer the recent site of the Boys' Academy to the town council for the purpose of erecting a town hall.

Moncton, N.B.

Plans have been ordered for a new school building in the west end. Chairman Hawke is interested.

Nakusp, B.C.

Mr. Miller, government inspector of schools, has appointed Messrs. Jordan, Edwards and Peters as a building committee for a new school.

New Westminster, B.C.

J. Cunningham has offered a building site on Royal avenue to the Y. W. C. A. Canvass for funds for an institution will be postponed until after the Y. M. C. A. campaign.

North Vancouver, B.C.

The Presbyterian church intends to establish a second congregation. A site has been secured at the corner of Twenty-fourth and Chesterfield. Rev. J. D. Gillam, pastor.

Orillia, Ont.

J. H. Robertson, architect, has called for tenders for erection of Sunday school building for the Methodist church, Peter street.

Ottawa, Ont.

It is probable that Mechanicsville will have a new public school this fall. Trustees, J. Salmon, Leake and W. Burton.

Peterborough, Ont.

W. Blackwell's plans for the isolation

hospital have been approved by the Property Committee, and tenders will be asked for. Aldermen Graham and Morgan are interested.

Portage la Prairie, Man.

Tenders addressed to R. Rogers, Minister of Public Works, will be received until May 3rd for the erection of the "Old Folks' Home." Plans, etc., on application to the Provincial Architect, Government Telephone Buildings, Winnipeg.

Prince Rupert, B.C.

Munro & Lailey have completed plans for hospital, tenders for which will be called shortly.

Renfrew, Ont.

An extension to the hospital is being considered.

Revelstoke, B.C.

Tenders addressed to T. W. Bradshaw, secretary, Board of School Trustees, will be received until May 9th for the erection and completion of an 8 room brick and concrete school building (exclusive of heating and ventilating). Plans, etc., at offices of the secretaries at Vancouver, Kamloops, Calgary, Alta., and at the office of the architect, William King, this place.

Sarnia, Ont.

A. Darvill, chairman Public Buildings Commission, Alvinston, Ont., will receive tenders until April 30th for improvements on court house here.

Saskatoon, Sask.

The council are asking for plans of a new hospital, the cost of which will be covered by a bylaw to be submitted to the ratepayers. A similar bylaw for \$110,000 was recently defeated.

Tenders addressed to W. P. Bate, secretary, Box 1406, will be received until May 3rd for the erection, exclusive of plumbing, heating and ventilation of school. David Webster, architect, this place.

Smith's Falls, Ont.

The bylaw granting \$10,000 towards the erection of the hospital was carried.

Strathcona, Alta.

Messrs. Ritchie and J. J. McKenzie were appointed to decide upon the best site for the new 4 room brick school, which is being considered.

Stratford, Ont.

Pounder Bros. have started work on the new Registry office, which is to be of white brick, 34 x 50 feet.

The council decided to ask for new plans for the residence of cemetery superintendent, cost not to exceed \$2,400. The tender of Fink & Pletsch called for \$2,870.

St. John, N.B.

Tenders were called on the 25th for repairing and painting exhibition building.

F. Neil Brodie, architect, 42 Princess street, called for tenders on the 25th inst. for mason work required in the erection of addition to Out-Door Dept. of General Hospital.

Toronto, Ont.

Tenders will be called shortly for the new wing of Osgoode Hall, for which the Provincial House voted \$50,000.

A permit for the erection of a three-storey addition to the Kimberley avenue school, \$35,000, has been issued.

It is understood that the Knights of Columbus have bought the corner of Sherbourne and Linden streets as a site for a

club house. Mr. Geo. McCullough is interested.

Tenders are being called until May 2nd for the several trades required in the erection of Oakwood High School, St. Clair and Oakwood avenues. See advertisement in this issue.

The Metropolitan Church trustees have decided to make extensive improvements in the church building, \$30,000. The work will be commenced as soon as the contracts are let, which will probably be in June.

Tenders addressed to G. R. Geary, mayor, will be received until May 2nd for the tearing down and removal of sundry buildings now at Exhibition Park. Information at Parks Dept., City Hall.

The carpentering work of the reconstructed wing, as well as the new addition to the Parliament Buildings, is to be done by day labor, with Contractor Thos. V. Gearing in charge. Cost, \$40,000 or \$50,000.

The Toronto Branch of Canadian Manufacturers have proposed a plan by which \$50,000 may be raised as a residence for young women coming into the city to work in different industries. T. Roden, 127 Dunn avenue, chairman; H. D. Scully, secretary.

Victoria, B.C.

A new court house is needed. The erection of a law court building has been suggested as a remedy.

Whitby, Ont.

Tenders addressed to J. A. Harvey, architect, 502 Manning Chambers, Toronto, will be received until April 30th for each trade required in the enlargement of county court house. Plans at office of J. E. Farewell, K.C., County Crown Attorney, or at the office of the above.

Winnipeg, Man.

J. H. Tremblay has submitted a tender of \$12,000 for a Ruthenian school.

The council voted in favor of purchasing a site on Rupert street for a fire alarm signal station.

The Y. M. C. A. have purchased a site on Selkirk avenue, corner of Powers, on which they propose to erect a \$20,000 building.

At the annual meeting of the congregation of All Saints, a committee was appointed to consider the building of a new church. Hon. secretary-treasurer, A. H. Young.

Tenders are being called until May 14th for purchase of \$40,000 5 per cent. 20-year school debentures for district of Britannia, No. 1517. For further particulars apply to H. F. Tench, secretary-treasurer, King Edward P.O.

Woods Lake, B.C.

Tenders addressed to Minister of Public Works, Victoria, will be received until May 3rd for erection of small school here; also for erection and completion of two-room school at West Fernie. Plans, etc., at offices of government agents, Vernon, Fernie and at Department of Public Works.

Woodstock, Ont.

The by-law to authorize debentures for \$10,000, for the purpose of finishing the erection of new schools has been passed.

AWARDED.

Dunnville, Ont.

Munro & Mead, the Hamilton and Brantford architects, have been awarded the contract for the new \$30,000 high school at Dunnville.

Headingley, Man.

C. W. Johnstone, secretary-treasurer S. D. No. 2, writes that the successful com-

petitor for plans for the new 2 room school house here is A. F. Nesbitt, architect, Shoal Lake, Man.

Levis, Que.

Joseph Couture, of this town, has been awarded the contract for the construction of a new stone church at Causapscal, \$39,000.

Montreal, Que.

The general contract for the erection of the Saskatchewan University Buildings has been definitely awarded to Smith Bros. & Wilson, Regina. The contract for plumbing, heating and power installation went to Mr. James Ballantyne. Brown & Vallance, architects.

Quebec, Que.

The Commissioners have awarded the contract for the erection of a storehouse, containing police station on the crosswall, to Jinchereau & Lamonde, contractors. The plans of the new station have been fully approved by Chief Trudel, of the City Police.

Regina, Sask.

It is understood that the contract for the new Grey Nun's hospital has been let to Lyall & Company, of Winnipeg, \$100,000.

Sydney, N.S.

The following is a list of tenders received for the erection of the academy here: Falconer & McDonald, of Halifax, \$64,000, according to the specifications required, and for \$1,035 less if faced with the pressed slag brick of the Sydney Pressed Brick Company; Thomas Cozzolino, \$58,200; F. L. Dixon, \$50,200, for Nova Scotia red pressed brick, and \$58,300 for Sydney slag cement pressed brick. Messrs. Rhodes, Curry & Company submitted three offers, as follows: Nova Scotia red pressed brick, \$53,800; Nova Scotia red pressed brick with Sydney slag cement brick trimmings, \$52,300; Sydney slag cement brick with stone lintels and quoins, \$51,800. Indirect instead of direct heating, \$200 extra. Chappel Bros. & Company, Limited, forwarded the following propositions: Nova Scotia red pressed brick, \$52,300; Sydney gray slag cement brick face stock red brick backing, \$51,640; indirect heating \$220 additional. With Sydney pressed brick used throughout the walls, stone trimmings and indirect heating system the total of Messrs. Rhodes, Curry & Company's tender was exactly \$52,000. A motion was unanimously adopted awarding the contract to this firm, with the five year guarantee of the brick product as a proviso. Building to be ready for occupation by December 31st, 1910. Architect, McDonald.

Toronto, Ont.

Contracts for the construction of the Howland avenue fire hall have been awarded as follows: Masonry, John McMurren, \$12,441; carpentering, Thos. Lewis, \$5,200; plumbing, Fred Armstrong Company, Limited, \$785; electric wiring, Fred Armstrong Company, \$250; roofing, Flowers & St. Leger, \$650; painting and glazing, Hanna & Nelson, \$950; heating, W. Schulkins, \$1,115; total \$21,861.

Victoria, B.C.

The contract for the new school house at East Arrow Park has been awarded to Jas. Dancy at \$1,780.

Contracts for the erection of three new schoolhouses were recently awarded by the Provincial Minister of Public Works as follows: At Chase, two roomed school, \$3,824.90, A. McConnell; at Aberdeen, Chilliwack, one room large, at \$1,725, to Angus McLean; and at East Arrow Park, one room large, at \$1,780, to Jas. Dancy.

Residences

Brandon, Man.

Building permits were granted recently to F. Lissman for the erection of two frame residences on Fourth street, to cost \$2,600 each.

Building permits were issued to W. A. Cochrane for the erection of a brick residence on Louise avenue, \$3,000, and to H. Gillespie for the erection of a frame residence on 16th street, \$3,000.

Brantford, Ont.

Building permit has been issued to Hugh Howie, jr., for the brick dwelling on Chestnut avenue, \$4,800.

Building permit was issued to Mr. E. Swartout, for a brick dwelling on Northumberland street, \$3,500.

Galt, Ont.

The old opera house block in Galt, recently gutted by fire, is to be converted into 14 suite apartment houses, cost \$25,000.

Hamilton, Ont.

Building permit was granted recently to J. F. Sharp, brick dwelling on George street, for T. H. Knowles, \$3,000.

Montreal, Que.

Tenders are being received for erection of a residence at Jesus Island on Riviere LaPrairie, for Mr. P. E. Nadeau, Alphonse Piche, architect.

Hilder Daw Construction Company are erecting five residences on Bellevue avenue, Westmount.

Plans have been prepared and tenders are being invited for the erection of a residence on Westmount boulevard for J. A. Cameron. Messrs. Saxe & Archibald, architects.

Ottawa, Ont.

A new manse in connection with St. Paul's Presbyterian church is to be erected. Rev. J. Little, pastor.

Recent building permits include: F. L. Campbell, brick veneer apartment house, Preston street, \$10,000; Jos. Forget, brick veneer apartment house, St. Patrick street, \$4,500; Albert Blyth, brick veneer dwelling, Park avenue, \$4,300; Geo. Spratt, brick veneer dwelling, Spadina avenue, \$2,000; C. E. McDougall, brick veneer addition to dwelling, Besserer street, \$2,500; Philip Lennon, brick veneer, row of dwellings, Percy street, \$6,000; W. Gardner, double brick veneer dwelling, Bell street, \$3,000; E. P. Stanton, brick veneer dwelling, Nelson street, \$3,400; Robert Booth, brick veneer dwelling, Elm street, \$2,000; N. Copeland, double brick veneer dwelling, Hinton avenue, \$3,500; A. H. Grison, brick veneer dwelling, Regent street, \$4,500; James Maloney, brick veneer dwelling, Co-hourg street, \$3,000; John Gilmour, row of four brick veneer dwellings, Nelson street, \$7,000; C. Pattison, brick veneer dwelling, Pansy avenue, \$2,000; W. H. Thompson, brick veneer dwelling, Eccles street, \$2,000; Philip Lennon, row of four brick veneer dwellings, Percy street, \$6,000; Wm. Gardner, double brick dwelling, Bell street, \$3,000.

Outremont, Que.

Recent building permits include: John Black, two houses, MacDougall avenue, cost \$16,000; Mr. MacLean, one house, Rockland avenue, cost \$24,000; A. Searrett, six houses, Querbes and Fairmount avenue, cost \$33,000.

Owen Sound, Ont.

Tenders were called until 27th inst. for residence on Second avenue west by Foster & Clark, architects.

Souris, Man.

The Board of Trade is considering the formation of a loan and building association as a means of supplying the need of houses of a better class here.

Toronto, Ont.

Mr. Amos Shunk has obtained a permit for the erection of a three storey apartment house on the southeast corner of Palmerston avenue and Herrick street, \$20,000.

Mr. D. B. Hanna has been given a permit for residence on Castle Frank avenue, \$28,000.

Vancouver, B.C.

Jones & Aspell, 347 Pender street, are the architects in charge of the residence being erected at Shaughnessy Heights for Mr. H. A. Edgett.

Wright, Rushford & Cahill, Tunstall block, 709 Dunsmuir street, are the architects for the 6 storey apartment house on Davis and Jervis streets of pressed brick, 131 x 111 feet; cost, \$175,000.

Victoria, B.C.

Building permits have been issued to H. T. Knott for a frame one and a half storey dwelling, on Harbinger avenue, \$3,000; F. Clark, two storey dwelling with six rooms on Pandora avenue, \$2,500.

Winnipeg, Man.

Tenders are called until the 27th inst. for residence on Oakwood avenue for A. R. Burt. W. Bruce, architect, 222 McDermot avenue.

M. Le Page has received a permit to erect an apartment block on Balmoral street, between Ellice and Sargent avenue, \$10,000; also to W. W. Cross, apartment block, southwest corner Dorchester and Li-lac streets, \$40,000.

Tenders addressed to W. Wallace Blair, architect, 400 The Nanton Building, will be received until April 30th for the following trades required in the erection of the Rostrevor apartment building, plumbing and heating, sheet metal and roofing, painting and glazing, electric wiring and conduits, cut stone work, marble and tile work and lathing and plastering. Plans, etc., at office of the above.

AWARDED.

Fort William, Ont.

Alf. Cusson has been awarded the contract for residence, corner Ridgeway and Catherine streets, for F. R. Morris, \$15,000. Cameron & Son has secured the contract for the plumbing, and Anderson Company the heating. Architect, R. E. Mason.

Galt, Ont.

Thomas & Hancock have just closed contracts for several houses: Mrs. J. Allan, on Aberdeen road; James Bennett, on Hope-ton street, brick; and for a double brick on Bond street for Mrs. McDonald. Mr. P. Nicol has the carpenter work.

Montreal, Que.

Contract for carpentry work, residence for Mr. Darling, has been awarded to J. N. W. Morrison. J. R. Gardner, architect.

Contract for the concrete work, residence, Summerville avenue and Victoria avenue, for Mr. Bilteline, has been awarded to S. Whittaker. MacDuff & Lemieux, architects.

Contracts have been awarded as follows: Residence, Holton avenue, Westmount, for H. E. McIntosh, excavations, Ward & Haddock; carpentry, A. E. Fraser. Remaining trade to be let later.

Contract for workmen's department on Colborne street for Col. J. Carson has

(Continued on page 31)

Tenders and For Sale Department

COUNTY COURT HOUSE

TENDERS WANTED

Tenders addressed to J. A. Harvey, architect, 502 Manning Chambers, Toronto, will be received until APRIL 30 for each trade required in the enlargement of the County Court House, Whitby.

Lowest or any tender not necessarily accepted.

Plans may be seen at office of J. E. Farewell, K.O., County Crown Attorney, Whitby, or the architect's office, Toronto. 17

Board of Education

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received until MONDAY NOON, MAY 2ND, 1910, for the several trades required in the erection of

The Oakwood High School

St. Clair and Oakwood Avenues

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in the said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, W. C. WILKINSON,
Chairman of Committee. Sec-Treas.



Land Titles Building

Moose Jaw

Sealed tenders, endorsed on envelop "Tenders for Land Titles Building, Moose Jaw," will be received up to 1 p.m., SATURDAY, MAY 7TH, 1910, for the erection of a Land Titles Building on lots 36 to 40, in block 78, Moose Jaw, Saskatchewan.

Each tender must be accompanied by an accepted cheque for \$3,000, made payable to the Minister of Public Works, which cheque will be forfeited if the tenderer fails to execute the contract and bond when requested to do so.

The deposit of the unsuccessful tenderers will be returned when the contract is signed.

The right to reject any or all tenders or to waive any defects or irregularities therein is to be at the discretion of the Minister of Public Works.

Plans, specifications, form of tender, and all information may be obtained on application to the undersigned, or to Messrs. Storey and Van Egmond, architects, Regina.

A deposit of \$10 must be made for the removal of plans from the office, as a guarantee of their return.

The unauthorized insertion of this advertisement will not be paid for.

F. J. ROBINSON,
Deputy Minister.

Department of Public Works, Regina,
April 20th, 1910.

Tenders for Steam Roller

Will be received at this office up to 4 o'clock on THURSDAY, MAY 5TH, for a Steam Roller of 12 or 15 tons.

ALD. J. A. TANCOCK, A. D. GRAYDON,
Chairman No. 2 Committee. City Engineer,
17 London, Ont.

TENDERS for Reinforced Concrete Arch and Viaduct

Tenders will be received by Wm. Pantton, County Clerk, Milton, Ont., up to twelve o'clock noon of TUESDAY, MAY 3RD, 1910, for the construction of a Reinforced Concrete Arch of 135 feet span, and 340 feet of Concrete Viaduct Approach, on the Middle Road, between the Town of Oakville and the Township of Trafalgar. Also alternative tenders will be received as above for Concrete Piers and Abutments for a Steel Bridge for the same site.

Plans and specifications may be seen and all necessary information may be obtained at the offices of the undersigned, at Guelph, Ont., or of Jas. C. Ford, Reeve of Oakville, or of Barber and Young, consulting engineers, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

JAS. HUTCHEON,
County Engineer for Halton.
Guelph, April 16th, 1910. 17



Temiskaming and North- ern Ontario Railway Commission

Sealed tenders addressed to the undersigned will be received up to noon, MAY 11TH, for the following works:

(A) Construction of three revised standard sectionmen's houses at Gillies Depot, Uno Park, and Charlton. Tenders to be marked on envelope, "Tender for Sectionmen's Houses," and to be accompanied by certified cheque on chartered bank of Canada for the sum of five hundred dollars (\$500).

(B) Construction of one or more standard sectionmen's houses for bachelors, situated along the line of the T. and N. O. Railway, between North Bay and Cochrane, tenders to be marked on envelope, "Tenders for Sectionmen's Houses for Bachelors," and to be accompanied by certified cheque on chartered bank of Canada for the sum of one hundred and fifty dollars (\$150).

Plans and specifications may be seen and forms of tender obtained at the office of the secretary-treasurer, 25 Toronto street, Toronto, and at the office of the chief engineer, North Bay.

The lowest or any tender not necessarily accepted.

A. J. MCGEE,
Secretary-Treasurer.

Papers inserting this advertisement without authority will not be paid for it.
25 Toronto street, Toronto, April 22nd, 1910. 18

Town of Sault Ste. Marie, Ont.

Notice to Contractors

Sealed tenders will be received by the Town Clerk, C. J. Pim, addressed to T. E. Simpson, Mayor, Soo, Ont., endorsed "Tender for Cement Walks," up till noon on MONDAY, MAY 2ND, 1910, for the furnishing of all materials for, and the construction of approximately One Hundred and Thirty-Eight Thousand (138,000) square feet of Cement Concrete Sidewalk.

Specifications and instructions to bidders to be seen at the office of the Town Engineer, Town Hall, Sault Ste. Marie, Ont., on and after April 15th, 1910.

The lowest or any tender not necessarily accepted.

T. E. SIMPSON, Esq., W. F. GRANT, C.E.,
17 Mayor. Town Engineer,

TENDERS FOR BRIDGE

Sealed tenders will be received by the undersigned up to 2 p.m. on SATURDAY, THE 7TH DAY OF MAY, for the erection of one 125 foot steel bridge with concrete abutments and also for a 30 feet reinforced concrete arch, to be erected near Plattsville. Plans and specifications may be seen at my office in Woodstock or at the office of F. Vickery, Reeve, at Princeton.

The lowest or any tender not necessarily accepted.

F. J. URE, County Engineer,
17 Woodstock, Ont.

City of Winnipeg Elec- trical Distribution System

Tenders for Conduit and Sub-Stations

Sealed tenders on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope "City of Winnipeg Electrical Distribution System—Tender for" will be received at the offices of the undersigned up to 11 a.m., on MONDAY, 16TH MAY, 1910, for the following items:—

No. 51. Conduit.
No. 52. Construction Conduit Runs, 1910.
No. 53. Sub-station Transformer and Switching Apparatus.

Copies of the plans, specifications, and forms of tender will be obtained at the Power Engineer's Office, Carnegie Library Building, Winnipeg.

These specifications may also be examined at the offices of Messrs. Smith, Kerry & Chace, Confederation Life Building, Toronto, Ont.

Each tender must be accompanied by a certified cheque, as set forth in the "Instructions to Bidders," which cheque will become forfeit to the Corporation in the event of the successful tenderer refusing or neglecting to sign a satisfactory contract when called upon so to do.

The City reserves the right to reject any or all tenders, or to accept any bid which shall appear advantageous.

M. PETERSON,
Secretary.

Office of the Board of Control,
Winnipeg, April 14th, 1910. 17

City of Vancouver

Tenders for

Garbage Destructor Plant

Tenders will be received by the undersigned up to 3.00 p.m., TUESDAY, THE 31ST OF MAY, 1910, for the installation of a Garbage Destructor Plant at the Bridge street yard, on the south side of False Creek in the City of Vancouver, British Columbia. The plant must be capable of destroying not less than seventy tons of mixed garbage per day of twenty-four hours.

Tenderers will be required to submit plans and specifications with their proposals and furnish a satisfactory bond and guarantee that the destructor will fulfill all the provisions of the specifications.

The tendered price is to include the erection of the stack and all necessary buildings.

A deposit of an amount equal to 5 per cent. of the contract price must be made with each tender by marked cheque payable to the City Treasurer.

The lowest or any tenders not necessarily accepted.

W. McQUEEN,
City Clerk.

19

Intercolonial
Railway Tender

Sealed tenders addressed to the undersigned, and marked on the outside, "Tender, Railway Nelson to Chatham," will be received up to and including TUESDAY, MAY 10TH, 1910, for the construction of a line of railway between Nelson and Chatham (N.B.), a distance of about 8.28 miles.

Plans and specifications may be seen at the Station Master's Office, Chatham (N.B.), at the Chief Engineer's Office, Moncton (N.B.), and at the office of the Secretary of the Department of Railways and Canals, Ottawa (Ont.), where forms of tender may be obtained.

All the conditions of the specification must be complied with.

A. W. CAMPBELL,
Chairman.

Government Railways Managing Board,
Ottawa, Ont., April 12th, 1910. 18

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—First class general foreman or superintendent by a firm of general contractors with head office in Winnipeg, Manitoba. Must understand all kinds of contractors' machinery and be able to handle all kinds of concrete work, coffer dams, etc. A steady position for the right man. State salary expected and give references. Address Box 969 "Contract Record," Toronto. 18

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—Van Kannel Revolving Door and Post Office Fixtures at half price. Apply to H. Weller, Welland, Ont. 18

FOR SALE.—Eighty-eight (88) pieces of Lackawanna Steel Sheet Piling, twenty-two (22) feet long, twelve and three-quarter (12¾) inches wide, three-eighths (¾) inch thick, WM. LESSLIE, Walkerville, Ont. 1

AGENTS WANTED.—United States manufacturers of a well-known waterproofing compound wish to get in touch with reliable firm or individual to represent them in Canada. This would be a desirable opportunity for an energetic young architect or engineer. Box 970 "Contract Record." 20

Positions Wanted

Advertisements under this heading one cent a word per insertion. B & No. ten cents extra.

QUARRY MANAGER, ENGINEER, 32, at present in charge of marble quarry and works, accustomed to preparing for the market, building and decorative stores, wishes modest appointment, would consider partnership in small quarry. Apply "Scott," care Street's Agency, 30 Cornhill, London, England. 18

Public Buildings, Churches,
Schools, etc.

(Continued from page 29)

been awarded to Peter Lyall & Sons Limited. The contract for residence, Columbia avenue, for Messrs. N. J. Pope has been awarded to F. M. Hoffman. J. H. Rodden, architect.

Contracts have been awarded as follows by Messrs. Hutchison, Wood & Miller for a residence Mr. D. W. Ogilvie, Summerhill avenue: Masonry and brickwork, John Stewart & Company; carpentry, D. M. Long; roofing, Campbell-Gilday Company; steel work, structural steel Company; plastering, E. H. Knott; wiring, Montreal Electric Company; painting, Hutchison & Stient; mantles, etc., G. R. Locker Company; interior decorating, G. E. Blackwell.

Business Buildings and Industrial Plants

Brandon, Man.

It is stated that the Cockshutt Plough Company will erect a three storey warehouse, 80 by 100 feet, here. E. A. Mott, general manager; D. Shirriff, local agent.

It is reported that the contract for the interior fittings for the C. N. R. hotel has been awarded to the Hanbury Company; heating to Brandon Electric Light Company.

Tenders addressed to Frank R. Evans, 506 Somerset Building, Winnipeg, will be received until May 2nd for all trades (except plumbing, heating and electrical work) required in the erection and completion of a five storey reinforced concrete office building, corner of Rosser and Ninth, for Clement Bros. Plans, etc., at once of Clement & Clement, this city, or at the office of the above.

Brantford, Ont.

The Watrous Engine Works Company are having plans prepared for additions to their factory.

The Crown Electrical Company, of St. Charles, Ill., manufacturers of electrical supplies and gas fixtures, will establish a branch factory in this city for the manufacture of Canadian lines. Industrial Commissioner, Dowling. The factory will be erected at once.

Calgary, Alta.

Officials of Quaker Oats, of Chicago, have been negotiating as to the location of a \$500,000 plant here.

A revised route map shows the entrance of the C. N. R. line on the same right of way as the G. T. P. into the city, and the same terminal site as the G. T. R., showing that the barracks property will be used as a union depot.

Cranbrook, B.C.

The sash and door factory will build a new mill beside their old one

Creston, B.C.

The Rogers saw mill here was damaged by fire to the extent of about \$10,000.

Chatham, Ont.

A large warehouse owned by Flavell's collapsed on the 22nd inst.

Dundas, Ont.

On May 16th the ratepayers will vote on a bylaw to guarantee \$30,000 bonds of the proposed engine works.

Dunnville, Ont.

The ratepayers carried two bylaws. To loan \$30,000 to the promoters of an industry for the manufacture of auto parts, furnaces, shovels and other articles; to grant a fixed assessment of \$25,000 and free water for ten years to the Dominion Hammock Manufacturing Company.

Edmonton, Alta.

Edmonton Lumber Company's mill was destroyed by fire on the 20th inst. Estimated loss, \$20,000. Owners, Minneapolis capitalists and W. H. Clarke, of this city.

Fort William, Ont.

J. B. Persee, of Tees & Persee, Winnipeg, has been looking for a suitable site for a branch warehouse.

Hamilton, Ont.

The premises of Taylor & Mulvaney, Charles street, were damaged to the extent of about \$6,000.

London, Ont.

A business block on Richmond street, occupied by Ryan & Russell, Regal Glove & Mitt Company, was damaged by fire on the 23rd inst. Total loss, \$4,000.

Montreal, Que.

The Molsons Bank contemplate the erection of a new office building at corner Ontario and Lasalle street.

Plans for the Yorkshire Insurance Building are nearing completion, and the architects, Saxe & Archibald, expect to call for tenders shortly for erection of same.

Plans and specifications have been prepared and tenders will shortly be received for the construction of four modern stores, corner St. Andre and St. Catherine streets. W. E. Doran, architect.

Plans have been prepared for an extensive five storey manufacturing plant to be erected on Parthenais street. A further announcement will be made when it is definitely decided to go ahead with this work.

Moose Jaw, Sask.

Estimated cost of Dominion Bank branch (on which tenders closed on 18th inst.), \$60,000.

McAdam Junction, N.B.

Tenders are being called until May 2nd for building addition to station and hotel. Plans, etc., with G. L. Wetmore, division engineer, St. John, also with F. M. Rutter, resident engineer.

Nakusp, B.C.

It is reported that another saw mill is to be built here. Cleveland, Ohio, capitalists are said to be interested.

Port Arthur, Ont.

The city officials have signed a tentative agreement with the Canadian branch of the Ironclad Manufacturing Company, by which the company agrees to a site at the north end where steel barrels and enamelware will be made.

Prince Albert, Sask.

The Northern Produce Company are advertising for tenders for the erection of a \$50,000 abattoir. Noted in issue of March 30th.

Portage la Prairie, Man.

B. D. Kirk, architect, of Crookston, Minn., has been here in connection with the building of the warehouse for the Reg-

ers Fruit Company. Noted in issue of April 13th.

Prince Rupert, B.C.

The Bank of British North America will erect a building on the corner of Third avenue and Fulton street, the Union Bank on the corner of Second avenue and Third street.

Quebec, Que.

A building permit was recently issued to Parisian Corset Company, new building, Colomb and Turgeon streets, \$15,000.

Tenders are being called until the 28th inst. by Rene P. LeMay, 21 d'Aiguillon street, architect, acting for Quebec Railway, Light & Power Company, for the demolition of Jacques Cartier market.

The Bank of Montreal have purchased 2,000 feet of land, corner St. John and Palace streets, and will in the near future erect a modern office building. (Confirmed by Montreal head office, architect not yet decided.)

The Eastern Canada Steel & Iron Works, Limited, is shortly to erect here a plant for the manufacture of structural steel for buildings, bridges, etc. The company has secured a large track or land at St. Malo, on the line of the C. P. R., measuring some 400,000 square feet, on which the workshops and other buildings will be erected. The plans for building are completed and it is expected that work on the structures will be commenced within the next ten days. Capital, \$200,000. President, R. Forget; secretary-treasurer, J. T. Donohue.

Regina, Sask.

Tenders addressed to W. J. Uren, superintendent, will be received until April 30th for heating and plumbing of Regina freight shed. Plans at office of H. B. Sims, resident engineer Moose Jaw.

Revelstoke, B.C.

A \$100,000 hotel in the business section of the city is being talked of.

Sarnia, Ont.

Conway & Murray, representatives of a Detroit stove manufacturing company, with large factory at Fremont, Ohio, will confer with the Board of Trade and council as to the location of a Canadian branch here. Mayor, A. J. Johnston.

St. Catharines, Ont.

The ratepayers voted on bylaws to grant exemption to the Canadian Crocker-Wheeler Company, Monarch Knitting Company and St. Catharines Woollen Mills Company.

St. Thomas, Ont.

Negotiations have been opened with this city by an Eastern Ontario woodenware concern as to removal here. Mayor Guest.

Tenders have been called for the several trades for erection of shoe factory for A. E. Medcalf. N. P. Darrach, architect.

The Norsworthy Company have purchased necessary land to enlarge their plant and will take steps very shortly to go on with the erection of the new buildings.

Toronto, Ont.

Gourlay, Winter & Leeming have obtained a permit for the erection of a four storey warehouse on Logan avenue, near Queen street; cost \$68,000.

De Young & Company, haberdashers, it is reported, are contemplating the extension of their business, three branches in the city being talked of, as well as branches in other cities.

Vancouver, B.C.

Building permits have been issued to Leek & Company for brick building, Hom-

er street, \$61,000; H. Bell-Irving & Company, brick office building, corner Railway and Cordova streets, \$15,000.

J. W. Considine, of Seattle, is erecting a 10-storey office building above the opera house. When the latter's lease expires in December, 1912, the lower floors will be installed.

Property on the east side of Granville street, between Helmecken and Nelson streets has been purchased, it is said, as a building site for a large up-to-date business block. A. S. Cole (R. V. Winch & Company) effected the sale.

Vermillion, Alta.

A bylaw to bonus the flour mill of Wiebe & Son, of Langham, for \$10,700 has been passed.

Victoria, B.C.

A building permit has been issued to the Dominion Realty Company for a two storey building, with concrete foundation, corner of Douglas and Bay streets, \$7,000.

H. S. Griffiths is the architect for the block to be erected by the Westholme Lumber Company. T. A. Brydon, contractor, has commenced operations on the Lee building, corner of Fisguard and Government streets, \$30,000.

Wadena, Sask.

Several proposals have come in to the Board of Trade re the building of a flour mill here. A municipal loan is being floated for the erection of a skating rink.

Wiaraton, Ont.

The Commercial hotel was destroyed by fire on the 18th inst. Loss estimated at \$4,500. A. Davis, proprietor.

Winnipeg, Man.

A building permit has been issued to the Eli Sand Company, Pembina street, for a factory, \$50,000.

The T. Eaton Company have taken out a permit for \$100,000 for extension of plant on east side of Hargrave; Alloway & Champion, office building, Main street, \$33,000. Jordan & Over, architects.

The Dominion Tar & Chemical Company has purchased an additional thirty acres (total, seventy acres) for their proposed extensions.

Tenders addressed to W. Wallace Blair, architect, 400 The Nanton Building, this city, will be received until April 30th for the erection of an office building on Main street for T. D. J. Farmer. Plans, etc., at office of the above.

It is stated that the Bank of British North America has purchased the northwest corner of Bond and Regent streets, and the Bank of Toronto, the northeast corner. It is the intention of both these financial institutions to build.

AWARDED.

London, Ont.

Geo. Anderson & Company, Limited, Montreal, Que., have been awarded contract for electric travelling cranes in connection with the new works of the Geo. White & Sons Company. Installation some time in July.

Montreal, Que.

The contract for the excavation and foundation work, new Y. M. C. A. building, Drummond street, has been awarded to John Stewart & Company. Ross & Macfarlane, architects.

The contract for masonry and brickwork, Crescent Manufacturing Company's new plant, has been awarded to John Stewart & Company. Finlay & Spence, architects.

The Phoenix Bridge Company have been awarded the contract for steel work for

the new store and warehouse building to be erected on St. Catherine street for H. P. Labelle & Company, Limited. G. A. Monette, architect. Other trades not announced.

The Atlas Construction Company have the contract for the erection of a 4 storey office and factory building, Mount Royal avenue and Clark street, for Messrs. Timmins, estimated cost \$62,000. Mr. Philip Turner, F.R.I.B.A., has been appointed supervising architect.

Prince Rupert, B.C.

The Bank of Montreal has let the contract for a building to be used as offices for their business and residence for the manager to Westholme Lumber Company.

Toronto, Ont.

Contract for the sheet metal and roofing work on warehouse for Mr. F. Nicholas, King street west, has been awarded to A. B. Ormsby, Limited.

Contracts were awarded as follows for the Upper Canada Tract Society Building on College street: Masonry, Smallwood Bros.; structural steel, Dominion Bridge Company; fireproofing, Robt. Bennett; ornamental iron, Dennis Wire & Iron Works; carpentry work, A. Clark & son; roofing, Duffy & Sons; iron windows, Aikenhead Hardware Company; plumbing and heating, F. Armstrong; marble work, Hoidge & Company; plastering, Blackburn & Son; plumbing and glazing, Conlan Bros.; mosaic flooring, Toronto Flooring Company. One contract not yet let. Gordon & Hellwell, architects, Confederation Life Building.

Welland, Ont.

Contractor Patton has the contract to erect a one storey cement block building, 50 by 135 feet, with cement foundation, for the Supreme Heating Company.

Winnipeg, Man.

It is stated that the contract for the interior finishing of the new C. N. R. and G. T. P. union station has been let to Lyall & Company, \$300,000. Work to be completed by October.

Power Plants, Electricity and Telephones

Brockville, Ont.

Ratepayers voted the light and power department \$50,000 for the purpose of improving and extending the town lighting system.

Bracebridge, Ont.

P. Hutchison, secretary-treasurer, Bracebridge & Muskoka Lakes Telephone Company, writes that owing to some changes having to be made the contracts have not yet been let, for the construction of line from Port Carlington Bala.

Brandon, Man.

The city council passed a resolution offering a contract to the E. B. Reese Engineering Company for the supply of power on switchboard at \$20 per h.p., etc. Final arrangements to be completed at end of May, 1910.

Estevan, Sask.

The by-law authorizing the expenditure of \$25,000 for a municipal electric light plant has been passed.

Lloydminster, Sask.

The ratepayers ratified a by-law passed by the town council granting a franchise for eight years to W. Johnson for the operation of an electric light plant.

Regina, Sask.

Electric light by-law was carried.

Contract Record

ESTABLISHED 1886

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Municipal Progress, Advance Information

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J. V. MCNAULTY, RepresentativeLONDON, ENG. - - - 3 Regent St., S.W.
W. A. MOUNTSTEPHEN, Representative

SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto April 27, 1910

No. 17

Great Britain's Opportunity

The attention paid to the Canadian market by British firms is of such a desultory nature that it is really refreshing to note that one who is claimed to be a "competent authority" has been criticising in a popular London paper the "insular arrogance" of old country houses in treating foreign orders of all kinds. The writer quotes the unwise policy of a Sheffield firm as an example. The firm in question was approached by the representative of a Canadian wholesale hardware house concerning the supply of axes of a particular shape and weight suited to Canadian needs. There was nothing complicated about the requirements, and what was asked it was only reasonable for a progressive house to supply. But the firm demurred, and in the end the order went to the United States. Our "competent authority" waxes satirical in his criticism of such business methods and slates the Sheffield firm thus:

"They had been manufacturing axes of set pattern since the days of William the Conqueror. They had supplied axes for every public execution worth noting and they could show unsolicited testimonials from Henry VIII. and Cromwell. They saw no reason why Canadians should not adapt themselves to the models already stamped with the approval of the people of England."

Here is the secret of the whole thing. Canadians are disposed to encourage the British manufacturer, but they feel that it is up to the latter to adapt himself to their requirements and show the same amount of enterprise that they themselves have to show when competing in the United States and other foreign fields. We have in mind the case of a young salesman for a British firm interested extensively in municipal supplies and contractors' requirements. He had been assigned the Canadian territory and was looking for business between

Montreal and Vancouver. He was affable enough and would like to have made contracts, but he was not only ignorant of the country but also of the lines he was trying to sell. He would admit that he could only give approximate prices and would have to obtain a proper estimate from headquarters. In the meantime, of course, other firms would be consulted and he would lose all chance of business. Eventually he was withdrawn from the field, his firm having concluded that the time was not yet ripe for Canada.

Such things as this affect not so much Canadian trade as England's commercial supremacy. The time is ripe for Canada, and the sooner the British manufacturer appreciates the great scope of the Canadian field and learns that it is to his advantage to send men of weight—competent, forceful men—to cultivate Canadian trade and study Canadian conditions, the better chance he will stand of obtaining a foothold in this country. The verbal castigation of the "competent authority" is timely.

Progress of Canadian Trade

During the twelve months ended January 31, 1910, the total trade of Canada amounted to \$655,546,884, an increase of \$102,072,692 over the same period for 1909. Compared with the twelve months period of 1908, which was the record year for Canadian trade, the increase was \$10,188,640.

An analysis of the imports for consumption and total exports separately show that the import trade for the twelve months ended January 31, 1910, was \$10,464,625 less than for the same period in 1908, while the export trade showed an increase of \$20,653,265.

No other country in the world can present such a remarkable advance in so short a time following so serious a decline as that recorded in the fiscal year ended March 31, 1909.

Accounting Methods for Contractors

It is astonishing how little attention the average contractor pays to bookkeeping. Careful records are generally kept up to a certain point which will show the output of a steam shovel or the work of a gang of men, but they neglect wholly a proper consideration of overhead charges. Not long ago some accounts were submitted to this journal in which no attention whatever had been paid to the heavy interest charges on the capital invested in plant. When a business man invests a sum of money in an enterprise he does not, as a rule, begin to count his profits until he has set aside 4 per cent., at least, as the interest which his money would earn for him if invested in some other way, requiring no attention whatever on his part. A man who puts \$100,000 in a big construction plant and fails to charge off 4 per cent. annually for interest on this sum is simply deluding himself as to the profits of his work. Another thing that is often neglected is the interest paid on borrowed money: why this is overlooked is inconceivable, yet the fact remains that it often is. Consequently, when the figures of unit costs are worked up and important overhead items like those mentioned are neglected, people who are ac-

quainted with real business methods are inclined to look askance at the statements. Several large contracting firms have recognized this uncertainty and have employed experienced accountants to devise systems of bookkeeping. These extend not only through the office work, but also out into the field, the engineers and contractors co-operating with their auditing advisers to devise a system which is workable and accurate. Contracting operations have become so large that it is absolutely necessary in these days of keen competition and small profits to have some such system. Contractors must rely more and more on bankers for money, and those firms which can submit to the representatives of bankers a set of books and an accounting system which is absolutely clean-cut, stand a far better chance of securing money at a low rate than the men who base their applications solely on their records of past successes.

Concerning Clay Products

That there is activity and aggressiveness among manufacturers of clay products in certain parts of this continent—in spite of what some people affirm to the contrary—may be gathered from the following article published in a recent issue of the "Improvement Bulletin":

"The efforts of the Northwestern Clay Association show that organization to be working out a system of operations which is bound to make it of great assistance to the clay industry in its field. The members are looking into the question of giving brick and clay products generally their proper place in the consideration of the public which pays the bills for new construction. The tentative plan for the development of a wider appreciation of the real worth of brick for home building is a suggestion which ought to receive the hearty co-operation of every insurance company which operates within the territory of the organization, as well as the support of every building inspector and every one who is interested in keeping down the fire risk and the cost of fire protection. All over the country arise complaints about the high cost of insurance and the expense of maintaining a fire protection which is admittedly inefficient, but is all that the community can afford. Vigorous roars are let forth because of alleged combination methods which lead to exorbitant insurance charges. And yet an inspection of the costs of insurance reveals that in many respects there is little or no ground for the charge. It is simply assuming a serious hazard, and then complaining because of the cost that it involves. The proposition of the clay association to push the real worth of brick for dwelling construction is one which will naturally lead to better fire protection and lower hazards. Another thing which will work to the ultimate benefit of the brick industry is the matter of formulating a set of standard specifications to which clay brick must conform. This is proposed for the city of Minneapolis, but it should and doubtless will extend and become fairly general. Brick manufacturers know the real worth of their product and do not appreciate the bad effect upon the public mind when it is observed that some brick in a pile will be crushed and broken merely from falling. Yet people who see such incidents will often assume that they are fair samples of the strength of brick, instead of being exceptions. Greater care in excluding poor and faulty brick, from lots to be delivered, will work to the benefit of the business in more ways than one. The Northwestern Association has taken up a good move, and one which can and should be supported by many who are not interested in the brick business."

Face Brick and "The City Beautiful"

BY R. M. COMBS

If a tailor were to show you a suit of clothes, the front of which was of the finest, up-to-date, attractive material, with the sides and rear elevation made of the fabric used in your underwear, what would you think of him and his shop? You would like to say he was crazy, but his name is "Custom" and he is bigger than you. You think of his age and resolve to reason with him that the entire suit would look best made of the same goods all around. So it is with a building. Buildings look to a man who has ideas for a "City Beautiful" like this suit of clothes, built with a finished front and a common rear and sides.

The average unattached residence or apartment building may require from five to ten thousand face brick and from fifteen to thirty thousand common brick for the other three sides. Stop and see how little more it will cost you to build entirely around with face brick. In the first place you cut common brick out of all exposed wall surface and replace them with the same brick used in the front. These, in many instances, are larger than the common brick, consequently not so many required. The cost of laying in many cases will be the same. If it should be more, the increase per cent. is such a small item in the total cost of the building, that it is hardly discernible.

In the large cities "sky-scrapers" towering above the surrounding buildings, as they are built to-day, look from the rear and sides like grain elevators backed up to be unloaded. With a little study and thought of a "City Beautiful" these giant blank walls could be made to assert the fact that they are office buildings. By using the same brick all around or by using a cheaper brick that would harmonize with the facing material, this effect could be accomplished. This is especially true of Chicago, because, within a radius of one hundred and fifty miles there are being made every day hundreds of thousands of good and beautiful red and brown brick that can be purchased for very little more than the cost of common brick and laid in the wall with no more expense than common brick.

The interest in the creation of a "City Beautiful" has been taken up all over the country by Boards of Trade and every citizen who has a pride in his town. They have spent vast sums of money in plans for parks and boulevards, making choice localities for buildings which the wise man will construct of brick and the wiser man of the same brick on all exposed surfaces.

What are the Brick Manufacturers Doing?

The manufacturers of cement are spending thousands of dollars annually in publishing plans and literature that advocate concrete as the artistic building material and are able to point to many beautiful homes made of the same material all around. These people have so widely advertised their material as an artistic, durable and inexpensive building product, that the Coliseum in Chicago and other large buildings throughout the land are filled to overflowing at their annual shows. Architects and owners swarm there looking for something they can use on all four sides of buildings that will make them look like a whole structure and not like a stall with a curtain let down to serve as the front.

In contrast to our cement friends, what are we brick men doing toward the creation of the "City Beautiful"? We brick manufacturers allow the architect and owner to disfigure our best localities with an abortion that has

*Extracted from paper read at the Annual Meeting of the Clay Manufacturers Association.

one kind of brick for the front and a totally different one for the balance of the building. We do this without a murmur or an effort to correct this deplorable condition.

Are we to let the face brick industry die the natural death that overtook stone as material for fronts? Stone men thought everyone knew what they had and sat back allowing Tom, Dick and Harry to come to them. They had no thought of the "City Beautiful." It shows in the buildings.

Let every brick maker wake up to the fact that by constantly suggesting to a customer the use of face brick all round, we will shortly compel him to see the necessity of making his building look balanced in design. In my opinion this subject is a most important one and I sincerely urge every one of you to wake up to the fact that we have got to show architect and owner how little more it would cost to use the same brick throughout for facing and that by so doing he would have his color scheme complete.

It is for each one of us to push this spirit of a "City Beautiful" from our own standpoint. If we find a man

those already laid, the engineer says this class of pavement has been found more expensive than asphalt. There were laid, in the year, 71 concrete walks with a mileage of 9.54, at a cost of \$44,878. This is 16 1-10 cents per foot, as compared with 17 cents the previous year. Only five plank walks were laid, the cost as local improvements being \$1,598.17.

New Departmental Building at Ottawa

The accompanying sketch represents the western side of the new departmental building at Ottawa, the contract for which will be let this spring. The building is to provide room for Government branches which are now being accommodated in rented buildings and which are scattered all over Ottawa. The new structure will be located in Major's Hill Park, across the locks of the Rideau Canal from the present group of Parliamentary and departmental buildings. It will be joined to the present Government group of buildings by an ornamental bridge thrown across the Rideau Canal. The new building will be constructed of Nepean sandstone, the ma-



Perspective view of proposed Government Building at Ottawa for which contracts will be awarded this spring

so in love with common brick, suggest his making his front of the same thing. Even this will give harmony in color, and will be an improvement on the arrangement of the suit of clothes to which I have referred.

Low Cost of Paving at the Federal Capital

The report of City Engineer Ker, of Ottawa, Ont., for last year shows that 1909 was a busy year for the department. A feature of the report is the manner in which the cost of pavements and sidewalks has been reduced. The most noticeable reduction was in the cost of asphalt paving, the lowest price being \$1.70 per square yard. The reasons given for the reduction are the civic asphalt plant and the fact that on every work the city engineer put in a tender. Where his price was lowest he did the work by day labor. The consequence is that pavements cost a dollar a yard less than before the civic plant entered into competition. The cost of sidewalk construction was also reduced almost a cent per foot, the reason being the long stretches of walk laid at a time. Only one block of tar macadam was laid during the year. Owing to the short life of this pavement, five years, and the extensive repairs required by

terial of which the departmental buildings are built. It will have an elevation of six storeys on the side shown and of eight storeys on the opposite, or Sussex street, side; a length of almost 600 feet, or two city blocks, and a width of almost 200 feet. It will contain about 600,000 feet of floor space.

Shortage of Labor in B. C.

Mr. R. Marpole, vice-president of the Esquimalt & Nanaimo Railway Company, of British Columbia, states that 58 miles of construction work will be commenced on the east coast of Vancouver Island as soon as the right-of-way is cleared. The only trouble that is likely to arise, according to Mr. Marpole, is that from a scarcity of labor. Concerning this, Mr. Marpole makes the following remarks:

"There is now apparent a scarcity of labor, which I am afraid will result in retarding construction unless more men are brought into the province to meet requirements in this respect, not only on this railway but on practically all other works and improvements now being carried out in British Columbia."

Proposed Rosenthal Building, Ottawa

The accompanying perspective illustrates a pleasing scheme evolved for Messrs. A. Rosenthal & Sons, Limited, of Ottawa, by Messrs. Weeks & Keefer, architects, also of Ottawa. Messrs. Rosenthal will occupy the basement, first floor and half of the second floor. The remaining part of the building will be devoted to office purposes. The proposition being of a strictly commercial nature, and light being available only from the front and rear, it was necessary to have the maximum amount of window area, which could only be obtained by piers and large bays. It was the intention originally to execute the entire front elevation in light Philippsburg



Design for Building to be erected by Rosenthal & Son, Ottawa.
Architects: Weeks & Keefer, Ottawa, Ont.

marble and the design here shown was prepared with that end in view, but it has since been changed to terra cotta above the second floor, the marble being retained for the ground floor only. The large bays, cornice and window treatment of ground floor will be carried out in cast iron. The scale of the architectural treatment is large with the detail in French renaissance. The ground floor being used entirely for the sale of jewelry, etc. The store proper will have a double row of polished marble columns and all interior finish will be of quartered white oak with silver gray filler and fittings of silver, to harmonize with the stock. The ceiling and walls will be panelled and modelled in plaster, finished in light shades of gray, picked out with silver. Building operations will be commenced about the 1st of May and finished, it is expected, by December 1st.

Building permits issued at Vancouver, B.C., during the first nine days of April totalled \$631,250.

Factory Architecture

It seems a rather strange fact that with all the progressive ideas in designing furniture, mill work, and even machines, that there is apparently very little effort at embodying the elements of beauty with those of utility in factory design, says the "Woodworker." In short, there is practically no effort at the artistic in factory construction. We design factory buildings with peculiar characteristics—the most common one, however, among the larger factories, is long, straight walls. Some of them may be imposing, some of those mammoth institutions with long, high walls, but so is the prison wall imposing and impressive, but the impression it gives it not an inviting one; neither is the impression many a big factory gives. In fact, many of them are decidedly gloomy-looking from the outside, and while there may be something inspiring in their magnitude, there is nothing much that appeals to one in their architecture.

We have made considerable progress in the way of designing for utility. We have the saw-tooth roof to give us more light, but who is there that can discern an element of beauty in a saw-tooth roof? Might we not even have a more artistic roof with prism glass? We have more light and a much better architectural effect. Might we not have diversion from the old straight walls and square corners, and a pleasing variation in the architecture of factories, just as we have it to-day in the architecture of homes? It would not be fair, probably, to argue that we should get this variation even at the sacrifice of utility, but there ought to be practical methods for combining utility and beauty in factory designing, and it is certainly time we give more attention to this.

Machinery people have long since given attention to beauty in design as well as utility, and everywhere, from the engine to the finishing room, we may see some effort of this kind. Also, we may see a brightening up of the interior of a factory by the eliminating of heavy line shafts and the installation of electric transmission, and by the use of paint and whitewash, and various other things suggesting progress, but in all this progress there is, when we come to look at it, very little that has been made in the way of artistic design in factory building. Isn't it time we give more attention to this subject?

City Engineer Ker, of Ottawa, proposes to experiment on the dusty roads of the Federal capital during the coming summer with "Tarvia" instead of oil. The cost of a car tank full of "Tarvia" is only about \$800 and one treatment is held to be sufficient for any decent road.

The Quebec & Orleans Island Railway Company have applied to the Provincial Government of Quebec for permission to construct a mono-railway system on the gyro-scope principle. The company claims that the one-rail system has been demonstrated satisfactorily. They are prepared to start work in three years and to complete the system in ten years.

Brandon, Man., has an important programme of building construction in hand. Some of the more important items are: office building and warehouse for A. E. Mackenzie & Company; offices and warehouse for the International Harvester Company; C.N.R. hotel; Bullock apartment block; implement warehouse for Beattie & Sons; new Knox, Methodist and Presbyterian churches, and additions for the Brandon Hardware Company.

Practical Data on Building Construction

How to Design Masonry Foundations—Handy Reference Tables Showing Ultimate Compressive Strength of Materials and Practical Working Values

BY PAUL T. LEHNER

Wall footings should be placed directly under or preferably a little outside the centre of the wall, which position tends to slightly tilt the walls inwards, but will be kept in place by the floor beams, etc. (See fig. 1).

The following proportions for the design of pier foundations of masonry and concrete are used in conservative practice.

For the capstone, fig. 2, make "T" at least twice "A."

For the body of the pier use a batter or slope of not more than 1 inch in 2 inches.

For the footing make the offset "D" not more than one-half of "S." "S" is, in good practice, never more than about 16 to 18 inches.

Safe Bearing Values for Foundations

Rock	20	tons per square foot
Gravel	6 to 10	tons per square foot
Sand	6 to 10	tons per square foot
Gravel or sand with clay	4 to 6	tons per square foot
Dry clay	2½	tons per square foot

(One ton equals 2,000 pounds.)

The high values are for the most compact materials. All of the above are assumed to be reasonably free from water, or anything which would occasion a lateral displacement.

A good rule to adopt when designing foundations is as follows:

"That which is below always determines the size of that which is to go above."

Problem—What size foundation is required to support a column that supports a load of 141,000 pounds? Assume the supporting soil to be a stiff dry clay, the body of the foundation is of good Portland cement and cinder concrete, and the capstone of granite. Assume our foundation to weigh 9,000 pounds, which makes our total on soil equal 150,000 pounds.

Solution—Calculation for Size of Base Plate—In the

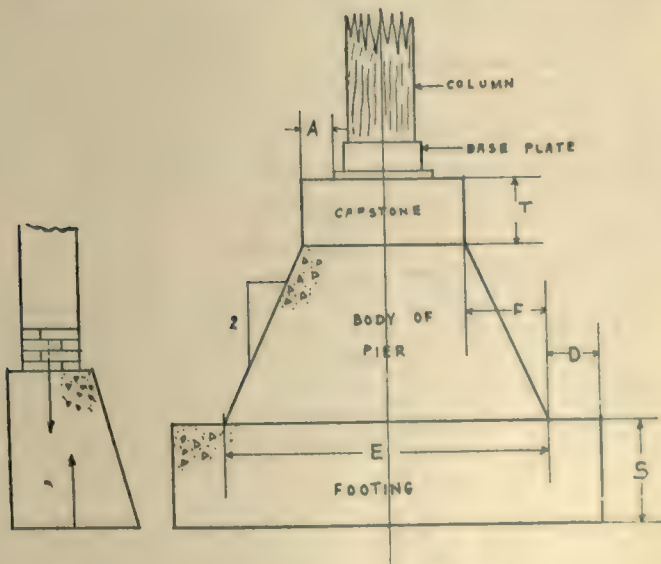


Fig. 1

Fig. 2

data already given we find that the safe compressive strength of a granite capstone is 700 pounds per square inch. To find the number of square inches required in the base of the column base plate, we will divide 141,000 pounds by 700 pounds, and we get for an answer 202, which is the number of square inches required. We will use a 15-inch by 15-inch base plate, which has an area of 225 square inches.

Calculations for Capstone—From our previous notes we find that the safe working value for the best quality of Portland cement and cinder concrete to be 250 pounds

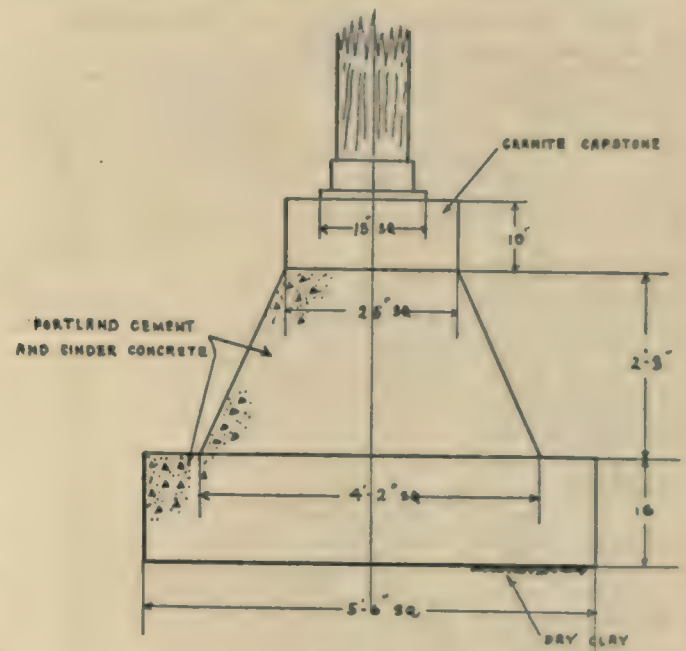


Fig. 3

per square inch. To find the number of square inches required in the base of the capstone we will divide 141,000 pounds by 250 pounds, and get an answer of 564, which is the required number of square inches. Will use a 25-inch by 25-inch capstone, 10 inches deep; the depth being made twice the distance "A." (See fig. 2).

Calculation for Footing—From our notes we find that dry clay has a bearing value of 2½ tons or 5,000 pounds per square foot, and dividing our load of 150,000 pounds by 5,000 pounds we receive an answer of 30, the number of square feet required in the base of the footing. We will use a footing 5 feet 6 inches by 5 feet 6 inches, and make the depth 16 inches.

Proportioning the Foundation—In the proportions given above it states that "T" should be at least twice "A" and in our case the base plate is 15 inches square and our capstone 25 inches square, therefore 25 inches minus 15 inches equals 10 inches difference or 5 inches on a side. Therefore 5 inches equals "A" and 2 times 5 inches equals 10 inches or "T."

For the footing, make the offset "D" not more than one-half "S," and as "S" in our case equals 16 inches, "D" will equal one-half of 16 inches, or 8 inches.

Calculation for Height of Body of Pier—The batter of

the body of the pier should be in a relation of 1 to 2, as shown in fig. 2.

In our case the capstone is 25 inches square and the distance "E" (fig. 3) is 50 inches. Now 50 inches minus 25 inches equals 25 inches, and this divided by 2 gives $12\frac{1}{2}$ inches, which is distance "F." The depth being in a proportion of 1 to 2 must therefore be 2 times $12\frac{1}{2}$ inches or 25 inches; say we make the depth 2 feet 3 inches.

A detail drawing of this foundation is shown in fig. 3.

Ultimate Compressive Strength of Materials

	Lbs. per Sq. in.
White pine, parallel to the grain	3,000
Hemlock, parallel to the grain	2,000
Spruce, parallel to the grain	3,000
Yellow pine, parallel to the grain	4,400
Oak, parallel to the grain	3,600
Wrought Iron	44,000
Structural steel	64,000
Cast iron	81,000

Use a factor of safety of four for timber, wrought iron and steel, and a factor of safety of six for cast iron.

The following are average working values conforming to the best practice. They are given in place of the ultimate values, because the ultimate values in these cases have a very wide range, dependent upon special conditions and workmanship.

Compression—Practical Working Values

	Lbs. per Sq. in.
Brickwork in lime mortar	100
Brickwork in gauged mortar	150
Brickwork in Portland cement mortar	200
First-class granite masonry	350
First-class marble or limestone masonry	250
First-class sandstone masonry	175
Granite capstones	700
Marble or limestone capstones	500
Sandstone capstones	350
Portland cement and stone concrete in reinforced concrete construction and in foundations	500
Best quality of Portland cement and cinder concrete in reinforced concrete construction	250
Rubble masonry in cement mortar	150
Rubble masonry in lime mortar	80

For the preceding values of masonry the height of a wall should not be more than sixteen times the least unsupported thickness of the wall, or the wall may fail by buckling or bending.

The height of a detached or free standing pier should not exceed ten times its least side.

British Building Trades

Building and woodworking trades in Great Britain are dealt with in the latest report of the Imperial Board of Trade giving the results of an exhaustive inquiry into the earnings and hours of labor of the workers in various industries. The report deals with the year 1908. For all workers in the building trade the average net earnings per head in an ordinary week in the summer of 1908 were found to be 28s. 6d. The average for men was 31s. 6d., and for improvers and apprentices of all ages, and lads and boys under 20 years of age, it was 10s. 3d. Excluding the large proportion who worked either less than or more than the ordinary hours, the average full-time earnings were 28s. 1d.—the men averaging 33s., the improvers, lads, etc., 9s. 7d. The average full time earnings of the principal classes of skilled men (such as bricklayers, masons, carpenters and joiners, plumbers, plasterers, and painters) were 36s. 4d., and of laborers were 24s. 5d. Since the last general inquiry by the Board of Trade (which

concerned the year 1886), the average wage of workpeople in the building trade have risen by about 18 per cent. Dealing with the full-time workers in an ordinary week the report gives the average earnings of the men in the different trades thus: Building, 33s.; cabinet making, 33s.; harbor construction, 31s. 10d.; sawmilling, 27s. 4d.

The average earnings of full-time men in the building trade during an ordinary summer week varied greatly. At the head were: London, 38s. 8d.; Scotland, 33s. 9d.; Northern Counties, 33s. 6d.; Yorkshire, 33s. 1d. Ireland was the lowest district, with 27s. 9d. for its average.

Carpenters and joiners formed 17.2 per cent. of all the men in the building trade returns. The list of the average earnings, working full time in an ordinary summer week, were headed by the Metropolis: London, 43s. 9d.; Yorkshire, 36s. 11d.; Northern Counties, 36s. 8d. The average full-time wages for the principal classes in London in the summer were: Plasterers, 45s. 4d.; bricklayers, 44s. 5d.; carpenters, 43s. 9d.; masons, 43s. 3d. Scotland, with an average of 37s. 7d. in a full ordinary week in summer, exceeded London (with 36s. 10d.) in the average wages paid to painters and decorators. In the construction of harbors, docks, roads, sewers, etc., the average earnings of all men in an ordinary week in the summer of 1906 were 27s. The average for a full-time worker was 31s. 10d. For lads and boys the corresponding averages were 13s. 1d. and 13s. 6d.

Interlocking Steel and Concrete Pile Construction for Sea Walls and Foundation Work

A new system of interlocking pile construction has been used recently in Chicago for protective work and jetties on the lake shore and for the foundations of buildings. The construction is such that the completed work forms a solid and continuous wall. The process consists in sinking steel tubes by jacking and loading, and then filling them with concrete. Each tube or cylinder has on one side a hollow vertical rib and on the other side a hollow vertical socket, both of dovetail form; the rib of one pile enters the groove of the other and the piles are thus locked together. As the rib and groove are hollow and form a part of the tube, the separate concrete piles in the tubes are locked together also, and do not depend upon the steel shell to lock the piles together. For land work, the cylinders are open at the bottom, and the faces of the rib and groove are open (the sides being tied together by transverse strips. With this arrangement the concrete filling forms a monolithic mass (above the surface of the ground), and may have horizontal and diagonal reinforcing rods embedded within it. This arrangement is used also in water where there is no danger of scouring. In this case, the tube does not displace the material, and the concrete filling does not extend below the bottom of the lake or river. For work in the water, and exposed to the action of waves and currents, the tube has a closed flat bottom and closed faces to the rib and groove, so that the concrete filling forms a separate pile, interlocking with the adjacent piles, and reinforced by vertical rods as may be required.

"A year of constant prosperity has been enjoyed, and the prospects are unusually bright," said City Treasurer Coady, of Toronto, in his annual budget, issued in connection with the estimates for 1910. The growth of Toronto is indicated in the estimates. The expenditures this year will total \$6,868,755, as against \$6,081,532 in 1909, or an increase this year of \$787,223. The estimated revenues are placed at the same figure.

To diminish the noise of elevated trains in New York City concrete is to be tried. A solid floor of this material 11 to 15 inches thick will be laid on the steel structure to serve as a base for the ties, ballast and rails.

April 27, 1910

The Science of Management Engineering

Fundamental Principles of Handling Work Successfully—Stimulating Effect of Bonus System—Problem of Finding Satisfactory Unit for Measuring Labor*

By H. P. GILLETTE

As I conceive it, the fundamental law of successful management is this: To secure maximum output make all payments for work proportionate to work done.

This may be termed "the law of reward increasing with increased performance." This law is so self-evidently true that some will be surprised to see it dignified by the name of law. Others, if in a carping mood, may say that I am striking matches to find the sun. However, it is not the novelty of a scientific law that gives it value. When formulated definitely, many laws of science are self-evident. They are not the less valuable for being thus self-evident. That laws of this kind should be formulated is highly desirable, because, until they are definitely stated, most men fail to apply them.

It is one of the traits of human nature to have no respect for unformulated laws, and none too much for those that are formulated.

The average employer will grant instantly that workmen should be paid in proportion to performance, but does the average employer so pay his workmen? Does the man who shovels 18 cubic yards daily into a wagon receive 20 per cent. more pay than the man who shovels 15 cubic yards? Does the foreman who erects a bridge in 15 days get any greater salary than the foreman who spends 20 days with a gang of the same size on a bridge of the same dimensions?

While the ordinary wage system of payment is crudely based upon the "law of proportionate reward," I think few will attempt to maintain that it represents a logical application of that law. Certainly the grouping of common laborers into a general class whose wages are, say, \$1.50 per day, is far from being an application of the fundamental law of management, for among these laborers are men varying widely in ability and inclination to work.

When thus confronted with a self-evident failure to apply this "self-evident" law of management, the average manager will find you forty excuses for failing to follow it. "It is impossible to vary wage without producing dissatisfaction." "Labor unions will not stand for it." "I know that men differ in output and in ability, but I have to work them in gangs and I can't pick out one from another." "You have to take the lean with the fat." "Theories are all right, but there are practical limits to their application." "I get more out of my men than my competitors do out of theirs." These and many other excuses leap to the lips in defence of the pernicious wage system. But I am forced to regard every such excuse as an afterthought, for there is scarcely one of them that does not give you its own answer the minute it is announced.

Causes of Dissatisfaction Among Workmen

Dissatisfaction among workmen is either the result of unfair treatment or the evidence of an unsound mind. The normal man is never dissatisfied when given a chance and an incentive to earn more money. It may be that a man has unthinkingly followed the mandates of a labor union and is opposed to a piece rate or bonus system on "general principles." He may tell you that theoretically it is admirable, but that experience has shown that employers invariably cut the rate. If this is the attitude—and note it keenly—the dissatisfaction of the workmen is not with the operating of our fundamental law of management, but with the failure of employers to obey that law. The workman objects not to pay proportionate to performance, but to the cuts in the price

rate or bonus which short sighted and hoggish employers have so often made.

When a manager excuses his failure to follow the fundamental law of proportionate reward by saying that he must work his men in gangs and that he cannot distinguish the relative performance of individuals, there is more reason for considering his excuse; but, even then, I regard it as an excuse badly in need of crutches. Because men must be worked in gangs on certain classes of work, does it follow that one must mingle good, bad and indifferent workmen together in the same gang? Not a bit of it. Every employer who is really keen tries to weed out the poorer workmen, if men are abundant, and secure gangs of more than average ability. But how often do these same employers then proceed to pay more than average wages? By not doing so they show their complete blindness to this fundamental law of management which they will tell you is so self-evident.

The man who starts with a determination to apply the law proceeds along different lines entirely. He first puts his wits to work to devise ways of doing away with gang work entirely, or at least of reducing the number of men in each gang. Thus, if a gang of men is engaged in shovelling earth into wagons, the manager is generally able to supply extra wagons and to split up the large shovelling gangs into small groups of, say, two men to each wagon. Since extra wagons are provided, no lost time occurs while loading them, and it is a matter of no consequence whether a wagon is loaded by two men in twenty minutes or by six men in seven minutes. The aim is to reduce the large gang to smaller gangs, and to put the best workmen together, so that they can be paid according to their performance. Still further to arouse individual ambition, it is often wise to put a dividing board across the wagon box, assigning one-half of the wagon to one shoveller and the other half to his mate.

Advantages of Grouping Men in Gangs

As a corollary of the fundamental law of proportionate rewards, we have this:

Group men in gangs according to their respective energies, and so plan the work as to make each gang as small as is consistent with efficient work. Then pay these gangs according to the number of units of work done by each.

There are many classes of work that do not admit of working men in small gangs, to say nothing of working as individuals, but the scientific manager will still persist in his effort to group men according to their energy. If laborers are scarce, he will not discharge the poorer ones, but will group the poorer workers together, and pay them less than the other groups of greater ability. But if laborers are plentiful, he will speedily weed out the poorer workmen, keeping only those who earn large incomes by virtue of their large output.

In any event, even where large gangs must be worked, payment of men should be based upon performance. Taking steam shovel work, for example, how often does one see anything given to the men except the standard wages? Yet every man of the various gangs, from the pitmen to the men dumping the cars, is a factor in the total yardage moved. Once the character and condition of the work are fairly well known, a scientific manager will establish a bonus on every yard in excess of a stipulated minimum, and this bonus will be distributed among all the men, pro-rated according to

* Read before the American Society of Engineering-Contractors.

daily wages. A special bonus should be given to the foreman (not pro rata), for upon him rests the display not merely of energy but of foresight. His reward should, therefore, be exceptionally large if exceptional output is secured.

Where several different gangs of men are dependent upon one another in securing a result, the problem of providing a reward proportionate to performance is obviously complicated. Take macadam road building, for example. There we have a gang of quarrymen, another gang delivering rock to the crusher, a gang on the crusher, a gang hauling, and a gang spreading, sprinkling and rolling the stone. If the gang on the crusher is slow, an output of only 50 cubic yards per day may result. Then the teams hauling the stone are unable to perform a satisfactory ton-mileage of work, and the gang spreading and rolling is unable to do a good day's work. How can a manager pay bonuses to these separate gangs in a manner satisfactory to each. The square yard of macadam may be the unit in which the contractor receives his pay, hence his tendency will be to establish a bonus based upon the number of square yards laid daily. However, to do so is an error. The rock drillers should receive their bonus upon the number of lineal feet of hole drilled. The men who handle the rock should receive their bonus upon the yardage of loose rock crushed. The teamsters should be paid a bonus upon the ton-miles, or yard-miles. The spreading gang should receive their bonus upon the cubic yards spread. The roller engineman should receive his bonus upon the number of miles his roller travels daily. In each case, the effort should be made to select for each gang a unit of work that most closely corresponds to the theoretical unit of mechanical work, namely, resistance multiplied by distance. In rock drilling this unit is the lineal foot of drill hole. In hauling, it is the ton-mile. In rolling it is the roller-mile.

The result of all these various units of work is the square yard of macadam, but the square yard of macadam is not the proper unit for measuring the work done by any single gang, excepting, perhaps, the gang engaged in spreading.

The work of a steam roller is commonly reported in terms of the number of square yards of macadam compacted daily. Nevertheless, this is a very unfair unit. On a compact gravel subgrade, a steam roller is capable of daily consolidating several times as many square yards of macadam as on a sandy subgrade. Double the amount of water used to puddle the screenings and the roller will greatly increase the yardage consolidated. In brief, the roller engineman has many more trips to make over a given length of road where the subsoil is soft, and where water is meagrely supplied. His work is more truly measured in the miles he travels than in the area he consolidates daily.

If the average manager of macadam roadwork realized this fact, we should see several decided changes in current practice. First, the 10-ton roller would speedily give way to the 15-ton roller having proportionately wider tires, and the same weight per lineal inch of tire, for one mile travelled by such a 15-ton roller is the equivalent of $1\frac{1}{2}$ miles travelled by a 10-ton roller. Second, the engineman would use the high speed instead of the low speed, and compact a correspondingly larger area per day. Third, the water tank on the roller would always be made large enough to enable the roller to run five hours continuously, even when working on steep grades. Fourth, the engineman would see to it that no stops to take on water would occur except at the noon hour and at night. Fifth, the engineman would have his roller steamed up the moment that the working day began. Sixth, the engineman's every effort would be directed toward making a big mileage, and he would be quick to complain of poor coal or of anything that in the slightest degree reduced his mileage.

Result? Twice as many trips over the macadam as needed? Precisely—and then what? Twice as much broken stone delivered daily to be consolidated by the roller. The first result of paying an engineman a bonus upon the mileage

covered (using an odometer to measure mileage) is to stimulate him to an over-production of mileage, which he should be paid for just the same as if it were needed. The next step is to utilize that mileage by increasing the amount of stone delivered daily.

Stimulating Effect of Bonus System

Now, it may be said, all this could be accomplished in other ways. How? Who has accomplished it otherwise. There is no stimulus comparable to the stimulus of paying men in terms of the best theoretical unit of work. The mile for the roller, the lineal foot of hole for the rock drill are units of this sort.

Now let us go a step farther. If a man is ready to work but has nothing to work with, what shall he do? Is it sufficient merely to pay him an hourly wage while he lies idle, and let him lose his possible bonus? I think not. I favor paying him for every hour of idle time on the basis of the total earnings he averages per hour when actually working. At first this seems like an undue penalty upon the contractor for delays due to accidents. But I believe the penalty for breakdowns and delays should be severe. Then those who are responsible for the accidents and delays will receive the punishment they deserve—the punishment that will quicken them to scheming how to escape it in future. I have found it a good plan to dock the wages of the engineman on a crusher a dollar for every hour lost through shutdowns in excess of three hours per week, and to give a bonus of a dollar an hour for all time saved from the three-hour standard of loss. An engineman who had been losing nearly an hour a day for one reason or another, woke up when he was informed that this rule was about to go into effect. He had come to regard short stoppages as being a matter of course, until it also became a matter of course that he should settle for such delays out of his own pocket, at least in part. I recall that one of the sprocket chains on the bucket elevator had been in the habit of breaking almost once a day. The engineman, who was an intelligent fellow, had blamed it upon poor material in the chain, too light a chain, and what not. But now he began to think. Thinking, he concluded to experiment a little. Perhaps the chain was too tight, and when a bit of stone flew out and caught between the chain and the sprocket wheel, there was not enough slack in the chain; so, perhaps, that was why it broke occasionally. The surmise was perfectly correct. Why some of us, who also had intelligence, had not thought out the reason for the breakages of the chain, I do not know, unless it is that we had many another thing to think about. By giving the engineman one thing to think about, and a very strong incentive for hard thinking, the trouble was speedily located.

Using a somewhat long story to illustrate a conclusion, I thus come to another corollary of the fundamental law of management:

Pay men for lost time not upon the basis of the hourly wage but upon the total hourly earnings (including the average bonus), and place a heavy penalty for lost time upon the man who is responsible for it, at the same time giving him a bonus for reducing lost time below a stated standard.

Sometimes the responsible individual is an engineman, sometimes a foreman. Sometimes a whole gang should be made responsible.

If men are to be paid a bonus for excellent performance, it is but logical that they should incur a penalty for carelessness, and even for lack of quick-wittedness. In the operation of machines there always will be some lost time, but there now is vastly more than there should be, and the real reason is to be found in the absence of sufficient incentive to reduce the delays.

Difficulty in Finding a Unit of Measurement

I have indicated, in a general way, how the units should be selected for measuring the performance of each class or

gang of workmen. A paper of very considerable size could be written on that subject alone. As the very foundation of successful management is the unit used in paying for work done. Indeed, to my way of thinking, nothing stands so in the way of an almost universal adoption of the bonus system as the difficulty of finding satisfactory units which can be readily applied in measuring the day's work.

Measuring drafting is even more difficult. Yet I am so sanguine that some suitable unit can be devised for each kind of work that I would never despair. Once I suggested that in measuring a certain class of drafting, a good unit would be the lineal inch of line drawn. It was objected, and very properly, that to measure up the number of inches would be itself no small task, to say nothing of the difficulty of telling where the morning's work had begun. The answer was that the india ink could be kept in a graduated glass, and measured daily. Since the lines were of equal thickness, the amount of ink was a function of the number of inches of lines drawn. Dishonesty could, of course, make the application of this method difficult, but occasionally checking up by actual measurement would discourage any attempts at dishonest use of the ink for other purposes.

At times I feel like saying that any man who can devise a satisfactory unit for measuring certain kinds of work is assured of a fortune, if he will but adopt that unit and hire men to work under it on the bonus system of payment. However, when I look about me and see the numberless jobs of a class where the units of work are readily measured by any intelligent man, and yet where the bonus system is not applied, I incline to the belief that genius is less needed for devising units of measurement than is common sense in using those we have. To me nothing is more amazing than that managers of contract work persist in using the unscientific wage system of payment after it has been demonstrated again and again that men will increase their output 50 to 100 per cent., and often much more, under a bonus system. Here are Klondikes under our very noses, yet we dream of Alaskan gold four thousand miles away, buried deep in frozen gravel and only to be upturned by prodigious labor yoked to preposterous luck.

If I were to show you a diamond and say: "A man with a wallet full of Kohinoors showed me where I could find diamonds, too—took me to the very spot where I picked up this one, and I am going back after more. Will you join me?"

Would I have company on the return trip? That is precisely what I have been telling you. I can not make the statement too strong that wealth awaits every independent manager of ordinary ability, provided he will grasp the fundamental law of management and apply it. Yet, in his search for wealth, he must use the greatest care not to become hogish. He must make it a cardinal principle to let his workmen secure most of the product of their increased efforts resulting from paying them according to the bonus system, preserving only a liberal percentage for himself. Acting in this manner, the independent manager can speedily build up an industrial "clan" of workmen who will be as loyal to him as were the old Scottish clansmen to their chief. Men never begrudge a leader a generous share of the spoils of war or the profits of peaceful industry—provided the leader has been generous in his division of the gains among the men of the ranks. Lack of generosity—yes, and even of common fairness—has brought the old piece rate system into such disrepute that it has long been regarded by trades unions as akin to slavery. It now devolves upon managers to show some heart in applying the bonus or piece rate system. If they do, they will demonstrate that well-planned generosity is the greatest getter of wealth.

During the past week the Canadian Pacific Railway Company have engaged a large number of workmen who will be employed in Western construction work.

English Expert Advocates the Use of Rough Masonry

Mr. M. H. Baillie Scott delivered an interesting lecture on "The Art of Building" in London, recently. With regard to some of the materials of building, Mr. Scott said: We have in many districts stone of various kinds for building, and in most of these districts we have object lessons in old buildings, showing how stone may be beautifully used. It is unfortunate, however, that the modern mason seems quite unable to profit by such examples. He always wants to improve on them. The art of masonry may often be made a kind of rude mosaic, in which stones of various shapes and sizes and tints can be combined and arranged. In old cottages in Surrey you may find the irregular spaces between the stones adorned with scraps of flint, iron, stone and broken red pottery, with excellent effect. Another instance of the same mosaic in masonry may be found in the old castle at Peel, in the Isle of Man, where the wide scale of tints in the local stone from various shades of red to gray and yellow is taken full advantage of. Is it necessary to add that in the local modern buildings of the same stone the material has been reduced to an absolute regularity of tint and surface? When the modern mason does descend to rough walling he lets us know it, and can only give us an exaggerated excrescence in the centre of each stone—a confection known as rock-faced. And he seldom knows how to deal with the mortar joint, which in good old work makes such a beautiful reticulated pattern of varying shades of gray.

If only, instead of ignoring the qualities of materials and forcing them into these meaningless forms, we were to begin at the other end, what a new world of art would be disclosed to us. A visit to the site of our building may disclose, perhaps, the fact that flints are the essential local materials for walling. What a palette is there for the artist, of tones of pearly gray; what a variety of textures can be obtained, too. Here the soft rounded outlines of the uncut stones, and here, to mark some special feature, the cut flints. The surfaces of the walling enriched, perhaps, with the shivers of the broken flints set in the joints, or notes of red brick or brown stone. And all this you won't find anything about in books, or learn anything about in offices, or art schools. It is a kind of rude natural mosaic, and if rightly done implies the use of materials in the right way, inasmuch as it develops to the utmost their possibilities, instead of obliterating their character by forcing them into preconceived academic formulas. It seems that we are too apt to put the cart before the horse in these matters, and instead of letting the materials influence us and suggest the design, we let them have no voice in the matter at all, but simply shape them into the arbitrary forms we have learnt at school.

Slates have the defect that they do not readily yield to nature's inimitable coloring. The rougher and thicker they are, the better the artist in building will like them; and except in their own special locality he will perhaps prefer a good gray tone to the more fashionable green. There is a kind of harshness about slates which makes them specially at home in bleak and barren uplands, or in wind swept open spaces by the sea, while the kindly warmth of tiles makes them more adapted in wooded and sheltered places.

C. P. R. to Spend Millions

The biggest individual contract ever given out by the C.P.R. will be awarded on May 1st, when tenders will be opened for the excavation of 25,000,000 cubic yards of earth from the canals and ditches to be constructed on the central division of the company's irrigation area. This work will extend over a period of five years, and its cost will run into millions of dollars. The C.P.R. will spend \$2,000,000 on irrigation work this year.

Bituminous Pavements on Macadam Base

Maintenance and Cost of Macadam Roads—Resurfacing with other Material—Practical Directions for Obtaining the Most Satisfactory Results*

By L. WHITE, Engineer, South Park Commissioners, Chicago.

Macadam, for the purposes of this discussion, may be broadly defined as meaning all kinds of broken stone road surfaces bonded with more or less finely divided mineral matter, which may or may not be of the same material as that of which the body of the macadam is made up. Road surfaces made up of slag, chert or gravel which does not depend on a soluble clay as a binder, may be considered in this class, where hydraulic cement or bitumen is used as a binder, the resulting composition is not macadam.

It seems unnecessary to state that macadam thus defined is one of the oldest and most universally used forms of improved road surfaces, and that in many towns and suburban districts it is almost the only road material used. In our cities, too, it constitutes a large percentage of the street pavements, and is easily among the most valuable assets of almost any community.

The city of Chicago, for instance, has 600 miles of macadam, which is about 50 per cent. of all the usable street pavement in the city, and may be conservatively valued at \$17,000 per mile, or a total of \$10,000,000. All other street pavements in Chicago may be valued at \$20,000,000. Thus 50 per cent. of the area and fully 33½ per cent. of the value of all pavements in the city is macadam. These figures of value do not, of course, include the value of the land on which the pavements are built, nor do they include the value of any grading, curbing or drainage.

Little Rock has 14.63 miles of macadam, costing \$290,000, and 14.39 miles of all other kinds of street paving, costing \$580,000, the percentage of area and value being about the same as in Chicago, that is, about half the area of street pavements in the city is macadam, the value of which is about one-third of the total. I use these figures to emphasize the quantity of macadam in use and its money value.

Care of Macadam Surfaces

If macadam could be maintained at a reasonable cost in good surface without dust, it would be a very satisfactory pavement for many situations. Its tractive resistance is low when in good surface; it affords secure foothold for horses and motor cars; it is not noisy as some other pavements, and its appearance is generally harmonious with the surroundings on a residence street, a park drive, or a suburban highway.

The cost of maintaining macadam will not be discussed at any length in this paper, as it is a large subject in itself, and would require the collection of a great deal of data. Local conditions, too, are very variable and each engineer or road superintendent should work out this phase of the subject for himself. Suffice it to say, that very few macadam roads in this country are maintained at all. They are generally built and left to wear out.

When the cost of maintenance passes a certain amount, the macadam should be replaced with other road surfacing material. There may be conditions where the volume of traffic is so great the question of maintenance goes beyond a mere question of cost—it becomes an impossibility. I will allude to one case of this sort that occurred on one of our Chicago boulevards. A portion of this boulevard was reconstructed in 1905 and paved with 12 inches of macadam with a granite top at a cost of \$1.25 per square yard. During the year following its construction, fully 10 per cent. of its original cost (or 12.5

cents per square yard) was spent in its maintenance, besides the regular charges for cleaning and sprinkling. In its second season it had deteriorated so much that the attempt to maintain it as a macadam road was abandoned, and a contract was let for a permanent bituminous pavement. It would be reasonable to estimate it would have cost 25 cents per square yard or 20 per cent. of its original cost to have put it back in its original condition and maintained it during the year.

During this period the traffic on it was about 3,000 vehicles per day. A census was taken in 1909, after the permanent pavement was laid, and found to be about 5,000 vehicles per day. Probably this increased traffic was due in part to its better condition with a better pavement.

If a dust-laying preparation is used, it must supply enough binding material to hold the stone together. If the stone is effectively bonded together, no dust is formed except the limited amount formed by attrition from the particles of stone itself.

Dust-layers are various, from water, with or without the addition of hygroscopic chemicals, to oil and water emulsions and crude or prepared oils, tars, etc. All of these have their value in preserving the road, as various experiences show, but will not be further discussed as this paper is addressed principally to the problem of utilizing macadam as the base for permanent bituminous pavements.

Observations as to Cost

In the beginning of this paper I gave two typical examples of cities with macadam pavement amounting to 50 per cent. of their respective total areas of paved streets. In each case the original average cost was approximately \$1 per square yard. By the time the determination is reached to resurface the macadam streets with some other paving material, the macadam would probably require a complete resurfacing with, say, four inches of new stone to restore them to approximately their original condition. Four inches of new macadam stone, well rolled and finished, would cost about 40 cents per square yard, leaving the present value of the old macadam without this resurfacing 60 cents per square yard. The old macadam will be thoroughly compacted under the traffic, but full of ruts and holes and with a considerable accumulation of dirt over the surface. There will, perhaps, be at least 75 per cent. of the original amount of stone still on the street. The cost of cleaning off the accumulation of dirt, spiking up and redressing the surface, and covering it with a sprinkling of new stone (not exceeding one inch in thickness) will cost about 15 cents or, say 20 cents as an outside figure.

An extended experience of the writer in this sort of work indicates that 17½ cents is a safe average figure. In this condition, the road surface is comparatively solid and unyielding, but not in a condition to carry any considerable traffic without some sort of paving surface over it. A 5-inch concrete layer would cost about 50 cents per square yard, and to remove the macadam and prepare for the concrete, 15 cents per square yard. The concrete would probably have some more stability and be safer to use than the macadam if it was intended to lay a brick or block pavement, or a sheet pavement of a kind that depended on the base for stability against shifting. The use of the concrete, however, would mean throwing away macadam worth 60 cents, and an additional expenditure of 75 cents per square yard. The obvious thing to do would be to use a paving material adapted to

*Read before the American Society of Municipal Improvements.

utilize the existing macadam base, and one that can be varied in construction somewhat, according to the needs of the traffic.

As stated, a brick or block pavement would not be an ideal one to use, as each individual block must in a measure find its own bed and carry practically all the weight imposed on it. Brick, creosoted block or granite, besides having other objections for use on such roadways as we are discussing, would not be flexible in cost to meet varying conditions of traffic. A standard construction with standard size blocks would have to be adopted, which would probably be suited to an entirely different traffic from that under consideration. The obvious thing to do would be to choose some form of sheet pavement, preferably a bituminous composition, that would assist in bonding and binding the macadam in place, adjust itself to slight inequalities of support and be more or less variable in thickness (and consequently variable in cost) according to the needs of the traffic.

The more common form of sheet asphalt pavements answers these requirements to some extent, but the objections to it are as follows:

It must be made comparatively thick, say three inches, to conform to accepted standards; its cost is dependent on its thickness but not in direct ratio thereto, it is more or less dependent on the base for its stability and consequently not safe to use on such a base as we are describing; it has a smooth sheet-like surface more or less slippery, and not desirable in appearance for boulevards and driveways with rural surroundings.

The ideal pavement for such conditions would be a bituminous composition with crushed stone as the principal mineral ingredient. The stone in the body and surface of the pavement would bond well into the macadam, afford a good foothold and present a desirable grainy surface to the eye similar to well-built macadam. The size of the stone should be regulated by the amount of traffic to be expected. The bitumen should be soft enough at all seasons to make an elastic and noiseless pavement, and yet of sufficient stability and constancy under extremes of temperature to hold the mineral aggregate firmly in place. If the bitumen becomes very soft under the summer heat it may act as a lubricant between the particles of stone instead of a stable binder.

Practical Directions for Obtaining most Satisfactory Results

To accomplish the best results by this method, there should be a layer of clean coarse stone spread on top of the macadam base described above, and lightly rolled just enough to level the stone off and set it in position. The size of the stone should be from $\frac{1}{2}$ to 2 inches, depending on the thickness of the layer of stone it is desired to bond with the bitumen. Generally this layer should not be less than 2 inches thick, as the bitumen should penetrate to that depth to make a safe stable road surface under average conditions of traffic.

After lightly rolling, the hot bitumen should be poured on until the voids in the stone are all evenly filled. Over the surface then spread a layer of screenings and fine crushed stone, none of which should exceed $\frac{1}{2}$ -inch in size. It is then thoroughly rolled until the fine material is forced into the interstices of the large stones, completely filling them, with a thin layer of fine stone left on the surface.

If, during the rolling process any of the bitumen is forced through to the surface, more screenings should be spread until the whole surface is well covered. In some cases a second light coat of bitumen is poured over the surface with a second dressing of stone chips or screenings. This, however, should not be done with any but the lighter bitumens, either tar or oil. Anything heavy enough to be termed asphalt and to produce a safe and stable binder will not penetrate through the layer of fine stone or screenings and consequently will lie on the surface as a thin coating not bonded to the rest of the pavement.

The best results may be expected from the use of the coarser stone and heavier binder, so long as it is not of a quality that will be hard and brittle in cold weather. For this reason, a comparatively heavier grade of asphalt may be used than of tar. The quantity of bitumen, either tar or asphalt, used in poured macadam should be from two or three gallons per square yard. Of the lighter grades of bitumen the less quantity should be used, otherwise a shifting, rutting surface will be gotten.

The drawbacks to the use of poured macadam are the irregular and somewhat uncertain results obtained, and the limited season in which the work can be done. Weather conditions must be just right, neither cold nor damp, and the stone must be clean and free from dust. Old macadam cannot be poured. The stone must be fresh and clean. The greatest obstacles to successful work in poured macadam may be set down as moisture and dust.

We come now to another form of bituminous composition, specially adapted to use on macadam base, which may most properly be termed bituminous concrete. This includes the bitulithic or tar concrete, and the asphaltic concrete. This kind of pavement is mixed like concrete and laid hot. The tar concrete, when well laid, makes a pavement of great strength and good qualities, when the temperature is just right. Tar, however, is much more susceptible to the influences of heat and cold than asphalt and is hence a more dangerous material to use.

A bituminous concrete should be laid hot and freshly mixed for the same reason that a sheet asphalt or sand asphalt pavement should be laid hot. There is, however, an additional reason why the tar or asphaltic concrete should be handled as quickly as possible. If it is hauled long distances while the bitumen is in a liquid or semi-liquid state, it is liable to settle down to the bottom of the load and become partially separated from the coarse aggregate. In the case of the sand asphalt paving mixture, the finer aggregate serves to hold the melted bitumen better.

Use of Portable Asphalt Mixing Machines

In the South Park system of Chicago there were laid during the season of 1909 about 150,000 square yards of this asphaltic concrete pavement on a macadam base, such as I have attempted to describe. All of it has been mixed in two portable asphalt mixing machines, which were designed and built especially for the commissioners. These machines are complete plants in themselves, drying and combining the stone and sand, heating the asphalt, automatically proportioning the materials, and delivering the paving composition ready mixed for laying. The machines are moved along the street, about 300 feet at a time, similar to portable concrete mixers. They are strictly portable, requiring only about 8 to 10 minutes from the time operations are stopped in one place until the machine is set in its new position and started again.

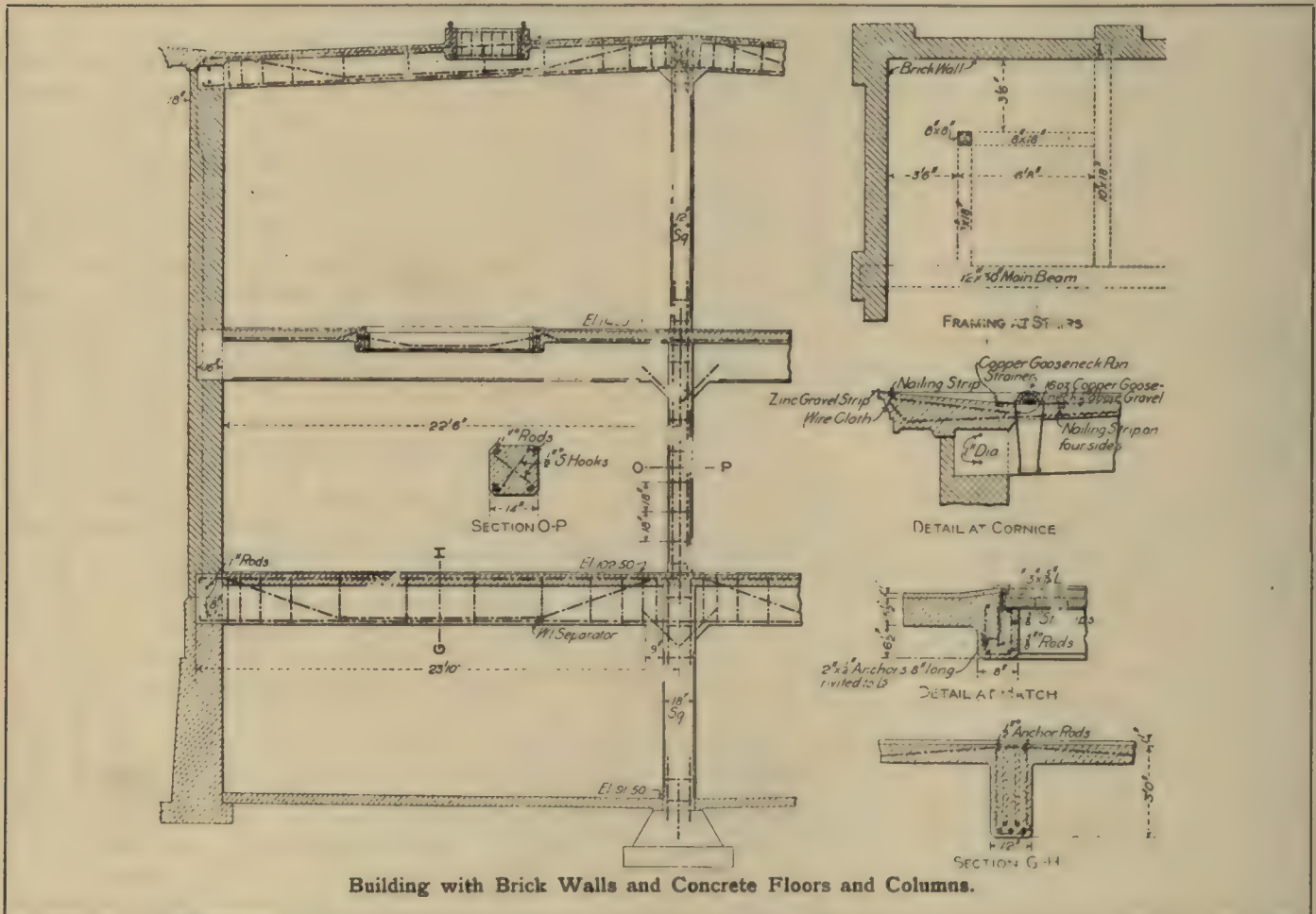
The average capacity of one of these machines under reasonably favorable conditions, is 1,000 square yards of pavement two inches thick per day, though as much as 1,250 square yards per machine has been laid in 9 hours. With this sort of a machine, the operation becomes a comparatively simple one and may be compared to the mixing and laying of ordinary concrete. In fact, the whole process has been treated from this standpoint. Everything is done on the street under the eye of one superintendent. The asphalt used has been chosen specially with reference to its suitability for this kind of pavement. It is a pure bitumen ready fluxed for use, of comparatively low melting or flow point, but is particularly constant under changes of temperature.

The ideal pavement of this class should have the maximum amount of coarse stone in its composition and the minimum amount of dust, or no dust at all. The omission of dust will give it the desired rubbery qualities and increase the binding quality of the bitumen.

Composite Brick and Concrete Building Construction

One obstacle in the way of securing cheapness in constructing reinforced concrete buildings is the cost of the expensive wall forms, which frequently cannot be used again. Mr. F. W. Dean, mill engineer and architect, of Boston, has recently designed a number of buildings with brick walls and reinforced concrete floors and roofs, which remove this obstacle and overcome the ob-

by reinforced concrete columns. They extend 16 inches into the pilasters and are bonded thereto by 1-inch parallel steel rods embedded in the walls. These rods, two at each end of the beam, pierce its ends at right angles. On the sides of the building the floors butt against the brick walls, the granolithic finish filling in or smoothing over any space between the two. But at the ends these floors and the integral longitudinal hatch beams extend into and rest on the brick walls. The roof, 4 inches thick, is also reinforced with wire cloth and bonded to



jections frequently urged against the appearance of reinforced concrete buildings unless the owners are prepared to spend sufficient money to finish them up in an attractive manner. Unfortunately this is not always done in buildings of the manufacturing type. In the buildings above referred to the concrete girders and floor slabs are connected to the brick work without difficulty. The advantages of a reinforced concrete building are thus obtained at a cost, it is stated, less than that of a building with concrete walls.

The accompanying illustration shows the method of construction employed. This particular building, 48 feet 4 inches wide by 82 feet long in outside measurement, is two storeys in height, with basement. The foundations are of concrete carried well below grade; the walls above are of brick, 12 inches thick, between pilasters of 20-inch thickness. Floors and roof are of concrete reinforced by galvanized wire cloth. The first and second floors, 6½ inches thick, including monolithic finish, are supported by reinforced concrete beams running crosswise of the building. These beams, 30 inches in depth by 12 inches in thickness, rest at their ends on the brick wall pilasters, and at the middle are supported

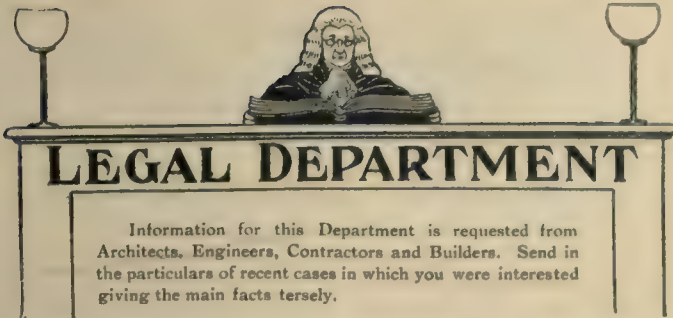
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G.T.R.'s Plans for Toronto and Montreal

Speaking in London, Ont., last week, Mr. Chas. M. Hayes, general manager of the G.T.R., had this to say concerning his company's plans:

"In Toronto and Montreal we have expenditures confronting us reaching into the millions in both places. Toronto will probably be commenced this year. When Montreal will be commenced I cannot say. When we do commence it will be a big undertaking, and these two big works stand ahead of claims coming from other directions."

Mr. A. O. Powell, of Seattle, has been appointed arbitrator in the dispute between the city of New Westminster and the engineering firm of Hermon & Burwell, in connection with the fees charged by the latter for work on the Coquitlam pipe line.



Injury to Workman—Application was made in the district court of Edmonton by one Allen Murray, a workman, to secure compensation from his employers, Messrs. Foley, Welsh & Stewart, railway contractors. The applicant was a bridge carpenter and sustained an injury to his foot by being knocked off a trestle bridge on G. T. P. construction work, near Edmonton. The accident occurred on the 25th of February. Following this he was confined to the camp for three weeks and then removed to the hospital for treatment. He was subsequently discharged from the hospital, but until the time of hearing had been unable to perform any work. He claimed compensation at the rate of \$9 a week.

The respondents denied their liability to pay compensation under the Act, and contended that, as contractors for the construction of the Grand Trunk Pacific Railway, they were subject to the exclusive legislative authority of the Parliament of Canada; that, in pursuance of such legislative authority, the Parliament of Canada had made applicable to such work the provisions of the Public Works Health Act, and the applicant came under the provisions of that Act, and received medical attendance in pursuance of its regulations; and that the Workmen's Compensation Act did not apply.

The court held that the Public Works Health Act does not in any way cover compensation for injury that may be incurred to any workmen. It is for the purpose of compelling certain contractors or companies engaged in public works to properly care for the health of the workmen and make the camps sanitary. It is also for the purpose of compelling them to have within reasonable distance of the workmen proper medical men and hospital accommodation to care for any of the workmen who may become sick or injured, as it is well known that most of these works are carried on at long distances from places where medical care or accommodation for the sick or injured is to be had. The Workmen's Compensation Act is to reimburse the workman for injuries which incapacitate him for work and applies to such construction work as that upon which the claimant was engaged.

Possession Nine-Tenths of the Law—Edmonton Concrete Company v. Cristall. This action was an appeal by the plaintiffs from the judgment of the trial judge dismissing the action. Plaintiffs were engaged in the manufacture of concrete at Edmonton, and for that purpose required a large quantity of washed gravel. They accordingly entered into a contract with the Northern Dredging Company, who operated a gold dredge on the river Saskatchewan, to purchase from that company the gravel which was washed in passing through the dredge. By the terms of the written contract, the washed gravel was to be delivered in barges, to be supplied by the plaintiffs at the dredge, but, by a subsequent arrangement between the two companies, it was deposited in piles in the river, or on the shore, at the rear end of the dredge, in the passage which had been cut by it in passing through the gravel bars. One of these piles was at the bar where the dredge had been laid up for the winter.

One Burrill, a servant of the dredging company, who lived on the bank of the river adjacent to where the dredge was laid up, was placed by that company in charge of it, as well as of the pile of gravel at that point. He posted up a notice upon the end of the pile nearest to the dredge, the notice being to the effect that the gravel was the property of that company, and forbidding the removal of the portion of the pile nearest to the dredge. It appears that that portion of the pile was required to be retained in order to protect the dredge against floating ice in the spring.

The plaintiffs also posted a notice upon the other end of the pile, claiming to be the owners of the gravel and forbidding its removal. About the 1st of February, 1909, the defendants, or one of them, came to the pile with three teams, and started to remove gravel.

The notices referred to were posted up at that time, and, while they were loading the gravel, they were warned both by Burrill and the plaintiffs' manager not to remove the same, but the loads were completed and carried away. The plaintiffs immediately commenced this action, claiming damages for the gravel removed and an injunction restraining further removals, and obtained an interim injunction.

At the first trial it was held that the plaintiffs were not in possession of the gravel and judgment was given for the defendants with costs. The trial judge contended that any judgment to the contrary would be to hold that the plaintiffs could take possession of all the gravel beds in the river and prevent any person other than grantees of the Crown from removing any gravel therefrom. In the appeal it was held that the person in actual possession of land or goods, though not an owner, is entitled to retain possession against everyone but the rightful owner. The Crown, the true owner, could prevent plaintiffs from getting any benefit from the gravel, notwithstanding the expenditure of labor on it. While they had no property rights in the gravel they could maintain their claim against others by having it in possession. The appeal was allowed with costs, the plaintiffs being granted the injunction asked and reference as to damages.

Dispute Over Contract for Waterworks and Sewerage System—This was an action brought in the Prince Edward Island court asking that an agreement made between the complainant and the defendants for the construction of a system of water supply and sewerage for the town of Summerside for the sum of 73,000 having been obtained by misrepresentation on the part of the defendants, be cancelled, and that an enquiry be made as to what damages the complainant sustained by reason of such misrepresentation; or in the alternative, that such agreement be rectified by inserting the sum of \$73,958.14 in the place of \$73,000, and by striking out all reference to the construction of a power house as part of such system. The complainant claimed in his bill that his contract to install such system was not intended to cover the erection of power house costing \$1,625.

The complainant put in one general tender for \$73,958.14, and also several separate tenders for certain portions of the work, and for the materials. The plaintiff claimed that he was induced to reduce his tender \$958.14 on the representation of the commissioners that if he did so they would assign to him a tender of L. H. Gaudry & Company for the iron pipe to be used in the work, which tender was some \$2,000 less than plaintiff's separate tender therefor; that being so induced he signed the contract for a similar amount, but that the commissioners afterwards refused to assign the Gaudry tender to him, claiming an after discovery that such tender was

not in accordance with the specifications for the work. Subsequently it was shown that Gaudry & Company's tender was duly transferred by the commissioners after rectification in the matter of certain pipe, for the difference in which plaintiff was properly compensated. The plaintiff further claimed that the commissioners misled him by telling him that they could buy pipe cheaper than he could by some \$2,000 and that he had reduced his bid but that the commissioners had not been able to fulfil their promise.

The judgment of the court revolved principally upon the agreement signed by the contractor in which he agreed to furnish all material and labor for the complete installation of a system of waterworks and sewerage for a certain price. The court concluded:

"You would not expect from a contractor, seeking such a contract, a want of knowledge of what a 'complete installation' of a system of waterworks meant, what it could possibly mean without a pumping station? Or that he would ever contend, when his agreement binds him to make, erect and build such a system for a specified sum, and requires him to erect this pumping station in advance of other portions of his work, that he never intended to build this pumping station except for the sum of \$1,625 additional." The action was dismissed with costs.

Personal News and Notes

The Edmonton city council has decided to engage a New York expert to map out the city's sewer system.

Mr. C. H. Fullerton, town engineer of New Liskeard, Ont., has been elected a member of the council of management of the Ontario Land Surveyors' Association.

The death occurred last week at Winnipeg of Alexander McCurdy, a former contractor on the C.P.R. to Winnipeg. Deceased was born in Antrim county, Ireland, 83 years ago.

Mr. A. E. Jupp assistant engineer in the roadway department at Toronto, is leaving the city to take a position at Haileybury, Ont., where he will obtain an appreciable increase in salary.

Mr. McGregor, of Ridgetown, Ont., a graduate of the School of Practical Science, Toronto, has been appointed to the staff of City Engineer Bell, of St. Thomas, Ont.

Before the Engineers' Club of Toronto last week Mr. H. C. Champ gave an illustrated lecture descriptive of the high pressure fire system at Winnipeg, Man. Prof. Angus presided over a good attendance.

We regret to report the death of Mr. Z. J. Fowler, of the railway contracting firm of O'Brien, Fowler & McDougall, Ottawa, Ont. The late Mr. Fowler was formerly a civil engineer and was a charter member of the Canadian Society of Civil Engineers.

The death occurred recently at Winnipeg of Mr. F. W. Russell, who for some years was engaged in the contracting business at Winnipeg. Deceased was a native of Hastings, Eng. Latterly he had been living at Minneapolis, Minn.

The total assessment of Prince Rupert, B.C., according to figures submitted by Assessor Cuthbert, is \$15,330,166, of which \$499,590 is represented by buildings. During the last six months there has been great activity in building. It is stated that no less than 805 buildings have been erected on the town site during this period.

Canadian City Engineers

Mr. J. M. Wilson, Moose Jaw, Sask.

Mr. J. M. Wilson, who was recently appointed city engineer of Moose Jaw, Sask., was born at Toronto 27 years ago. He is a graduate in civil engineering of the University of Toronto and an associate member of the Canadian Society of Civil Engineers. After spending some time in the bridge department of the Canada Foundry Company, Mr. Wilson was engaged in making surveys for the 6-foot steel conduit and tunnel across Toronto Bay. Before the tunnel was completed he was transferred to the high pressure fire system and was in charge of the outside work. Mr. Wilson left the employ of the city of Toronto to accept a position with the Wood Products Company of Canada, by whom he was engaged as construction engineer on the large plant erected by the company at Haliburton. Upon the completion of the



Mr. J. M. Wilson, who was recently appointed City Engineer of Moose Jaw, Sask.

plant in 1908 Mr. Wilson became general manager for W. H. Oliver & Company, engineers, Toronto, until the beginning of 1910, when he again resumed his former connection with the City Engineer's department. At the time of his appointment to the Moose Jaw position, Mr. Wilson was in the Main Drainage Department at Toronto.

The appointment of Mr. Geo. Powell to the position of assistant city engineer of Toronto has been confirmed by the Board of Control of that city. Mr. Murray Stewart has been appointed roadway engineer in Mr. Powell's place.

As previously noted, the City Engineer's Department at Vancouver, B.C., is being reorganized. Instead of having an expert engineer to superintend the whole department, it is probable that the Board of Works will appoint a number of assistant engineers so as to afford an opportunity for the present city engineer, Mr. Clement, to devote more time to improvement work and the development of the city.

Trade News from Montreal

**Contractors Satisfied with Season's Developments
Supply Business Active—Important Works Under Way**

Montreal Office of the "Contract Record."

April 28th, 1910.

In and around Montreal building operations have commenced in earnest and contractors, on the whole, are being favored with excellent weather conditions. Up to the present time, April rains have not interfered with construction work to any extent and consequently there is a resultant feeling of satisfaction.

Permits are being issued from Inspector Chaussé's office at the average rate of 30 each day, and since the first of April have totalled in volume well over the million and a half mark. In the outskirts of the city building construction is proceeding equally as fast. In Maisonneuve, Mr. C. A. Reeves, the local building inspector, predicts a particularly busy season. Since the first of the year permits have been issued totalling a value well over \$250,000. The improvements which the St. Lawrence Sugar Refining Company have on hand will reach, it is expected, \$80,000. The town council, too, has scheduled a large amount of work in macadamising, street grading, drains, etc., and for this work has voted approximately \$600,000. The apparent scarcity of labor is, however, a serious drawback to the carrying out of this work expeditiously.

In Verdun there is a small building boom and permits are being issued with great regularity. Outremont also is busy, judging from Inspector Read's reports. This municipality aims to become a model corporation, and is at present asking the Quebec Legislature to amend their building by-laws to prevent the erection of tenement houses and factories within certain districts.

Supply Business Active

A general improvement is noted in the supply business and dealers report an activity in several lines. Cement is moving very freely and is still quoted at \$1.90 per barrel wholesale, f.o.b. Montreal.

The brickyards are commencing to open up for the spring business and their stock is in excellent demand.

Iron pipe and other lines of imported supplies are now on the way by the water routes and can take advantage of summer freight rates.

Paints and oils are quoted at steady figures but are meeting with a good demand from the spring trade.

The announcement of Major Stephens, president of the Harbor Commission, to the effect that navigation will be kept open for eight months instead of six, as formerly, is hailed with delight in all circles and will not be without its effect on the building supply trade.

Improvements to the Harbor Under Way

The work outlined for the present year towards improving the Montreal harbor has been placed under way by the engineering department of the Harbor Commission. The first project to receive attention is the construction of the high level railway tracks from the high level wharves above Victoria pier to a point near Hochelaga and Molson's creek, and for which this year's appropriation is \$200,000. Two Government dredges have arrived from Sorel, Que., and commenced operations at the lower end of the harbor. All the work is taken in charge by the harbor engineers.

The Hilda Daw Construction Company have opened an office at 99A Drummond street, as an addition to their present office at 207 St. James street.

Dominion Dry Dock Company

The gentlemen who form the Dominion Dry Dock Company, and who expect to construct the docks at Levis and St. John, N.B., are Sir Thomas Shaughnessy, president of the Canadian Pacific Railway Company; Mr. Hugh Andrew Allan, of the shipping firm of H. & A. Allan; George D. Davie and W. M. Dobell, of Quebec; Walter E. Foster, of St. John, N.B.; Lord Pirrie, of the Belfast shipbuilding firm of Harland & Wolff; Sir Robert W. Perks, and Mr. Arthur M. Grenfell, of London, Eng.

Three Subway Companies for Montreal

The Quebec Legislature has chartered three subway companies, viz., the Montreal Street Railway Company, the Montreal Underground & Elevated Railway Company, and the Suburban Tramway & Power Company. All three companies are obliged to spend two million dollars within four years or otherwise forfeit their charter.

Canadian Marble Company's Product in Demand

The new plant of the Missisquoi Marble Company, at Philipsburg, Que., is rapidly nearing completion. The company report both their eastern and western business particularly good while the American market is also buying Canadian marble quite extensively.

With their new plant completed and both their old and new factories running night and day and operating to full capacity, the Missisquoi Company have sufficient work ordered to keep them busy for at least the next 30 months.

New Grand Trunk Station for Montreal

At the annual banquet of the Board of Trade in London, Ont., Mr. Chas. M. Hays, president of the Grand Trunk Railway Company, announced the intention of the company to erect large stations at both Toronto and Montreal, the latter mentioned work to be commenced in the near future.

Rosemount's Extensive Plans

The municipality of Rosemount is asking the Quebec Legislature for power to borrow \$465,668, to be used for local improvements; \$147,207 of this amount to be expended in the construction of the Rosemount boulevard, and sums varying from \$3,000 to \$90,000 on twelve other streets. The bill empowers the town to borrow \$250,000 within the next year.

Location of Work to be Specified

As forecasted in the "Contract Record" some time ago, the Board of Control have dealt with the question of calling tenders for permanent street work and have definitely decided to have the names of streets upon which the work is to be carried out, mentioned in the calls for tenders. This gives the contractor the additional advantage of being able to figure out the cost of handling material and of studying the natural conditions. Former tenders did not specify the location of the work and the contractor, to protect himself, naturally had to figure on the longest possible distance from the base of supplies.

Personal and News Notes

Examinations for admission to the study of architecture will be held in the rooms of the Province of Quebec Association of Architects, 5 Beaver Hall Square, Montreal, and at the City Hall, Quebec City, commencing July 25th.

The old Union Building, situated at the head of Hospital street on St. Francois Xavier street, is undergoing extensive alterations and will be transformed into a modern office building. The Hilder Daw Construction Company have charge of the work for the proprietor, Alderman Robinson. The foundations have practically been rebuilt and the ground floor concreted.

J. Ulric Leclair, a plastering contractor, Duquette street, has assigned. His liabilities are placed at \$5,000.

The Point St. Charles Grand Trunk shops have completed the first of 25 heavy fast locomotives ordered for western passenger service.

Mr. Fuller, of Messrs. Serring, Fuller, Johnston & Monahan, a New York engineering firm, has been instructed to prepare a report upon the proper filtration methods which the city should adopt to obtain a pure water supply.

Mr. Adolphe Reeves, formerly building inspector of the town of St. Louis, has joined Inspector Chausse's staff and will have charge of buildings in the Laurier Ward.

Mr. Thomas O. Sinclair, formerly associated with the Hall Engineering Works and the Clyde Iron Works, has acquired the Scotia Engineering Works, at 11 Busby lane, succeeding the late Andrew Young.

The Canadian Sand Blast Company have completed their contract on the Lake of Woods building, St. Sacramento street, which called for the cleaning of that part of the walls remaining intact in the recent rebuilding operations.

Messrs. A. C. Leslie & Company, Limited, Canadian managers for John Lysaght, Limited, Bristol, Eng., have just received a cable from this firm stating that 1,760 tons of galvanized and black irons are being shipped to them via the steamer Turcoman, of the Dominion Line, which is due to arrive in Montreal in the course of a week. The Canadian market is using galvanized and other irons quite extensively.

Major Stephens, president of the Montreal Board of Harbor Commissioners, has returned to the city after an extended visit to the Continent.

Mr. Norman H. Cronk, late of the firm of Cronk & Company, of Pall Mall, London and Kent, has been appointed assistant engineer and surveyor for the Hilder Daw Construction Company.

A deputation from the Montreal Builders' Exchange recently waited upon the Board of Control and made a request that the plans of all the city's public works be placed on exhibition at the Builders' Exchange rooms. The Board of Control have promised to give the matter their attention.

Mussens, Limited, have removed their head office to new and commodious quarters at 318 St. James street, almost directly opposite their former premises. The new building is a five-storey structure with a basement and will be used exclusively for showrooms and office purposes.

Messrs. John Stewart & Company have commenced operations on the foundation and excavation work for the new Y.M.C.A. building on Drummond street.

A card bearing the names of the new Board of Control and city aldermen has been issued from the City Clerk's Department. In addition, the card contains some interesting statistics of Montreal. The population is placed at 450,000 and the city has 257 miles of streets, only 60 miles being paved. It also states that the corporation owns 232 miles of brick sewers and that there are 36,730,992 gallons of water pumped daily.

Gravel for Laying Dust

The C. P. R. has made an appropriation of \$250,000, which will be expended in spreading selected gravel and broken stone over the grade to reduce the amount of flying dust on the line between Fort William and Winnipeg. This is the method adopted by some of the best railways of the world to secure this end, and it will be used for the first time this year by the Canadian Pacific. The company has used vast quantities of gravel in previous years, but the object sought at that time was the improvement of the road bed.

In the United States the experiment has been made of spraying the roadbed with oil to abate the dust nuisance. The result has not been such as to lead to the universal use of oil for this purpose, and nothing of the kind has yet been done on the C.P.R. in the west.

Brick Scarce at Winnipeg

Buildings Statistics and Forecast for 1910—Is Shortage of Brick Attributable to Winter Operations?

Office of the "Contract Record."

Winnipeg, April 22nd, 1910.

Building permits issued from the first of the year are now approaching the four and a half million mark. Up to the middle of April the figures were \$4,198,400. For the same period of 1909 the figures were little in excess of one and a half million dollars. If the same rate of advance were kept up throughout the year, the permits at the end of the year would total over \$25,000,000.

Building Inspector Rodgers, of Winnipeg, has prepared a detailed report of the operations of his department during 1909. The following is a table showing the number of buildings in each class and the approximate cost:

499 Frame dwellings, semi and non-modern....	\$ 488,450
937 Frame dwellings, all modern	2,363,000
99 Brick dwellings	537,400
30 Brick veneer dwellings	253,000
105 Stores and garages	300,800
65 Tenements and office blocks	3,017,950
11 Churches, schools and institutes	445,200
58 Warehouses, storehouses, mills, etc.....	899,300
12 Public buildings	286,450
331 Stables, sheds, workshops, etc.....	138,775
795 Additions, alterations and repairs	496,500
2,942	\$9,226,825

The progress of building in the western capital during the last ten years is shown by the following statement:

Year	Permits	Building	Cost
1900	530	656	\$ 1,441,863
1901	630	820	1,708,557
1902	822	973	2,408,125
1903	1,227	1,593	5,968,400
1904	1,768	2,268	9,651,750
1905	3,349	4,099	10,840,150
1906	3,487	4,204	12,625,950
1907	2,433	2,827	6,309,950
1908	1,544	1,769	5,513,700
1909	2,498	2,492	9,226,825

Brick and Other Materials

There is great activity in all lines of the building industry but there is one disagreeable feature, and that is the scarcity of brick. The unprecedented demand for building material that has been experienced this spring has caused a run on several lines and there is a general tendency to stiffening of prices. Common brick can be obtained for neither love or money, and face brick, fireproofing brick, cement, stone and terra cotta are trending in the same direction.

It is estimated that so far this spring more than five million of brick have been ordered and to-day local stocks are exhausted. Dealers are bringing this material to the city from Portage la Prairie, Beausejour, and Sidney, but the supply is not equal to the demand. The shortage on brick will materially delay work on the larger structures. Brick which previously sold at \$10 a thousand is now quoted at \$11.

The increase in the cost of brick is due to the shortage, and the shortage, in turn, is caused by the heavy spring demand. The shortage is more noticeable than during any previous year and may be responsible for many extensions to brickyards this summer. Winter building is also blamed for the present shortage. Last winter was practically the first winter in the history of the city when building operations were carried on, and reserve stocks of material were

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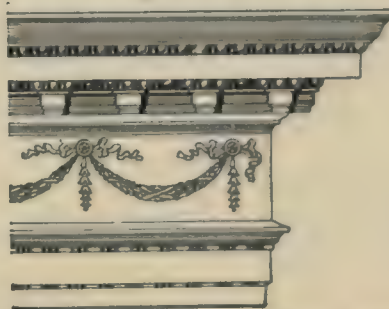


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A knowledge of the requirements of contractors and architects demanding a strictly high grade article have enabled us to market the best interior finish.

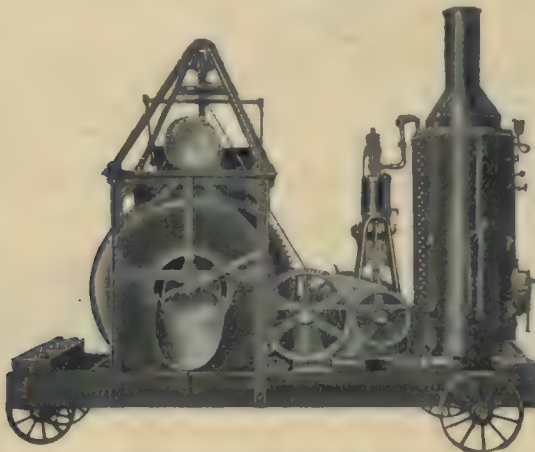
Batts Limited

50 Pacific Avenue - West Toronto

greatly depleted by this unexpected condition. Supply firms will not be able to overcome the difficulty until new brick is placed upon the market, which will not be for six weeks. The shortage in lumber is due to the increased demand and also to some difficulty encountered in getting British Columbia products through the mountains. Lumber has not become as scarce as brick and will not delay any building.

An Economical and Up-to-Date Mixer

One of the latest inventions of the London Concrete Machinery Company, London, Ont., is the London Standard Batch Mixer, advertised in this issue. This machine evoked much favorable comment at the recent exhibition of the Canadian Cement and Concrete Association. It is manufactured in three sizes, namely, one-third yard, one-half yard, and one yard batches. The accompanying illustration conveys some idea of the up-to-date equipment of the machine. Features of the London Standard Batch are its simple construction, the small number of wearing parts and the fact that the load is always equally balanced. It discharges rapidly and is built



London Standard Batch Mixer.

in many styles. From an economical standpoint the manufacturers claim that it cannot be beaten. In addition to this machine the company also manufacture the London Automatic Concrete Mixer.

Recent Canadian Patents

The following is a list of patents relating to contractors' appliances and building trades. Furnished by Fetherstonhaugh & Company, 5 Elgin street, Ottawa (Russel S. Smart, resident):

124,384. Chas. A Matheson, Perth, Ont.; drying apparatus for peat and the like.

124,470. J. L. Roche, Nominique, Que.; excavator teeth.

124,795. A. M. Ferguson, Hamilton, Ont.; combined step, extension and scaffold ladders; A. M. Ferguson and Wm. H. Bronson.

124,841. P. Boisvert, East Angus, Que.; snow road machines.

124,880. Jno. E. Neyvatte, West Toronto, Ont.; composition matters for pavement construction and similar work.

The annual meeting of the Quebec Land Surveyors was held last week at Quebec. Four of the retiring directors were re-elected without opposition, namely, Messrs. A. Leofred, A. Smith, G. Michaud and M. Sirois. The question of the competition of government surveyors with private firms occasioned quite a discussion, and it was finally decided to appoint a deputation to wait upon the Government and enquire as to whether Government employees could leave their official work to take up outside employment.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

540. Sanitary ware—A Staffordshire firm wish to get into communication with a reliable party in Winnipeg, calling on users of building materials, hardware, etc., to take up the sale of their sanitary ware.

544. Saw—An engineer in the English Midlands manufacturing a patent stone saw which is claimed to have double the speed of the old type, wishes to place his specialty upon the Canadian market.

547. Machinery—A firm in Yorkshire manufacturing ventilating, warming and drying machinery, wish to extend their Canadian business.

551. Steel—A London correspondent representing several important continental steel manufacturers is desirous of opening up Canadian business connections.

552. Agency—A firm in the North of England making a specialty of brick-making machinery and grinding pans and mortar mills would like to be put into communication with a firm in Canada willing to represent them.

616. Hydraulic apparatus for raising water—A London firm are desirous of disposing of the Canadian patent rights in a new hydraulic apparatus for raising water and fluids automatically, which is claimed to be useful for irrigation, draining and sewage purposes, unwatering mines, conveying oil in pipe lines, etc.

618. Sheet metal stampings—A firm in the English Midlands manufacturing sheet metal stampings from half-inch to 42-inch in diameter for the engineering trade, motor manufacturers, electrical engineers, etc., wish to do Canadian business.

633. Agency abroad—A firm in London, Eng., are anxious to get in touch with sellers and agents of second-hand machinery, contractors' plants, etc., for whom they could act on commission in Great Britain.

645. Vitrified blue bricks, etc.—A firm in the English Midlands manufacturing vitrified blue bricks, coping pavings, roofing tiles, etc., wish to be placed in touch with Canadian exporters of these goods.

656. Iron piping, paints, etc.—An inquirer in Barbados is desirous of hearing from Canadian manufacturers exporting iron piping, paints and other articles required in connection with water supply and municipal work.

658. Agents—A Liverpool firm would like to get in communication with municipalities or private firms in Canada to handle their oil gas apparatus for the lighting of towns, works, villages, etc.

697. Overmantels—A South African firm of timber merchants desire to be placed in touch with Canadian shippers of overmantels. Quotations to be f.o.b. Montreal and St. John. Terms cash against documents in New York.

698. Felt roofing—A South African firm of timber merchants desire to be placed in touch with Canadian shippers of felt roofing. Quotations to be f.o.b. Montreal and St. John. Terms cash against documents in New York.

722. Expanded metal—A South African firm desires to be placed in touch with Canadian shippers of expanded metal for building purposes. Quotations to be c.i.f. East London and Durban.

723. Concrete reinforcement—A South African firm desires to be placed in touch with Canadian exporters of concrete reinforcement for building purposes. Quotations to be c.i.f. East London and Durban.

724. Roofing—A South African firm desires to be placed in touch with Canadian shippers of roofing material. Quotations to be c.i.f. East London and Delagoa Bay.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bridgeburg, Ont.

Tenders addressed to J. H. Atwood, reeve, will be received until May 16th for material and construction of about 10,000 lineal feet of vitrified pipe sewers, running from 8 to 24 inches in diameter; also septic tanks of 15,000 cubic feet capacity, etc. Plans, etc., at office of R. A. Land, clerk, and also at office of Ross & McCaw, Welland.

Cobalt, Ont.

Tenders are being called until May 17th for \$25,000 5 per cent 8-year waterworks debentures, guaranteed by Township of Coleman. R. L. O'Gorman, town clerk.

Chippawa, Ont.

A bylaw to raise \$27,000 will be submitted shortly for the installation of a waterworks system.

Creston, B.C.

Charles Moore, P. L. S., has been appointed by the Government to carry on the survey for the proposed subway construction and sewerage system.

Fort Frances, Ont.

Tenders will be received until May 26th for extension of sewers. See advertisement in this issue.

High River, Alta.

Messrs. Chipman & Powers, of Toronto, have been asked to outline plans for waterworks here.

Kingston, Ont.

Tenders will be received until May 5th for supply of crude petroleum for road sprinkling. H. B. R. Craig, city engineer.

Lethbridge, Alta.

Council adopted the following estimate of expenditure on anticipated works:—Street grading, \$3,000; cement walks, \$70,000; sewer main extensions, \$40,000; water main extensions, \$67,000; plank sidewalks, \$4,000; sewer outlet, \$42,000; total, \$254,000.

North Vancouver, B.C.

City Engineer Geo. S. Hanes, has submitted to council his report on the proposed sewerage scheme.

Niagara Falls, Ont.

Tenders addressed to J. H. Jackson, C.E., superintendent, will be received until May 17th for construction of macadam roadway, etc., for different sections, totaling 45,800 feet. Plans at Administration Building.

Magrath, Alta.

The town council has decided to construct a number of concrete sidewalks.

Montreal, Que.

Tenders will shortly be called for the construction of pavements and sidewalk work amounting to approximately \$1,400,000.

Richmond, B.C.

Tenders close on the 7th inst. for supply and work in connection with the laying of wood pipe, steel pipe and valves here. Cleveland & Cameron, 506-508 Winch Building, engineers, Vancouver.

Swift Current, Sask.

Mr. J. D. Whitmore, formerly city engineer of Moose Jaw, with Mr. T. A. Murray, is planning a new waterworks and sewerage system for this municipality.

Toronto, Ont.

The awarding of contract to Ryan and Reilly, Philadelphia, for construction of siphon under the Don river, has been postponed for two weeks by the council.

Victoria, B.C.

City Engineer Angus Smith has recommended reservoir repairs to cost \$7,500.

Welland, Ont.

Council are considering the construction of a trunk sewer to cost \$5,450.

Walkerville, Ont.

Tenders are being called by this municipality for construction of concrete pavement, etc. See advertisement in this issue.

AWARDED.

Calgary, Alta.

J. T. Child, City Engineer, submits list of tenders received for sewer pipe and sewer and water extensions for 1910, also for excavation on subway under C. P. R. at First street east. In regard to the sewer and water extensions the Commissioners have examined the engineer's figures for last year's work and have recommended that the contract be carried out by day labor as in previous years. The lowest tender received for iron castings was from the Alberta Iron Works, as follows: Man hole frame and cover, \$14.45; extra man hole covers, \$4.50; catch basin, open grate gutter pattern, \$6.95; extra gutter gates, \$2.15; catch basin, side entrance, \$7.90; extra covers for side entrance, \$1.95; side entrance castings, \$1.35; street railway track drips, \$8.90. For cement the lowest tenders were the Canada Cement Company and the Western Canada Cement & Coal Company, who both tendered at \$2.63 1-2 per barrel, f.o.b. Calgary, not including sacks. The Rocky Mountain Cement Company tendered at \$2.65 per barrel. For concrete curbs the lowest tenderers were Batchelor, Marshall & Skarin, at 42 cents per lineal foot; the highest were Hewson & Boney, at 47 cents. For sewer pipe the Canadian Equipment Company, of Calgary, were the lowest at a bid of \$75,638.75 for pipe, \$5,638.75 for subways, and \$282 for bends. The lowest tender received on subway excavation was from Davidson & Mestaway, Edmonton, Alta, at 77 cents for free hole of one-half mile. A. G. Stewart, at \$1, was the highest tenderer in the last named connection.

North Battleford, Sask.

Secretary-treasurer S. Cookson, sends us the following list of accepted tenders:—Cast iron pipes and special, Canada Iron Corporation, Limited; hydrants, valves,

etc., Canada Foundry Company, Limited; trenching and pipe laying, Wm. Newman Company, Limited, of Winnipeg, and Manus & Marocco, of North Battleford; erection of concrete reservoir, Wm. Newman Company, Limited.

Ottawa Ont.

The contract for the paving of Wellington street has been given to the Barber Asphalt Company, \$22,190, the lowest. The other tenderers were: City asphalt plant, \$24,804; Union Construction Company, \$23,197; Ottawa Construction Company, \$24,000.

St. Boniface, Man.

The contract for street paving for the present year was awarded to the Bitulithic and Contracting, Limited. It is estimated that between 50,000 and 75,000 square yards of the former will be laid.

Winnipeg, Man.

The tender of Thos. Jackson & Son for sewer pipe was accepted by the board, \$6,755.50.

W. Beverley Robinson, of Montreal, was awarded the contract for cast iron pipe required for waterworks extensions here at \$18,131.11. Other bidders and prices:—The Canada Iron Corporation, Limited, Montreal, \$18,735.10; United States Cast Iron Pipe & Foundry Company, \$20,657.18; Wm. Jacks & Company, Glasgow, \$19,731.08; Canada Foundry Company, Toronto, \$20,670.75; Bissett & Loucks, partial bid, \$20,131.84; Camden Iron Works, partial bid, \$19,878.90.

Wetaskiwin, Alta.

The tender of the Canadian Rand Company for pumping equipment has been recommended for acceptance. The following prices per foot for waterworks and sewer construction (referred to the engineer) are as follows:—Waterworks: E. Maunders, Edmonton, 65 cents, 64 cents, 64 3-4 cents, 64 1-2 cents; August Johnston, 70 cents; Geo. Irish, \$1.10, 80 cents, 90 cents, 75 cents. Hydrants were quoted at \$17 by E. Maunders, while the other bids were at \$13. Sewers: August Johnston, 65 cents, 65 cents; Geo. Irish, \$1.55, \$1, \$1, \$1.35; Hans Anderson, 85 cents, 60 cents, 70 cents, \$1; E. Maunders, 38 3-4 cents, 64 1-2 cents, 67 1-4 cents, 84 cents. Prices quoted on manholes were: A. Johnston, \$6; Geo. Irish, \$6; H. Anderson, \$3.80; E. Maunders, \$5.80.

Weston, Ont.

The council have awarded the following contracts: The Smart Turner Manufacturing Company, Hamilton, pumping machinery, \$6,758. Other competitors, Canada Foundry, Toronto; John McDougall Caledonian Works, Montreal; Purdy, Mansell, Toronto. Filters: American Water Separator Company, Philadelphia, \$2,742; other tenderers, the John McDougall Caledonian Works, Roberts Manufacturing Company, Pittsburg Filter Company. Pump house, George W. Moock, of Waterloo, \$4,500; others tenderers, F. C. Taylor, Mount Dennis, Wells & Gray, Toronto.

Railroads, Bridges and Wharves

Brockville, Ont.

Tenders are being called until May 11th for construction of six bridges, etc. Barber & Young, consulting engineers. See advertisement in this issue.

Bobcaygeon, Ont.

Tenders are being called until May 5th for the steel superstructure of bridge over Nogey's Creek. E. M. Elliott, county clerk.

Fredericton, N.B.

Tenders are being called until May 9th by Public Works Department for rebuilding Sharp bridge, King's County. Plans, etc., at above Department and at the office of G. B. Jones, Apohaqui and of J. E. McAuley, Lower Millstream, King's County.

Merritt, B.C.

The Kettle Valley Railway has called for tenders for building a 20-mile section of the line between Merritt in Nicola valley to Clearwater, a point on the Clearwater river en route to Penticton.

Montreal, Que.

Plans have been prepared by the Grand Trunk Railway Company to eliminate all their grade crossings in the city of Montreal, and they have asked the Board of Railway Commissioners to ratify this work.

The Railroad Commission have ordered the construction of a bridge at Rockfield, Que., to span both the Grand Trunk and Montreal Park and Island Railway tracks. The cost to be divided as follows: G. T. R., 50 per cent.; M. P. & I. Company, 14 per cent.; municipality of Lachine, 10 per cent.; Lachine parish, the town of St. Pierre and Montreal Turnpike Trust 2 per cent. each; Dominion Government, 20 per cent.

Ottawa, Ont.

The following items are culled from the supplementary estimates for fiscal year ending March 31, 1911:—Hudson Bay Railroad, construction, \$500,000; Quebec Bridge, construction, \$500,000; St. Ours, wharf one east side of River Richelieu, \$5,500; Nova Scotia, Shubencadie river, enlargement of span on D. A. R. bridge and construction of warping piers, \$23,000; Three Fathom Harbour, breakwater, \$4,000; Woods Harbour, breakwater, \$4,000; Prince Edward Island, Miminogash Harbour, breakwater pier, \$3,500; New Brunswick, Campbellton, additional deep water wharf accommodation, \$25,000; Alberta, Edmonton bridge across North Saskatchewan river, \$10,000; Ontario, extension of Sapper's and Dufferin bridges, Ottawa City. British Columbia: Burton city, wharf on east side of stream between Upper and Lower Arrow Lakes, \$6,000; Columbia and Kootenay rivers, wharves, \$14,000; Fraser and Thompson rivers, wharves, \$15,000; Skidgate, Graham Island, wharf, \$5,000; Sooke Harbour, improvement of entrance, \$5,000. Ontario—Hamilton, harbour improvements, \$20,000; Owen Sound, harbour improvements, \$15,000; Port Bruce, extension of west pier, \$3,000; Pelee Island, North Bay, extension of wharf, \$5,000; Peterborough, wharf on Little Lake at foot of Mark street, \$4,500; Pen-galley's Landing, pier on north shore of Rice Lake, \$5,000; Port Colborne, repairs to head block of eastern breakwater, \$10,000.

Revelstoke, B.C.

It is reported that next fall the C. P. R. will begin constructing the Arrowhead & Kootenay Railway to connect the main line

at Revelstoke with the Crow's Nest road via the Lardeau.

Summerland, B.C.

The C. P. R., it is reported, will erect a cold storage plant, wharves, etc., here. Estimated expenditure, \$38,000.

St. Alexis, Que.

Tenders are being called by Department of Public Works, Ottawa, Ont., for extensions and repairs to wharf. N. Tessier, secretary.

Sault Ste. Marie, Ont.

Tenders are called until May 16th for clearing of right of way, construction of bridges, cleaning of cuts and making up embankments on the Algoma Central & Hudson Bay Railway. C. N. Coburn, chief engineer.

Tuscarora, Ont.

Tenders are being called by S. T. McKelvey, township clerk, for construction of concrete abutments for steel bridge, etc. See advertisement in this issue.

Shediac, N.B.

Tenders addressed to N. Tessier, secretary, Department of Public Works, Ottawa, will be received until May 26th for construction of wharf here. Plans, etc., at office of T. P. Shewen, district engineer, Chatham, and on application to local postmaster.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until June 28th for construction of concrete piers to be completed on or before November 15th; also for erection of steel superstructure and floors. Plans, etc., at office of City Engineer.

AWARDED.

Brantford, Ont.

The following tenders were received for the Market street bridge:—City Engineer, \$44,408; A. J. Cromer, Brantford, \$49,470; Rutherford & Patten, St. Catharines, \$46,400; J. Y. Harper, St. Thomas, \$42,468 (accepted); R. Brewder, Ottawa, \$50,712; M. M. Hiles, Atwood, \$49,000; D. H. Clemens, Berlin, \$44,700. Noted in last issue. T. Harry Jones, City Engineer.

J. A. Smith, township clerk, sends us the following list of tenders: Rispin steel bridge superstructure, 80 feet, Western Bridge & Equipment Company, Chatham, Ont., \$1,530; Rispin bridge, concrete abutments on piles, \$1,230; Fawcett bridge, 24 foot span, \$499; Hunter's bridge, 16 foot span, \$275, all three to George Thompson, Paris. Construction of Parkdale drain to James Mitchell, Brantford, \$1,306.55, township furnishing tile.

Fort William, Ont.

M. H. Braden, of this city, has been awarded the contract for the new addition of the C. P. R. machine shops.

Montreal, Que.

The C. P. R. have recently awarded to the Dominion Bridge Company contracts for the erection of a number of steel bridges, aggregating approximately 2,000 tons. This work is distributed over the eastern and western sections of the company's lines.

Winnipeg, Man.

J. McDiarmid & Company, of Winnipeg, have the contract for construction of freight car shops here, and engine houses at Ignace, Fiel, Roger's Pass, Kamloops and Smelter Junction, for the C. P. R.; A. G. Creelman & Company, of Calgary, and E. J. McGreevy, Winnipeg, the station buildings and section houses.

For the construction of abutments for

bridge 24.4, Souris section, the C. P. R. awarded contract to Jas. Kelly, this city.

Public Buildings, Churches, Schools, etc.

Arnprior, Ont.

The school board have decided to improve and add to the high school here. Cost, \$14,000.

Amherstburg, Ont.

Tenders will be received until May 9th for the erection of an eight-room school house. Watt, Jaquest & Williamson, architects, Windsor. C. H. Cuddy, secretary.

Brandon, Man.

The council are considering the alteration of city hall. Estimated expenditure, \$20,000.

Chilliwack, B.C.

Mr. Neate has been asked to draw plans of hospital. When these are approved by Board, work will be commenced at once. Building committee, J. O. Nichol, A. D. McEachren, Drs. Henderson and McCaffrey.

Coquitlam, B.C.

Competitive designs are invited until May 16th by the Department of Public Works, Victoria, for the laying out of the grounds of the new hospital for the insane here. F. C. Gamble, public works engineer.

Edmonton, Alta.

Superintendent McCaig has recommended the erection of a 12-roomed building between the Norwood and Alexandra Taylor school districts this year. The residents of Eastwood subdivision have presented a petition for a new school.

Gretna, Man.

A by-law will be submitted at once to raise \$10,000 for the purpose of building a new brick school. Plans have been prepared.

London, Ont.

An electric lighting plant will be installed in the hospital here. Estimated cost, \$25,000.

Lindsay, Ont.

Tenders are being called until May 16th for erection of school. See advertisement in this issue.

Medicine Hat, Alta.

A new theatre will probably be erected here. Wm. Cousins is interested.

Meaford, Ont.

The council decided to submit a bylaw to raise \$32,000 to be applied towards a new school.

Melville, Sask.

Mayor Dawsey is the authority for the statement that a site has been granted to the German Theological College.

Montreal, Que.

Tenders for the construction of the new Hochelaga School building will be received until May 6th. Dalbe Viau, architect.

Tenders for the construction of a public bath in St. Henry Ward will be received until May 6th. L. O. David, city clerk. Alphonse Piche, architect.

Niagara Falls, Ont.

A \$15,000 bylaw may be submitted for an extension to the collegiate institute.

New Westminster, B.C.

A Masonic building will be erected on the south side of Agnes street shortly. Approximate cost, \$20,000.

A debenture by-law for the sum of \$97,-

500, to be applied to the building of three schools, a high school on Tipperary, \$60,000; a school at Sapperton, \$35,000, and a school on Lulu Island, \$2,500, will probably be submitted shortly.

Owen Sound Ont.

Andrew Carnegie has offered this town \$25,000 for a free library.

Ottawa, Ont.

The following are culled from the supplementary estimates ending March 31st, 1911: Alberta and Saskatchewan — Calgary, Immigration building, \$10,000; Calgary, public building, additions to fittings, etc., \$7,000; Lethbridge, public building, \$20,000; Moosejaw, new public building, \$50,000; Melfort, public building, \$5,000; Saskatoon, purchase of land for public buildings, \$35,000; Vegreville, public building, \$5,000. British Columbia — Kamloops drill hall, addition to building and new heating apparatus, \$3,200; Nanaimo public building, extension of, \$15,000; Revelstoke public building, \$10,000; Vancouver public building, fittings, etc., \$16,000; Vancouver old post office building, alterations and fittings, furniture, etc., \$15,000. Prince Edward Island — Charlottetown, additional Dominion building, \$13,500; Summerside armory, \$10,000; Tignish, public building, \$5,000; New Brunswick — Chatham public building, enlargement of, \$5,000. Quebec — Montreal Postal Station "E", St. Louis du Mile End, addition to, \$7,000; Montreal Post Office, renovation of older portions of building, \$50,000; Napierville public building, \$5,000; Quebec Immigration Building, detention building in Savard Park, \$50,000; Quebec Examining Warehouse, fitting up building temporarily for customs purposes and permanent improvements, \$10,000; Quebec Immigration buildings, additions, renewals, repairs, etc., additional amount, \$6,000; Rigaud public building, \$7,000. Ontario — Kingston Royal Military College, additional dormitory accommodation for cadets, \$10,000; Ottawa military buildings, new magazine and caretaker's quarters, \$7,500; Ottawa Parliament Buildings, improvements, \$10,000; Paris, armory, \$5,000; Port Perry, public building, \$5,000; Peterboro Post Office building, addition to, \$10,000; Toronto Meteorological Observatory, to complete fittings, side-walks, fencing, electric fixtures, etc., \$6,000. Nova Scotia — Halifax Citadel, new quarters for single men, \$15,000; Yarmouth public building, increased accommodation, \$5,000.

Prince Albert, Sask.

There is a movement on foot to erect a modern theatre here.

Port Arthur, Ont.

Peden & McLaren, 20 St. Alexis street, Montreal, are preparing plans and specifications for the erection of a Carnegie library building.

Tenders addressed to Rev. Father J. A. Grenier, this place, will be received until May 15th for erection of Roman Catholic church. Plans, etc., at the Presbytery, or at the office of the architect, G. Émile Tanguay, 20½ d'Aiguillon street, Quebec, Que.

M. B. Aylesworth has plans for proposed Oddfellows' Hall, estimated cost \$32,000 (contract not yet awarded); also for \$20,000 banking and office building, cut stone and marble front, for Colonel S. M. Ray (contractor, Geo. Otto); also for theatre and apartment buildings for R. A. Burriss, cost \$15,000 (not yet awarded); for Norwegian Lutheran Church, cost about \$15,

000. Last named building may not be erected this year, except basement.

Regina, Sask.

Sharron & Tripp are the architects for the new exhibition building. Estimated cost, \$15,800.

Rev. L. P. Bergstrom, Winnipeg, has been here looking for a site for a school for Lutheran divinity students. Cost about \$30,000.

Rosthern, Sask.

Tenders were called on the 3rd inst. for the erection of Lutheran church at Stoney Hill. Plans, etc., at residence of J. E. Lanz, southeast quarter section 26, township 48, range 5, Laird, Sask.

Stewart, B.C.

An emergency hospital is to be erected.

Port Dalhousie, Ont.

Tenders addressed to A. E. Nicholson, architect, will be received until May 4th for erection of a Roman Catholic school.

St. Catharines, Ont.

Tenders will be received until May 5th for addition to the Nurses' Home, General and Marine Hospital. W. B. Allan, architect.

Sandwich, Ont.

A by-law to raise by debentures the sum of \$20,000 for the purpose of erecting offices in connection with the Court House will be submitted on the 10th July.

Southampton, Ont.

Tenders will be received until May 9th for erection of brick town hall. J. C. Eckford, town clerk.

Sydney, Ont.

A permit has been issued to John Morley, contractor, for an extension of St. Joseph's school. Cost, \$5,000.

Toronto, Ont.

A site at the corner of College and Markham streets, has been purchased as a site for the new Masonic hall in the west end.

Property Commissioner Harris has been asked to report on available sites for a wholesale fruit market building.

The management of the Toronto Bible Training School are considering the erection of a students' residence. President, Rev. C. E. Burrell, Hamilton; secretary-treasurer, H. L. Troyer, Toronto.

Union, Ont.

Tenders will be received until May 14th for the erection of a new school (Seminary School, No. 8, Yarmouth). Plans, etc., at H. McComb's, secretary-treasurer.

Victoria, B.C.

Wm. W. Norcott, purchasing agent, called for tenders until May 2nd for a two-storey building for garbage to be built on wharf on Herald street.

Woodstock, Ont.

Tenders are being called until May 10th for supply of school desks, etc. W. A. E. Ried, secretary Board of Education.

Winnipeg, Man.

Tenders addressed Chairman of Board of Control will be received until May 11th for supply of labor and materials for the erection of two stations and drill tower. Plans, etc., at office of A. & W. Melville, architects, 813 Union Bank Building.

Tenders will be called shortly for the erection of the police patrol system office.

The following are members of the Y. M. C. A. Building Committee, in charge of the coming campaign: E. Brown, A. L. Crossin, B. J. Dyson, and G. R. Crowe; those in charge of the north end branch,

O. W. McKerchar, H. B. Thompson and J. P. Frith.

AWARDED.

Huntsville, Ont.

Messrs. Irons & Winnacott have taken the contract for the erection of a large club house at Hollow Lake for Pittsburgh tourists.

Halifax, N.S.

S. M. Brockfield & Company, of Halifax, have been awarded the contract for the construction of the new Y. M. C. A. building in this city. Their tender was the lowest. The tenders for plumbing, heating and lighting have not yet been received.

Lakeview, Ont.

J. A. Saxton, chairman building committee, Baptist church, sends us the following list of tenders: T. H. Dussanbe, mason; Port Burwell, and H. Z. Balcom, builder, are the accepted tenderers, \$4,139.72 (seats, brick, gravel and sand, furnished by the church, also excavation done). Other tenderers, A. Bible, Port Burwell, \$4,465, and T. Brady, Port Burwell, \$1,800, for mason work only.

Montreal, Que.

The contract for alterations, Lachine market, Lachine, Que., has been awarded to Mr. G. Langlois. Dalbe Vian, architect.

The general contract for the erection of the additional wing to McGill University Medical Building has been awarded to Mr. E. G. M. Cape, general contractor. Brown & Vallance, architects.

Orillia, Ont.

The contract for a new Methodist Sunday school building, 62 x 92 with fifteen class rooms, has been awarded to Mr. Wm. Switzer, at \$15,700, exclusive of heating, plumbing and electric work.

Ottawa, Ont.

The contracts awarded for alterations to city hall are as follows: Exterior painting, Ritchie & Nunn, \$875; masonry, T. James, \$7,875; carpentry, A. Christie, \$9,604; plastering, J. J. Green, \$4,400; painting and glazing, Ritchie & Nunn, \$2,561; plumbing and heating, McKinley & Northwood, \$6,145; marble and tile, A. K. Mills & Son, \$2,126; electric wiring, J. A. Ellacott, \$753; galvanized iron, Modern Machine Company, \$540; ornamental iron, Dennis Wire & Iron Company, \$4,819.37; steel, E. C. Arnoldi, \$1,245; vault doors, J. J. Taylor, \$280; fire escapes, J. J. Enright, \$474. These were all the lowest tenderers. Tenders for elevator still to be called. Architect, C. P. Meredith.

Pictou, Ont.

Jas. H. McDonald, of Point Ann, has secured the contract for the cut stone needed in the construction of the I. O. O. F. hall here.

Vancouver, B.C.

The following tenders for the erection of two fire halls were received: Jas. Layfield, No. 4 firehall, \$16,630, and No. 11, \$10,675; C. S. Phalen, No. 11, \$9,569; R. D. Cowan and F. F. Bennett, No. 4, \$15,854; N. G. Patterson, No. 11, \$8,500. The lowest tender, those of Cowan & Bennett, for No. 4, \$15,854, and N. G. Patterson, for No. 11, \$8,500, were accepted.

Residences

Hamilton, Ont.

Recent building permits include: Eastwick & Sons, brick dwelling, Jackson street, for D. Jarvis, \$4,000; A. McMillan, two frame dwellings, Harvey street, \$2,400.

Montreal, Que.

Tenders were received until April 30th for the construction of a residence on Roslyn avenue for Mr. E. G. Coyle. Hutchison, Wood & Miller, architects.

Port Arthur, Ont.

M. B. Aylsworth has prepared plans for \$12,000 colonial dwelling for A. J. McComber. Contract not yet awarded. The same architect has plans for three \$5,000 houses for George Otto and for a number of smaller dwellings.

Victoria, B.C.

Plans are drawn up for the erection of an 8 storey apartment house, corner of Government and Humboldt streets.

Victoria, B.C.

Recent building permits include: Hon. W. J. Macdonald, brick building, \$4,000; B. S. Heisterman, for a two storey dwelling on Elford street, \$4,000; R. Petticrew, for a one and a half storey frame dwelling on Quadra street, \$2,600; James Baker, for a two storey brick dwelling, nine rooms, on Discovery street, \$7,000; McPherson & Fullerton, for a frame two storey dwelling, Hollywood crescent, \$3,800.

Winnipeg, Man.

Mrs. W. Rutherford has a permit for apartment block on west side of Hargraves street, \$45,000. Contractors, Claydon Bros. Architect, G. G. Teeter.

It is stated the Galbraith Bros., building contractors, have purchased property to the value of \$17,500 between Portage avenue and Assiniboine river, where they have taken out permits for residences.

Recent building permits include: John Morris, dwelling, Banning street, \$7,200; R. Garne, three dwellings, Gallagher avenue, \$2,000; A. J. Rothwell, dwelling, Jubilee avenue, \$2,600; P. Gallagher, two dwellings, Leslie street, between Glenwood and Silvia avenues, \$5,000; C. V. Wilmot, dwelling, East street, \$2,700; Wm. McLean, of Victoria, B.C., five dwellings, Cathedral avenue, \$12,500; G. F. Stephens, for private house, \$11,000; T. J. McVicar, Arlington street, Preston, \$2,500; J. J. Rooney, house, \$2,800; R. J. Smith has taken out permits for eight houses to be erected on the north side of McMillan avenue, one \$4,000, three \$3,500 each, and the remaining four \$3,000 apiece; R. J. Mackenzie, conservatory, 245 Kennedy, \$2,500; T. J. McVicar, dwelling, Arlington street, \$2,500; J. J. Rooney, dwelling, Ruby, \$2,800.

A permit was granted for apartment block, River avenue and Lewis street, \$90,000. J. Moxam, owner.

AWARDED.**Montreal, Que.**

Contract for the erection of three flats, Alwyn avenue, has been awarded to O. Charivin. Dalbe Vian, architect.

Contracts for the erection of a stable building at Montreal Junction for Mr. T. A. Trenholme, have been awarded as follows: Brickwork, Napoleon Leduc; fenestration, Expanded Metal & Fireproofing Company, Limited. Peden & McLaren, architects.

St. Boniface, Man.

Omer Dupont, Selkirk, has received a contract to build forty cottages on the Grand Trunk townsite.

Business Buildings and Industrial Plants**Brandon, Man.**

Tenders were called until May 3rd for the erection of a brick and stone hotel for H. Johnson. W. A. Elliott, architect.

Black Lake, Que.

Fire caused extensive damage to the sash and door factory of Mr. Pourier, a local contractor, recently.

Cornwall, Ont.

The Rossmore Hotel was destroyed by fire and other buildings badly damaged on the 29th ult. Total estimated loss, \$25,000.

Chatham, Ont.

Alex. Kennedy has a permit to erect a two storey brick store, \$2,000.

Tenders will shortly be called for a new block. Wilson & Son, architects.

Fonthill, Ont.

It is stated that a new \$10,000 hotel will be erected here.

Edmonton, Alta.

W. H. Clark states that the Edmonton Lumber Company's mill recently burned down, will be rebuilt.

Port William, Ont.

Plans are being prepared by Architect Carl Wirth for the construction of a \$60,000 business block for Jas. Murphy. Tenders will be called as soon as plans are completed.

D. McDonald, manager for Revillon Bros., Nepigon, is completing arrangements for his two storey block to be erected on May and Cameron streets. Estimated cost, \$15,000. It is proposed to have the building completed by end of September.

Galt, Ont.

The Citizens' Committee and Mr. Jos. Stauffer will confer with the town council as to the desirability of purchasing a tract of land to be used for industrial sites.

Indian Head, Sask.

The Dominion elevator was destroyed by fire on the 29th ult. Total estimated loss, \$15,000.

Kingston, Ont.

The North America Smelting Company is negotiating for a site here. Estimated expenditure, \$75,000.

London, Ont.

The Watt Manufacturing Company, of Ridgeway, recently burned out, will build a factory here.

Laird, Sask.

The warehouse of the Imperial Oil Company and other buildings were destroyed by fire recently. Estimated loss, \$18,000.

Moose Jaw, Sask.

The Board of Trade is interested in the erection of a new hotel here. Mr. Willoughby, president.

Montreal, Que.

Mr. Joseph Perrault, architect, 2106 Park avenue, is calling for tenders for erection of manufacturing buildings for Messrs. Martin-Senour Company, Limited, on Beaumont and Greenshields avenue.

Plans for the remodelling of the Carley Building are being prepared by Finley & Spence for a Montreal syndicate who will, it is stated, expend \$200,000 in converting this building into a modern hotel.

The Transportation Building Company, Limited, has secured a ninety-nine year lease on the Seminary St. Sulpice property fronting on St. James, St. Francois Xavier and Notre Dame streets, and it is stated that they will ultimately erect a modern ten storey office building on this property.

Tenders will be received until May 5th for the construction of the Yorkshire Insurance Building on St. James street. Saxe & Archibald, architects.

D. R. Hanna, vice-president C. N. R., is authority for the statement that the company is considering the expenditure of about \$4,000,000 on a central passenger station here. Victoria Square is reported to be favored as a site.

New Westminster, B.C.

The Canadian Bank of Commerce will build a handsome office in this city some time this summer or fall, on Columbia street. Darling & Pearson, Toronto, architects.

Ottawa, Ont.

It is reported that the Reardon Rifle Sight Company will locate here shortly.

The James Power Company, of Toronto, is seeking to locate a factory for the manufacture of motor car requisites. Estimated expenditure on building, \$10,000.

It is stated that the C. N. E. is negotiating for possession of the Varsity oval grounds as a site for their new station.

W. E. Noffke, architect, has completed plans for the 3 storey block, corner of Dalhousie and York streets (cost about \$100,000), to be erected for Mr. K. Farah.

Prince Rupert, B.C.

Blake Wilson, manager for P. Burns & Company, it is stated, has selected a site for a refrigerator plant, three storeys.

Prince Albert, Sask.

H. H. Ittner intends extending his brick making plant.

Port Colborne, Ont.

The by-law to loan cork factory \$10,000 was carried.

Quebec, Que.

Tenders close on the 5th inst. for trades of carpentering, roofing, masonry, etc., in the enlargement of "Kent House," Montmorency Falls, for Quebec Railway, Light, Heat & Power Company. Staveley & Staveley, architects.

Stevensville, Ont.

The planing mill and neading factory owned by John Pierson were destroyed by fire on the 27th ulto. Estimated loss, about \$10,000.

Saskatoon, Sask.

The Trussed Concrete Steel Company will erect a \$75,000 flour mill here for the Saskatchewan Milling Company.

Toronto, Ont.

A. A. Barthelmes & Company, 91 Niagara street, have a permit to erect a 5 storey and basement factory, \$46,000.

The factory of the Blackwell Varnishing Company, 1367 Bathurst street, was badly damaged by fire on the 28th ult. Damage about \$5,000.

The Union Bank has secured a permit for its bank on the corner of Bay and King streets, \$150,000.

Joseph S. Mack, president of United Textile Corporation, headquarters, Pennsylvania, U.S., has been looking at possible sites for a factory, on which, it is reported, \$1,000,000 will be spent. Property Commissioner, Harris.

It is understood that J. L. Nicholls Company, publishers, have purchased 184 Spadina avenue.

Victoria, B.C.

A building permit has been issued for the block to be erected by Finch & Finch, on Yates street, \$18,000. Architect, D. C. Frame; contractors, Westholme Lumber Company.

Plans are being prepared by H. S. Griffiths, 1006 Government street, for the 3-storey business block to be erected on the

corner of Douglas and Johnson streets for Messrs. Moore and Scott, managers of the Victora Chemical Works, and Hamilton Powder Company, respectively.

Vancouver, B.C.

Wright, Rushford & Cahill are the architects for the 6 storey block on the corner of Davie and Jervis streets. Estimated total expenditure, \$157,000.

Winnipeg, Man.

Tenders addressed to P. E. Ryan, secretary Commission of the Transcontinental Railway, will be received until May 25th for the equipment for power house in connection with shops east of Winnipeg. Plans, etc., at office of Chief Engineer, Mr. Gordon Grant, Ottawa, and in the office of District Engineer, St. Boniface, Man.

John D. Atchison is the architect for the new Eastern Townships Bank to be erected on Main street.

The Winnipeg Elevator Company's elevator was destroyed by fire on the 27th ulto.

The building occupied by A. S. Girvin and others at 575-577 Selkirk avenue, was destroyed by fire on the 23rd ulto. Estimated loss, \$4,000.

The Dominion Bank will start immediately on the erection of a handsome terra-cotta building at the corner of Norte Dame avenue and Nena street.

Thos. Kelly & Son has a permit for 3 storey block, 110 feet on Notre Dame street and 120 feet on Princess street, \$70,000. Architect, G. W. Northwood.

The warehouse of Foley Bros., Larsen & Company, were damaged to the extent of about \$300,000 on the 29th ult.

AWARDED.

Alliston, Ont.

Wm. Jerreat & Son have secured the contract for the erection of the Home Bank branch.

Montreal, Que.

W. Beverley Robinson has been awarded the contract for the terra cotta work in the H. P. Labelle & Company, Limited, new building, Notre Dame street west. Doulton & Company's "Carrara" terra cotta will be used.

Montreal, Que.

The general contract for the erection of a brewery building for the National Brewery, St. Paul and Dupre streets, has been awarded to J. B. Gratton, Limited, contractors, 82 Mercier street. Cost, \$23,500. C. F. Hettinger & Company, architects.

The following sub-contracts have been awarded by the general contractors, Byers & Anglin, for the Alexandria School on Sanguinet street as follows: Electric wiring, Sayer Electric Company; ornamental iron works, F. A. MacKay; plumbing and heating, T. O'Connell; roofing, Sibley & Huot.

Gray & Wighton have been awarded the general contract for the construction of the new Semi-Ready factory building on Guy street. The new building to have four storeys and basement. MacVicar & Heriot, architects.

D. G. Loomis & Sons have been awarded the contract for the construction of a coal pocket for the Montreal Light, Heat & Power Company, in the vicinity of Longue Point. This building is to be constructed of reinforced concrete and will be approximately 400 feet by 200 feet and 40 feet high.

St. Thomas, Ont.

The contracts awarded for the Nursery Shoe Company (A. E. Medealf, manager)

are as follows: Carpentry, J. M. Green & Sons; masonry, A. E. Ponsford; plumbing, J. Williams.

Smith's Falls, Ont.

The contract for the new warehouse of Messrs. Robertson, Nicolle & Company, wholesale grocers, Kingston, has been let to Mr. M. Ryan.

Toronto, Ont.

The following contracts for erection of Canada Linseed Oil Mills plant have been awarded: Reinforced concrete construction and brick work, Leach Concrete Company and C. W. Wood respectively; the grain elevator used in conjunction with the plant will be built by J. H. Troman-hauser.

The Sanitary Floor Company, of Toronto, have been awarded the contracts for laying their sanitary flooring in the Grand Opera Hotel, Adelaide street, and the new hotel for Messrs. Taylor & Baker, Niagara Falls.

Winnipeg, Man.

The Maple Leaf Milling Company have let contracts for the building of 17 elevators in Saskatchewan to the W. A. Harper Construction Company, this city, \$102,000.

Power Plants, Electricity and Telephones

Camrose, Alta.

M. A. Maxwell, of Boston, has been asked to draw plans and specifications for an electric plant. Probable site, north bank of Stoney Creek, east of G. T. R. bridge.

Fort Saskatchewan, Alta.

The ratepayers will be asked to vote on the expenditure of \$10,000 for construction of electric light plant on Sturgeon river. Mr. Lynn, engineer.

Ingersoll, Ont.

By-laws to raise \$39,000 for the purchase of power plant, etc., and another to provide a sum of \$15,000 to augment equipment and prepare for distribution of electricity will be submitted to the ratepayers shortly.

Moose Jaw, Sask.

Tenders are being called until May 7th for the erection of telephone building. Plans, etc., on application to Storey & Van Egmond, architects, Regina.

Minnedosa, Man.

This municipality is preparing to call for tenders for the construction of a hydro-electric power plant; power, 500 h.p., to be developed from Little Saskatchewan river. P. H. Mitchell, Traders Bank Building, Toronto, consulting engineer.

Moose Jaw, Sask.

The ratepayers voted in favor of street railway franchise, which goes to a company composed of Ottawa capitalists. An up-to-date system will be installed at once. Noted in issue of April 6th.

Nelson, B.C.

The report that the C. P. R. will electrify the Crow's Nest Pass line is revived by the statement of an incorporation of a company capitalized at \$1,000,000 to develop power from the Pend D'Oreille river at its junction with Salmon river.

Ottawa, Ont.

The proposed street railway extensions have been approved by council.

The following are culled from the supplementary estimates, ending March 31, 1911: Maritime Provinces: Hawkesbury, Meat Cove, lines along shore of Gulf of St. Lawrence, renewal of poles, \$3,000; Meat Cove, Baddeck line, extension from

Baddeck via Nyanza to Little Narrows, \$2,350. British Columbia, extension of Courtney, Campbell river telephone line from east shore of Vancouver Island, etc., \$11,900; Kamloops, Okanagan Valley telegraph and telephone lines, \$11,000; Ashcroft-Dawson main line, telegraphic communication between Port Simpson and Stewart, \$16,000, etc.

Quebec, Que.

Two lines only of those proposed for construction by M. S. R. have been approved by Legislative Assembly.

Rouleau, Sask.

Tenders will be received until May 14, to overhaul the instruments and generally reconstruct the Riverside Rural Telephone Company's system here. Nine miles of line. C. N. Bonsall, secretary-treasurer.

Victoria, B.C.

B. C. E. R. is planning to create a big summer resort at Cordova Bay, where forty acres of land have been purchased.

Vancouver, B.C.

The following tenders were received:—Northern Electric, 20 miles copper wire at \$21.50 per 1,000 feet; 1,000 feet of covered wire, \$13 per 5,000 feet; half inch conduits, \$5.75 per 100 feet; 1,000 insulators at \$45 per 1,000 feet. F. Darling tendered for the same as follows: \$21.50, \$13.50, \$5.85, \$24.60. Cope & Son's tender was \$1,407 for the lot, and the Canadian General Electric, \$1,374 for the lot. These were referred to the city electrician.

Tenders are being received until May 7th by E. A. Earle & Company, 532 Pender street west, for material and work in connection with the proposed system of ornamental street lighting on four streets here.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until May 16th for the erection of sub-station for the electrical distribution system. Plans, etc., at office of Smith, Kerry & Chace.

Yorkton, Sask.

The town council is considering the installation of an electric light plant at a cost of \$24,000.

AWARDED.

Regina, Sask.

The Provincial Department of Railways and Telephones have awarded contracts as follows: Moose Jaw to Outlook, Martinson & McCutcheon, of Elbow; Saskatoon to Humboldt, Simpson & Craig, Virden; Wapella to Carlyle, Martin Misferdt, Alameda, Sask; Abernethy to Esterhazy, with branch to Melville, to R. & D. McLeod, Winnipeg. Construction work to commence by May 1, and completed in two or three months.

Stratford, Ont.

Tenders are to be called almost immediately for the \$75,000 electric distribution plant for Stratford.

Victoria, B.C.

The contract has been let to Bryce & Munro, of Sidney, for the telephone line from Victoria to Sidney and local exchanges in North and South Saanich. Work will proceed at once.

Miscellaneous

Chatham, Ont.

Tenders are being received by the Reeve of Chatham township for extensive improvements on the Maxwell drainage outlet. Engineer, G. A. McCubbin, St. Thomas. Estimated expenditure, \$44,000.

Edmonton, Alta.

Twelve money by-laws, totalling \$673,000, were passed.

Fernie, B.C.

The town has decided to raise \$10,000 for street improvements, \$7,000 for schools, \$6,000 for electric light extensions, \$1,900 for water extensions, \$2,700 for surface drainage and \$41,000 for sewers.

Grandview, Man.

Tenders will be received up to the 4th May for debentures amounting to \$5,000. Wm. Dickie, secretary-treasurer.

Kingsville, Ont.

The town of Kingsville is offering \$5,000 30-year park debentures. Advertisement in this issue.

London, Ont.

Recent building permits include: Mrs. C. W. Andrus, for re-building the warehouse on York street, \$7,000; Mrs. R. R. Talbot, 2 storey brick veneer on Tecumseh avenue, to cost \$2,000; George S. Gibbons, alterations to his residence at Ridout and Kent streets, \$6,000; H. Fulton, two storey brick residence on Louisa street, \$2,000; H. E. Gates, two storey residence, St. James street, \$10,000.

Montreal, Que.

Beaubarnois canal improvement work, which was undertaken by the Canadian Light & Power Company, will be done by the Canadian General Development Company, between St. Timothee and Valleyfield, while Fraser, Bruce & Company, of New York, will improve the canal mouth. Estimated cost, \$750,000.

Recent building permits include:— J. Lemebvre, 410 St. Andre street, two houses containing six dwellings, \$5,000; L. Dalbec, 287 Garnier, two houses containing four dwellings, \$4,000; J. P. Filion, 120 St. Philippe, one house, \$2,800; Wm. Gilmour, one house containing three dwellings, cost \$5,000; P. McMahon, 120 Colborne, one house containing three dwellings, \$3,500; P. Denis, 1284 St. Denis, one house containing three dwellings, cost \$3,000; G. Martineau, 42 villeneuve, two houses containing six dwellings, \$9,000; T. Girard, 13 Joachim, one house containing five dwellings, \$5,600; J. P. Legault, 894 Beaubien, one house containing two houses and two stores, \$4,500; G. Gregoire, 1365 St. Lawrence boulevard, one house containing three dwellings, \$4,000; John Welch, 490 Mountain street, one house containing dwellings, \$10,000; D. Cousineau, St. Urbain, one house containing three dwellings, \$3,000; L. Hamelin, 1077 Mount Royal, one house containing six dwellings, \$6,000; N. Lavallee, 122 St. Philippe, one house containing five dwellings, \$4,300; H. Corbell, 138 Garnier, four houses containing twelve dwellings, \$16,000; Mme. V. A. Thomas, 633 Boulevard St. Joseph, one house containing three dwellings, \$4,000; L. Lapierre, 34 Palm, one house containing three dwellings, \$5,000; E. Gascon, 868 Berri, one house containing three dwellings, \$2,800; D. Depatie, 301 DeCarrieres, two houses containing five dwellings, \$5,000; C. H. Blonin, 628 Boulevard St. Joseph, one house containing three dwellings, \$5,000; Jos. Demers, 475 Marquette, two houses containing six dwellings and one store, \$7,000; A. E. Rae, 401 St. Catherine west, alterations to one store, \$11,000; Mme. Alex. MacCombe, 304 Prince Arthur west, alterations to one house and one store, \$2,500; John Welch, 490 Mountain, alterations to four houses containing six dwellings, \$10,000; Reverend Sisters St. Croix, St. Laurent, Que., alterations to four houses, \$31,000.

Recent building permits include: Jos.

Demers, 475 Marquette street, two houses containing six dwellings and one store, \$7,000; Ernest Lattier, 15 Hospital, one house, \$7,000; J. E. Meagher & Company, 1111 avenue, one house, \$19,000; Isaac Freon-taine, 101 St. James, one house, \$13,000; C. Roseneberg, 4 Ontario east, two houses containing fourteen dwellings and one store, \$10,000; C. C. Boucane, 138 Christopher Colomb, one house containing two dwellings, \$6,000; Vincent Deschambault, 1845 St. Lawrence Boulevard, four houses containing eight dwellings and four stores, \$8,500; Jos. Granda Cigar Company, one factory, \$9,000; Viau & Duchesneau, 11 Drolet, one house containing five dwellings, \$3,000; A. Leonard, 2111 St. Urbain, one house containing three dwellings, \$3,000; A. L. Groux, 515 Dorchester east, one house containing two dwellings, \$6,500; J. C. Carlier, 215 Notre Dame west, two houses containing six dwellings, \$10,000; H. L. Timmons, N. A. Timmons, Atlas Construction Company, 141 St. Catherine west, one house and one factory, \$62,000; Frank Scott, 1111 Grosvenor, one house, \$10,000; D. Tremblay, St. Catherine & Jonette, one house containing two dwellings and one store, \$8,500; E. Clermont, 526 Alwyn, one house containing five dwellings, \$3,600; J. Beaungk, 1884 Mance, one house containing two dwellings, \$3,400; Arthur Bastien, 849 Park avenue, four houses containing eleven dwellings and one store, \$13,000; Jos. Kiel, 1435 Demontigny, one house containing three dwellings, \$4,500; Walter A. Lowney & Company, 103 William, one factory, \$10,000; Ecole Commissioners' Protestant, 197 Peel street, one house and one school, \$90,000; H. Godin, 51 Esplanade, one house containing two dwellings and one store, \$6,000; Bank Hochelaga, 212 St. Catherine west, alterations to house, \$5,500; C. A. Dugas, 402 Dorchester, alterations to theatre, \$3,000; Geo. W. Stepaenson's Estate, 15 St. Alexis street, alterations to house, \$3,500; Louis Dubeau, Dufferin, alterations to house, \$2,000; G. H. Randall & Company, City Hall avenue, alterations to factory, \$1,500; Miss M. L. Giguere, 285 St. Denis, alterations to house and store, \$3,200; Oct. Mousseau, St. Hubert street, alterations to house and two dwellings, \$1,400; Windsor Hotel, Dorchester street west, alterations to building, \$3,150; A. L. Strachan, 167 Cadieux, alterations to house, \$67,500; National Brewing Company, St. Paul and Dupre, alterations to brewery, \$23,500.

Recent building permits include:—A. Piche, 1894 Sanguinet, house containing five dwellings, cost \$3,500; O. Cardinal, 58 Rouville, house containing three dwellings, cost \$6,500; O. Fournier, 125 Amherst, store and two dwellings, cost \$5,000; A. Riopel, 2187a St. Urbain, two houses containing six dwellings, cost \$6,000; F. Leduc Dame, 62 Agnes street, St. Henri, two houses containing six dwellings, cost \$5,000; A. Janvice, 132 Cuvillier street, house containing three dwellings, cost \$4,000; J. H. Dansereau, 425 Sherbrooke street east, house, cost \$8,000; Dr. J. A. Fortier, 503 Rachel street, house containing three dwellings, cost \$3,500; Hy. Blais, 364 Laurier, two houses containing six dwellings, cost \$6,000; E. E. Wallace, 416 Guy street, house containing eight dwellings, cost \$20,000; A. Bissonnet, 423 Davidson, one house containing four dwellings, cost \$3,000; S. J. Vallieres, 1431 St. Hubert, apartment house containing fourteen dwellings, cost \$15,000; G. Bayard, 27 Bagg, house containing three dwellings, cost \$3,000; A. Gauthier, 1353 St. Hubert, two houses containing six dwellings, cost \$7,500; A. Lacroix, 239 Christophe Colomb, one house containing three dwellings, cost \$3,000; A. Leonard, 45 Casgrain, one house contain-

ing two dwellings, cost \$2,500; G. Paquette, 122 Dagenais, one house containing three dwellings, cost \$3,500; J. P. Forest, 243 Esplanade, two houses containing six dwellings, cost \$7,500; J. P. Forest, 253 Esplanade, four houses containing twelve dwellings, cost \$16,000; G. Galarneau, 192 Guy street, one house, cost \$2,500; H. Pelletier, 661 St. Lawrence Boulevard, one house, cost \$5,000; Dr. T. R. Wilson, 44 Park avenue, seven houses containing twenty-eight dwellings, cost \$17,000; N. Nolin, 175a Park avenue, one house containing three dwellings, cost \$4,000; J. Barsalon & Company, 222 Plessis street, stable, cost \$10,000; J. St. Amand, 1975 St. Lawrence Boulevard, two dwellings, cost \$10,000; N. Leclair, 875 Sanguinet street, house containing seven dwellings, cost \$21,000; M. Rodrigue, 2 Beaudoin, house containing two dwellings and one store, cost \$4,500; J. F. Brule, 151 St. Denis street, one house containing three dwellings, cost \$5,000; M. Beauchamp, 869 Delorimiere avenue, house containing three dwellings, cost \$4,000; A. E. Cousineau, 217 Hotel-de-ville, house containing five dwellings, cost \$3,000; J. S. Prince, 500 Guy street, one apartment house containing twenty-eight dwellings, cost \$35,000; J. S. Prince, 500 Guy, house containing eight dwellings, cost \$12,000; N. Beauchamp, 1231 Bordeaux, one house containing three dwellings, cost \$2,000; M. Deslauriers, 171a Christophe Colomb, two houses containing four dwellings, cost \$3,000; I. Moquin, 55 St. Lawrence Boulevard, one house containing three dwellings, cost \$6,000; A. Sageau, 667 St. Catherine east, two houses containing six dwellings, cost \$11,000; B. Damiens, 898 Mount Royal avenue east, three houses containing six dwellings and three stores, cost \$15,000; D. Cusson, 171 Parc Sir Georges, E. Cartier, one house containing six dwellings, cost \$5,000; A. Beaudoin, 1846 Mance street, two houses containing six dwellings, cost \$6,000; J. T. Lajoie, 1341a Chapleau street, two houses containing four dwellings, cost \$2,700; Jos. Sawyer, 407 Guy street, house containing thirteen dwellings, cost \$35,000; G. Derochers, 88 Bourbonniere, two houses containing six dwellings, cost \$7,000; D. Charbonneau, 1846 Notre Dame west, house containing eight dwellings, cost \$10,000.

Outremont, Que.

On May 4th a by-law will be voted on to issue \$250,000 4 1-2 per cent. 42-years local improvement debentures. Geo. A. Robinson.

Ottawa, Ont.

Tenders are being called by Public Works Department until May 4th for dredging in Maritime Provinces.

Recent building permits include: Chas. Ropwell, concrete garage, Queen street, \$12,000; Dr. C. H. Jewet, brick veneer dwelling, Monkland avenue, \$4,000; A. Charpentier, row of five brick veneer dwellings, Main street, \$5,500; E. N. Soper and J. W. Nimmo, brick veneer dwelling, Carling avenue, \$5,000; Alexander and Campbell, brick veneer dwelling, Powell avenue, \$6,000; James Low, brick veneer dwelling, Cooper street, \$3,000; J. Connors, frame dwelling, Carlyle avenue, \$2,750; W. O. Burns, double brick veneer dwelling, Arlington avenue, \$2,800.

000.

The following are culled from supplementary estimates for year ending March 31, 1911: Chambly Canal—St. Johns' improvements, \$20,000. Welland Canal—Surveys and borings for proposed new or enlarged canal, Port Colborne improvements, dock south of Welland, \$140,500; to build new steel gate lifter, \$12,000. Whitby,

harbour improvements, \$20,000. Annapolis harbour improvements, ice piers, additional amount, \$15,000. Little Bras d'Or breakwater wharf, \$10,000. North Sydney, deep water wharf, \$8,000.

Quebec, Que.

The following is a list of contemplated public and private work to be constructed in this vicinity during the next five years: Bridge and approaches, \$10,000,000; dry dock and ship building yards, 5,000,000; Grand Trunk Pacific terminals, \$3,000,000; Quebec & Saguenay Railway, \$3,000,000; Q. R. L. & P. Company's improvements, \$1,500,000; custom house and other Government buildings, \$1,000,000; harbor improvements, including extension Louise Dock, etc., \$2,000,000; Canadian Pacific Hotel and Station extensions, \$1,500,000; four thousand new houses at average cost of \$2,000 each, \$8,000,000; civic improvements in Limoilou, etc., including two bridges over St. Charles river, \$500,000; Battlefields Commission, \$1,000,000; total, \$36,500,000.

Regina, Sask.

The following permits have been issued recently: S. Beach, residence, \$2,800; Robt. Armour, block, \$28,000; A. M. Fraser, residence, \$6,000; Alex. Mowat, business block, \$20,000; P. McArthur, business block, \$20,000; A. W. McGregor, building, \$2,500; Robt. Ehman, dwelling, \$3,100.

A. E. Chivers, city clerk, is calling for tenders until June 6th for 4 1-2 per cent. debentures for market building (30-year), \$16,000; waterworks extensions (30-year), \$10,000; sewer extensions (30-year), \$10,000; agricultural industrial exhibition (20-year), \$25,000; Albert street subway (30-year), \$41,000. Total, \$102,000.

Toronto, Ont.

Recent building permits include: D. A. Williams, one pair semi-detached two storey brick dwellings, Gladstone, \$4,200; Geo. Nicholson, ten detached two storey and attic roughcast dwellings, brick fronts, Galt, \$12,000; Mary S. Thompson, three storey brick store, office and dental room, corner Bloor and Clinton, \$9,000; W. S. Hodgins, two and a half storey brick dwelling, Russell Hill road, \$10,000; Dr. J. O. Orr, four attached two and a half storey brick dwellings, Horticultural Place, \$10,000; H. S. Mara, two and a half storey brick dwelling, Rowanwood, \$4,500; Mrs. S. Williamson, two detached two storey brick dwellings, Elmer, \$4,000; G. A. McTaggart, one pair semi-detached two storey brick stores and dwellings, corner College and Sheridan, \$6,000; A. O. Scott, one pair semi-detached two storey brick dwelling, Emerson, \$4,000; A. Grassi, one pair semi-detached two storey brick stores and dwellings, Queen street west, \$4,500; J. W. Brown, one pair semi-detached two storey brick dwellings, St. Clarens, \$4,000; J. T. Robertson, two storey brick dwelling, on 42 Hayden street, \$3,750; A. McGill, two detached two and a half storey brick dwellings, Humberstone and Mavety, \$6,000; J. Donagh, two storey and attic brick dwelling, Chestnut Park, \$10,000; Mrs. Lane, two storey and attic frame addition to residence, Iroquois, \$6,500; H. Shenhman, three attached two storey brick dwellings, Symington, \$7,500; Dr. W. B. H. Aikens, alterations and additions to dwelling on Bloor, near Avenue road, \$7,000; Geo. H. McLaughlin, one pair semi-detached two storey brick dwellings, Wroxeter, \$3,500; W. H. Marks, three attached two storey brick dwellings, Margueretta, \$6,000; Wm. Lightle, two and a half storey brick dwelling, Castle Frank crescent, \$5,000; J. S. Hedge, three pairs semi-detached two stor-

ey brick veneer dwellings, Weston and Morton road, \$10,000; G. H. Webb, one pair semi-detached two storey and attic brick dwellings, Walter, \$7,000; Hayes & Caldwell, three pairs semi-detached two storey roughcast dwelling, brick fronts, Dingwall, \$8,000; Prof. J. H. Cameron, two and a half storey brick dwelling, Admiral, \$4,500; R. Laidlaw & Company, three storey brick woodworking factory, corner Bridgman and Spadina road, \$15,000; Sarah English, two pairs semi-detached two storey brick dwellings, Churchill, \$10,000; J. O'Leary, one pair semi-detached two storey brick dwellings, Wallace, \$4,000; G. Williams, four pairs semi-detached two storey brick dwellings, Brampton place, \$10,000; M. Healy, three storey brick warehouse, 76-78 Richmond street east, \$10,000; W. H. T. Stevens, three pairs semi-detached two storey brick dwelling, Salem, \$10,500; C. A. Grant (in trust), one pair semi-detached two storey brick stores and dwellings, on 293-5 Broadview avenue, \$4,500; D. Todd, one pair semi-detached two storey brick dwelling, St. Clarens avenue, \$4,000; W. L. Larkin, 2 storey brick dwelling, north side Laburnum, \$4,500; James Gibson, five detached two and a half storey brick dwellings, Lansdowne, \$13,500; J. W. Young, three attached three storey brick stores and dwellings, Danforth, \$11,000; Mrs. A. Rhodes, two storey brick dwelling, Keele street, \$3,500; Waters & Elliott, six pairs semi-detached two storey brick dwellings, Yarmouth Gardens, north side, \$30,000; A. Cross, three attached two and a half storey brick dwellings, College, \$7,500; A. J. Savage, two storey brick dwelling, East Roxboro, \$6,500; J. & T. Bishop, two detached and one pair semi-detached two and a half storey brick dwellings, Hepburne and Havelock, \$12,000; L. J. Bland, two pairs semi-detached two storey brick dwellings, Dupont, \$8,000; R. Ranaldo, one pair semi-detached two storey and attic brick dwellings, 100-102 Curzon, \$4,300; W. B. Charlton, three storey brick apartments (2), southeast corner Home-wood and Wellesley, \$20,000; J. F. Murray, two storey brick dwelling, 46 Eleanor street, \$3,500; Mrs. E. Piper, two storey and attic brick dwelling, 86 Admiral road, \$6,500; W. H. Holmes, one pair semi-detached two storey and attic brick dwellings, St. Clair, \$5,800; J. H. Simpson, two storey and attic brick dwelling, Gladstone, \$6,000; A. Bryce, two and a half storey brick dwelling, Russell Hill road, \$6,000; Standard Sanitary Manufacturing Company, Limited, three storey brick, steel and concrete factory on Royce and Lansdowne, \$15,000.

Victoria, B.C.

The ratepayers will vote at an early date on a \$65,000 road improvement by-law.

Vancouver, B.C.

Building permits were granted as follows: Haida Confectionery Company, brick Coleman, 12833 Dock street, four houses, \$9,000; Jefferson & Clapham, 1637 Maple street, \$2,000; H. Labrash, Eleventh avenue, \$3,300; James Sparks, 1016 Thirteenth avenue, \$1,800; V. Braithwaite & Glass, 1874 Seventh avenue west, four houses, \$4,000; J. Bentley, 1828 Sixth avenue, \$5,000; Fred Melton, 1531 Twelfth avenue, \$4,000; C. Farmer, five dwellings, 2138 Victoria drive, \$7,500; R. J. Bealey, 363 Hastings street east, \$2,000.

Recent building permits include:—D. Caldwell, frame dwelling, 1665 Twelfth avenue west, \$4,000; Wilkinson & Son, frame dwelling, Seventh avenue east, \$2,500; James Dickie, 1455 Seventh avenue, two storey frame house, \$2,500; B. C. Bed-

ding & Upholstering Company, Frank street, brick warehouse, \$25,000; M. Edith Johnston, 1226 Richards, frame addition, \$3,300; A. Hailey, 3523 First avenue, storey and a half frame house, \$3,190 C. R., 2030 Whyte street, \$5,400; C. P. H., 1626 Eleventh avenue east, \$9,321 A. B. ter, frame bungalow, Thirteenth avenue, \$3,682; H. J. Monroe, frame house, Thirteenth avenue, \$3,000; J. Pierce, 2 Burns street, \$6,400; Prudential Building Company, \$3,000; R. O. Boulton, 536 Thirteenth avenue west, \$3,000; H. L. Munro, 305 Thirteenth avenue west, \$3,682.

Winnipeg, Man.

Recent building permits include: M. & Hutton Company dwelling on Lipton, \$2,000; Copping Bros., dwelling, Home street, \$5,500; A. L. Bond, six dwelling, Rosedale avenue, \$12,000; B. Persichin, additional storeys, north side of Portage avenue, \$22,000; T. Olson, dwelling, Broadway and Assiniboine, \$10,000; Sherwin Vincent, two dwellings, Morley avenue, \$2,800; Boyle Higgins, dwelling, Nassau, \$2,500; J. Isenberg, dwelling, Cathedral, \$4,000; J. Isenberg, dwelling, Aikins, \$4,000; H. Galbraith, dwelling, Basswood street, \$5,000; Andrews & Sons, dwelling, Canora street, \$4,800; A. C. Galbraith, west side Banning, \$2,000; F. D. Burris, (2) south side Beresford, \$5,000; W. A. Cameron, east side Arlington, \$4,000; Dunlop & Wallace, north side Yale, between Wilmot and Rockwood, \$7,000; P. Lakusta, north side Magnus, \$2,500; J. Atkinson, north side Hart, \$2,000; C. Wigert, No. 38 Jasper, \$2,800; J. T. Bergman, west side Alverstone, \$2,800; A. C. Galbraith, (3) west side Basswood, \$6,000; J. C. McNab, (double) south side Alfred, \$5,000; J. Matthews, south side Arnold, \$2,000; J. E. Lauzon, dwelling, 95 Athole street, \$2,000; R. Cohen, dwelling, Selkirk, \$3,000; A. McFarland, dwelling, corner of Garfield and Livinia, \$4,800; L. Armstrong, dwelling, Hetherington, \$2,000.

Recent building permits include: J. I. Duncan, house, Grosvenor, \$4,000; Thomas Jackson & Son, house, Ruby, \$3,200; John Saul, house, Harvard, \$10,000; J. Dodd, dwelling, west side Young street, \$2,500; Ripstein & Company, addition to 606 Main street, \$9,000; S. Brown, dwelling, north side Preston, \$5,000; H. W. Eaton, dwelling, east side of Centennial street, \$2,600; G. O. Aulsebrook, dwelling, Maryland, \$4,500; G. F. Stephens, dwelling, 3 Wilmot place, cell, between Maryland and Walnut, \$3,000; D. James, west side Walnut, \$3,600; Moss-Hutton Company, four houses, one on Athol, between Mae and Scotia, two on east side Lipton, between Portage and Livinia, and one on Boyd between Charles and Aikins, total cost \$11,400; C. D. Stovel, dwelling, Ruskin Row, opposite Yale street, \$22,000; J. C. McNab, 2 dwellings, Alexander avenue, \$2,000; T. Crowe, dwelling, Rosedale avenue, \$2,500; E. James, 3 dwellings, Home street, \$8,400; A. C. Galbraith, Newman street, eleven dwellings, \$23,100; G. W. Ford, three houses, west side Chestnut, between Preston and Buell, \$14,500; J. C. Hicks, apartment block, southwest corner of Helen and McMillan, \$12,000; O. Storster, house, west side Home, \$2,500; J. A. Martin, house, west side Ethelbert, \$5,000; J. A. Martin, two houses, east side Canora, \$10,000; H. M. Patterson, dwelling, east side of Agnes, \$2,000; E. M. Wood, dwelling, south side of Boslyn road, \$11,000; H. Galbraith, dwelling, east side of Banning, \$5,000; J. Fowhe, annex to Brunswick hotel, east side of Main street, \$22,000; J. H. Laplante, dwelling, west side of Arlington, \$6,000; P. McDiarmid, two

(Continued on page 28)

Tenders and For Sale Department

Town of Kingsville

Debentures for Sale

The Town of Kingsville offer for sale 30 park debentures of \$289.15 each, representing \$5,000, for 30 years, at 4 per cent. Particulars on request. W. A. Smith, clerk, Kingsville, Ont. 18

Notice to Contractors

Sealed tenders addressed to the undersigned will be received up to 3 o'clock p.m. on THURSDAY, THE 26TH DAY OF MAY, 1910, for the construction of Concrete Abutments, containing approximately 80 cubic yards, for a steel bridge in the Township of Onondaga, in the County of Brant. The site of the bridge is about two miles from Onondaga Station, G. T. R., and the same distance from the Village of Middleport.

Tenders must contain the composition of the concrete.

Contract will be awarded then if satisfactory.

S. J. McKELVEY,
Township Clerk,
Tuscarora P.O., Ont.

19

Tenders for Bridges

Tenders will be received by Geo. K. Dewey, Town Clerk, Brockville, Ont., up to twelve o'clock, noon, of WEDNESDAY, MAY 11TH, 1910, for the construction of six bridges in the Town of Brockville, including concrete or stone masonry abutments and steel beam or reinforced concrete superstructures.

Plans and specifications may be seen and all necessary information may be obtained at the office of the Town Clerk, Brockville, Ont., or at the offices of Barber and Young, consulting engineers, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

S. GOWAN,

Chairman of the Board of Works.

Brockville, April 27th, 1910. 18



To Contractors

Sealed tenders, endorsed "Tender for Addition to Osgoode Hall," addressed to the undersigned, will be received up to noon of SATURDAY, MAY 14TH, for the erection of an addition to Osgoode Hall, Toronto, for all trades excepting Heating, Plumbing and Electric Lighting. Plans and specifications can be seen at this Department.

An accepted bank cheque, payable to the order of the Hon. J. O. Reaume, Minister of Public Works, for 5 per cent. of the amount of the tender and the bona fide signatures and addresses of two sureties, or the bond of a guarantee company, approved of by this Department, must accompany each tender.

The Department will not be bound to accept the lowest or any tender.

By order.

H. F. McNAUGHTEN,

Secretary Public Works Dept.

Department of Public Works, Ontario,
Toronto, April 28th, 1910.

Newspapers publishing this advertisement without authority will not be paid for it. 18

Tenders for

Concrete Bridge and Floor

Tenders will be received up to the hour of letting at 2 p.m. on TUESDAY, MAY 19TH NEXT, for (1) 35 Feet Concrete Arch, near New Dundee; (2) Concrete Floor on Bridge, near Ayr, according to plans prepared by Bowman and Connor, civil engineers. For further information apply to F. Vickert, Esq., Princeton, or to

HERBERT J. BOWMAN, C.E.,
County Clerk, Berlin.

19

Notice to Contractors

Sealed tenders, marked, will be received by the Town Clerk up to 5 o'clock p.m. on MONDAY, 9TH MAY, 1910, for the building of a brick Town Hall.

Plans and specifications may be seen at the Clerk's office.

parts thereof.

Tenders may be for the whole works or for

A certified cheque to the amount of ten per cent. thereof, payable to the order of the Town Treasurer, must accompany each tender.

Lowest or any tender not necessarily accepted.

J. C. ECKFORD,

Town Clerk.

18

Tenders Wanted

Sealed tenders, marked "Tender for Six-room or Ten-room School," as the case may be, for the separate trades or for the whole contract, will be received by the Board of Education, Lindsay, Ont., up to the SIXTEENTH DAY OF MAY, 1910. Plans and specifications and all information may be obtained from the Town Clerk's office, Lindsay, and also from the office of Architects Ellis and Connery, Manning Chambers, Toronto. No tender necessarily accepted.

Tenderers may name a price to be allowed for the materials in the old Central and North Ward School, to be removed after the completion of the new building.

ROBERT SPIER,

Secretary Board of Education,
Lindsay, Ont.

18

City of Vancouver

Tenders for

Garbage Destructor Plant

Tenders will be received by the undersigned up to 3.00 p.m., TUESDAY, THE 31ST OF MAY, 1910, for the installation of a Garbage Destructor Plant at the Bridge street yard, on the south side of False Creek in the City of Vancouver, British Columbia. The plant must be capable of destroying not less than seventy tons of mixed garbage per day of twenty-four hours.

Tenderers will be required to submit plans and specifications with their proposals and furnish a satisfactory bond and guarantee that the destructor will fulfill all the provisions of the specifications.

The tendered price is to include the erection of the stack and all necessary buildings.

A deposit of an amount equal to 5 per cent. of the contract price must be made with each tender by marked cheque payable to the City Treasurer.

The lowest or any tenders not necessarily accepted.

W. McQUEEN,

City Clerk.

19

Town of Fort Frances

Sealed tenders will be received by the Corporation of the Town of Fort Frances, addressed to W. H. Elliott, Clerk of Fort Frances, Ont., until 8 o'clock p.m. on THURSDAY, THE 26TH DAY OF MAY, 1910, for the construction and completion of the following contracts in the extension of the sewerage system of the said Town of Fort Frances, viz:

"A." All labor for the construction of the extension to the sewerage system, and certain materials therefor.

"B." The supplying of vitrified tile pipe and junctions.

"C." The supplying of cast iron manhole covers, catch basin covers, and flap valves.

Copies of plans and specifications and forms of tender may be had upon application to the undersigned, the Clerk of Fort Frances.

H. WILLIAMS,
Mayor.

W. H. ELLIOTT,
Town Clerk.

Fort Frances, April 21st, 1910. 19

Intercolonial Railway Tender

Sealed tenders addressed to the undersigned, and marked on the outside, "Tender, Railway Nelson to Chatham," will be received up to and including TUESDAY, MAY 10TH, 1910, for the construction of a line of railway between Nelson and Chatham (N.B.), a distance of about 8.28 miles.

Plans and specifications may be seen at the Station Master's Office, Chatham (N.B.), at the Chief Engineer's Office, Moncton (N.B.), and at the office of the Secretary of the Department of Railways and Canals, Ottawa (Ont.), where forms of tender may be obtained.

All the conditions of the specification must be complied with.

A. W. CAMPBELL,
Chairman.

Government Railways Managing Board,
Ottawa, Ont., April 12th, 1910.

18

City of Winnipeg

Tenders for

Construction of Brown and Brant Street Over- head Bridge

Sealed tenders, addressed to the Chairman, Board of Control, Winnipeg, and marked on the envelope, "Tenders for Brown and Brant Street Bridge," will be received at the office of the undersigned up to 11 o'clock a.m., on TUESDAY, JUNE 28TH, 1910, for the following works:

(a) Construction of Concrete Piers, to be completed on or before the fifteenth day of November, 1910.

(b) Erection of Steel Superstructure and floors, with two lines of street railway tracks, to be completed on or before the first day of June, 1911.

Plans, specifications and forms of tender, together with conditions governing tenders as prescribed by law, may be obtained at the office of the City Engineer, Winnipeg. The lowest or any tender not necessarily accepted.

M. PETERSON,
Secretary.

Office of the Board of Control,
Winnipeg, April 30th, 1910.

19

Town of Walkerville

Tenders for
Pavement and Sewer

Sealed tenders will be received by registered post, addressed to the undersigned up to noon on TUESDAY, THE 17TH MAY, 1910, for the construction of a Concrete Pavement on Monmouth road, from Ontario street to Ottawa street; also of a Cedar Block Pavement in a concrete foundation on Monmouth road and Ottawa street.

Also for the construction of a Brick Sewer in Argyle road, Ottawa street, and along the south-east side of the Grand Coulee ditch to the east limit of the town, in the Town of Walkerville.

Plans and specifications may be seen on application to Mr. Owen McKay, C.E., Walkerville.

Tenders must be accompanied by a marked cheque, made payable to the Town Treasurer, equal to 5 per cent. of the amount thereof.

Should any party whose tender is accepted fail to execute the necessary contract and bond for the due fulfilment of the same, his deposit will be forfeited to the town.

Deposits of unsuccessful tenderers will be returned.

The lowest tender not necessarily accepted. The names of the two responsible persons willing to act as sureties must accompany each tender.

CECIL H. ROBINSON,
Town Clerk, Walkerville.

Walkerville, April 30, 1910. 18

Temiskaming and North-
ern Ontario Railway
Commission

Sealed tenders addressed to the undersigned will be received up to noon, MAY 11TH, for the following works:

(A) Construction of three revised standard sectionmen's houses at Gillies Depot, Uno Park, and Charlton. Tenders to be marked on envelope, "Tender for Sectionmen's Houses," and to be accompanied by certified cheque on chartered bank of Canada for the sum of five hundred dollars (\$500).

(B) Construction of one or more standard sectionmen's houses for bachelors, situated along the line of the T. and N. O. Railway, between North Bay and Cochrane, tenders to be marked on envelope, "Tenders for Sectionmen's Houses for Bachelors," and to be accompanied by certified cheque on chartered bank of Canada for the sum of one hundred and fifty dollars (\$150).

Plans and specifications may be seen and forms of tender obtained at the office of the secretary-treasurer, 25 Toronto street, Toronto, and at the office of the chief engineer, North Bay.

The lowest or any tender not necessarily accepted.

A. J. MCGEE,
Secretary-Treasurer.

Papers inserting this advertisement without authority will not be paid for it.

25 Toronto street, Toronto, April 22nd, 1910. 18

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—First class general foreman or superintendent by a firm of general contractors with head office in Winnipeg, Manitoba. Must understand all kinds of contractors' machinery and be able to handle all kinds of concrete work, coffer dams, etc. A steady position for the right man. State salary expected and give references. Address Box 969 "Contract Record," Toronto. 18

Positions Wanted

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra.

QUARRY MANAGER, ENGINEER, 32, at present in charge of marble quarry and works, accustomed to preparing for the market, building and decorative stores, wishes modest appointment, would consider partnership in small quarry. Apply "Scott," care Street's Agency, 30 Cornhill, London, England. 18

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—Van Kannel Revolving Door and Post Office Fixtures at half price. Apply to H. Weller, Welland, Ont. 18

FOR SALE—Eighty-eight (88) pieces of Lackawanna Steel Sheet Piling, twenty-two (22) feet long, twelve and three-quarter (12 3/4) inches wide, three-eighths (3/8) inch thick, WM. LESSLIE, Walkerville, Ont. 1

AGENTS WANTED—United States manufacturers of a well-known waterproofing compound wish to get in touch with reliable firm or individual to represent them in Canada. This would be a desirable opportunity for an energetic young architect or engineer. Box 970 "Contract Record." 20

Miscellaneous

(Continued from page 27)

dwellings, north side of McMillan, \$3,250; B. Radford, north side of Wellington crescent, apartment block, \$75,000; L. Overdale, dwelling, west side of Ruby street, \$3,000; E. Bremner, dwelling, east side of Telfer, \$5,600; J. C. McNab, dwelling, west side Ruby, \$3,200.

AWARDED.

Calgary, Alta.

Geo. H. Archibald & Company, of Winnipeg, have been given the contract for labor required by the Canadian Pacific Railway in the completion of the western section of their irrigation system, which involves upwards of 2,500 cubic yards of reinforced concrete and much excavation and backfill work.

Cornwall, Ont.

The contract for the improvement of the north bank of the Cornwall canal above Lock 17 has been awarded to Fallon Bros., Cornwall. Price, about \$70,000.

Halifax, N.S.

Following is a list of tenders received for supplies for 1910-1911: Bricks, per 1,000, Rhodes, Curry & Company, \$8.40 at I. C. R. depot; \$8.55 at Cotton Factory siding (\$1 less for run of kiln; \$8 for hand picked; Eastern Portland Cement Company, \$7.20 at depot; \$7.30 at siding; A. Gunn & Company, \$8 at depot, \$8.35 at siding; General Contractors' Supply Company, \$7.10 at depot, \$7.30 at siding; J. Simmonds & Company, \$7.05 at depot, \$7.25 at siding; Simmonds & Company's was accepted. Cements: Eastern Portland Cement Company, 43 3/4 cents per cwt. net; Brookfield Bros., 40 3/4 cents; Stairs, Son & Morrow (barrels), 51.04 and 52.94 cents per cwt.; Sydney Cement Company, 41 cents; Rhodes, Curry & Company, Limited, (barrels), 56 cents per cwt.; Musgrave & Company, 48 3/4 cents. The tender of Brookfield Bros. was accepted. Stop cocks—Guildford & Company, 1 1/2 inch, 52 cents, 3 1/2 inch, 65 cents; McAvity & Son, 75 cents and \$1.05; James Robertson & Company, 72 cents and 80 cents. Guildford & Company accepted if specifications are complied with. Drain pipe—Rhodes, Curry & Company, Limited, Brook-

field Bros., Black & Flinn, Eastern Portland Cement Company.

Ottawa, Ont.

Contracts totalling about \$300,000 for dredging in Ontario have been awarded by the Government. The prices vary from 9 1/2 to 29 cents per cubic yard, and the successful bids are the following: For dredging at Byng Inlet, Manley & Company, Toronto; Cobourg, Randolph Mac Donald Company, Toronto; Goderich, William L. Horton, Toronto; Kincardine and Port Elgin, the Dredging & Drainage Company, Toronto; Owen Sound, W. E. Phin, Welland; Port Burwell, General Construction & Dredging Company, Toronto; Port Hope and Whitby, W. E. Phin, Welland; Rondeau, Windsor Dredging Company. Contracts for dredging in Quebec Province totalling \$200,000 have been awarded. The biggest job is at Quebec, amounting to \$60,000. The successful bidders are: For Quebec Harbor, Dominion Dredging Company, 24 1/2 cents per cubic yard; St. Maurice river, at St. Pierre, 15 cents; Beauharnois, H. M. Conley, 20 cents; Berthierville, L. Cohen and Son, 16 cents; Batiscan, Dufresne & Marchildon, 20 cents; Riviere du Loup, W. J. Poupore, 20 cents; Yamaska river, W. J. Poupore, 18 cents; Valleyfield, General Construction Company, 21 1/2 cents.

Vancouver, B.C.

The following tender for four auto hose wagons and auto chemical engines was accepted; W. H. Seagrave, \$25,983.

Business Notes

A. Levesque, Montreal, Que., contractor, has assigned.

Simpson & Lailey, builders, Winnipeg, Man., have dissolved.

Stevens & Coutu, Dunham, Que., contractors, have registered.

A. K. VanWyck, Park Hill, Ont., have advertised their business for sale.

R. A. Wesley & Company, contractors, Killarney, Ont., are stated to have assigned.

The Pacific Coast Lumber Mills, Limited, sold mill and stock to British Canadian Lumber Company, Limited.

Summerland Fruit Company, Limited, Summerland, B.C., have sold their lumber stock to Wm. Ritchie, and their sawmill to Campbell Bros.

P. A. Mackle & Son, woodworkers, Toronto, Ont., have assigned to N. L. Martin.

Peppard & Cairnie & Company, contractors, Montreal, Que., have dissolved.

The B. C. Gazette gives notice of the incorporation of the following companies:—G. E. Gibson Company, Limited, capital \$50,000, incorporated to carry on the business of contractors and builders; the British Columbia Ceiling & Roofing Company, Limited, capital \$150,000; the Port Mellon Development Company, Limited, capital \$125,000, incorporated to build flumes, tramways and the development of electrical power, etc.; Peace River Lands Company, Limited, capital \$25,000, incorporated to construct, operate, etc., electric works, power houses, generating plants; Atlin Construction Company, Limited, capital \$500,000; the H. B. Morley Company, Limited, capital \$25,000, incorporated to carry on the general business of plumbers, dealers in all kinds of machinery, saw mill operators; Chas. C. Moore & Company, engineers, capital \$495,000; Seaboard Timber & Trading Company, Limited, capital \$25,000.

New Companies

Northern Automobile Company, Limited, Fort William, Ont., capital \$100,000. Incorporators, Edward Dunlop Higginbottom, plumber, and James Preston Jones, manager of Empire Elevator Company, both of Fort William.

Canadian Knowles Company, Limited, Toronto, Ont., capital \$50,000. Incorporated to carry on the business of general contractors. Incorporators, Lionel Davis and Geo. Edgar McCann, barristers at law, Toronto, Ont.

The Ontario Motor Car Company, Limited, Toronto, Ont., capital \$100,000. Incorporators, Robert Benjamin Henderson, barrister at law, and James Cooper Royce, consulting engineer, both of Toronto, Ont.

Charles Jarrott & Letts, Limited, Toronto, Ont., capital \$50,000, incorporated to manufacture and deal in motor cars, etc. Incorporators, John Ingham Sutcliffe, chartered accountant, and Albert Henry Winter Joyner, engineer, both of Toronto.

The Foundation Company, Limited, Montreal, Que., capital \$50,000. Incorporators, Franklin Remington, contractor, and Louis Livingston Brown, engineer, both of New York, N.Y.

The Burroughs Falls Power Company, Limited, Ayer's Cliff, Que., capital \$50,000. Incorporators, William Brault, manufacturer, Sherbrooke, Que., and William Gay Libby, lumber manufacturer, Ayer's Cliff, Que.

The Laurentian Chemical Company, Limited, Montreal, Que., capital \$590,000. Incorporated to manufacture wood alcohol, etc., and to buy timber and lumber.

Seller's Anchor Bottom Tie Plate Company of Canada, Limited, Montreal, Que., capital \$100,000. Incorporated to deal in tie plates, railway supplies and all sorts of iron and steel. Incorporators, Robert Jewett Mercer, merchant, and Samuel William Jacobs, K.C., both of Montreal.

La Compagnie P. P. Giguere, Limited, Quebec, Que., capital \$20,000, incorporated to carry on the business of plumbers, installers of steam heating apparatus, electricity, etc. Incorporators, Joseph Letarte, accountant, and Alexander Giguere, electrician, both of Quebec, Que.

William McWilliam, Incorporated, Quebec, Que., capital \$40,000, incorporated to manufacture and produce steam, gas, light and power. Incorporators, Wm. Leopold McWilliam, Alfred Lyell McWilliam, confectioners, and Chas. Claude McWilliam, clerk of City of Quebec, all of Quebec, Que.

Paradis & Boisvert, Incorporated, Montreal, Que., capital \$20,000, incorporated to erect and construct workshops or other works, with the machinery necessary to carry on the said trade and industry. Incorporators, Chas. M. Cotton, advocate, Montreal, and Herbert A. Webb, printer, Covansville, Que.

The Dredging & Drainage Company, of Ontario, Limited, Toronto, Ont., incorporated, capital \$50,000. Incorporators, J. E. Russell, contractor, C. W. Thompson, E. W. Wright and Irving Stuart Fairty, barristers at law, all of Toronto.

LeBel-Turnbull Lumber Company, Limited, Sarnia, Ont., incorporated, capital \$401,000. Incorporators, E. A. LeBel, H. Turnbull, lumber dealers, and A. Steves Burnham, barrister, all of Sarnia.

The Rodney Woodenware Company, Limited, Rodney, Ont., incorporated, capital \$15,000. Incorporators, J. J. Mistele and G. R. Whitton, merchants, L. Miller, wood merchant, all of Rodney, Ont.

International Paving & Construction Company Limited, Montreal, Que., capital

\$10,000. Incorporators, Frank Henry Norman and Chas. William Norman, professors, Montreal, Que.

C. Robillard & Company, Limited, Montreal, Que., capital \$75,000, incorporators, Clement Robillard, manufacturer, and Alphonse Robillard, accountant, both of Montreal. Incorporated to construct, erect buildings, factories, etc.

The Transportation Building Company, Limited, Montreal, Que., capital \$750,000. Incorporators, Francis A. Brodie, bank manager, and Arnold Wainwright, advocate, both of Montreal, Que.

La Compagnie de Briques de Quebec, Limitee, Quebec, Que., incorporated, capital \$60,000. Incorporators, Louis-Eugene De Villers, accountant, and Edouard Nadeau, contractor, both of Quebec, Que.

The William Rutherford & Sons Company, Quebec, Que., capital, \$60,000, incorporated to carry on the business of manufacturers and dealers in lumber, wood, timber, etc.

La Compagnie Electrique de Deschambault, Quebec, Que., capital \$145,000. Incorporators, Joseph Elzear Voisard, physician, Saint-Marc des Carriers, and Joseph Henri Pare, accountant, of Quebec, Que.

The Brown, Jarvis Roofing Company, Limited, Brantford, Ont., incorporated, capital \$50,000. Incorporators, G. W. Brown, G. Jarvis and F. Jarvis, slaters, all of Brantford, Ont.

The Edwards, Reesor Company, Limited, Toronto, incorporated to manufacture, install, etc., boilers, sheet metal work, plumbing, etc. Incorporators, A. B. Reesor and G. E. Edwards, manufacturers, both of Toronto.

Bermuda Trolley Company, Limited, Toronto, Ont., incorporated, capital \$100,000. Incorporators, J. S. Lovelle, accountant, W. Bain, bookkeeper, and R. Gowans, all of Toronto.

Clarke & Monds, Limited, Toronto, Ont., capital \$40,000, incorporated to carry on a general engineering and contracting business in sewers, concrete works, etc. Incorporators, W. Monds, E. B. Clarke and J. H. McKnight, contractors, all of Toronto.

Knight Bros. & McKinnon, Limited, Cobalt, Ont., incorporated to deal in building material, such as brick, cement, etc. Capital, \$50,000. Incorporators, Malcolm McKinnon, lumberman, and Thos. McCauley, accountant, both of Cobalt, Ont.

Excelsior, Limited, Toronto, Ont., capital \$150,000; incorporated to carry on the business of manufacturers of wood fibre, lumber, etc. Incorporators: J. A. Manning, Owen Sound, traveller, and G. Howard, operator, Toronto.

Positive Clutch and Pulley Works, Limited, Toronto, Ont., incorporated, capital \$50,000. Incorporators: E. W. J. Owens and W. A. Proudfoot, barristers, Toronto.

The Central Land and Building Company, Limited incorporated, capital \$40,000. Incorporators: A. A. Mathews, builder, J. L. Sharkey, manufacturer, and F. S. Morrison, accountant, all of Hamilton, Ont.

Schumacher Brick & Tile Company, Limited, Toronto, Ont., incorporated, capital \$100,000. Incorporators: A. W. Holmsted and J. Leith Ross, barristers, Toronto.

The Ball Planing Mill Company, Limited, Barrie, Ont., incorporated, capital \$75,000. Incorporators: W. Gallie, J. Dinwoody Rodgers and Thomas Gray, contractors, and G. Rodgers, carpenter, all of Barrie, Ont.

Canadian Mahogany Company, Limited, Ottawa, Ont., capital \$200,000, incorporated to carry on the business of saw millers, planing, etc. Incorporators: Hon. W.

C. Edwards, G. C. Edwards, lumbermen, Ottawa; W. A. Hall, City of New York, U. S. A., manufacturer, and W. B. Chisholm, Charleston, Cal., manufacturer.

The Robinson Glue Company, Limited, Montreal, Que., incorporated, capital, \$75,000. Incorporators, J. G. DeLormier, E. H. Godin, advocates; G. W. Dow and W. B. Converse, bankers, all of Montreal.

Frank Lime Company, Toronto, Ont., capital \$50,000, incorporated to manufacture and deal in all kinds of cement. Incorporators: O. Mowat Moore and John McBain, manager, both of Toronto.

The Wabi Iron Works, Limited, New Liskeard, Ont., capital, \$40,000, incorporated, F. L. Hutchinson, A. V. Summers, both of New Liskeard.

British Empire Timber Co., Limited, Montreal, Que., capital, \$1,500,000. Incorporators, G. Vipond Cousins, accountant, P. F. Brown, both of Montreal.

The Niagara Falls, Welland & Dunnville Electric Railway has been incorporated with capital stock, \$200,000. The provisional directors are: J. G. Gardner, Geo. Arnold, F. E. Misener, G. H. Bugar H. A. Rose.

A New Mixture for Prevention of Dust

In England some county authorities are trying a new process of preventing dust on roads, which, it is claimed, will last three years, and the county engineer states that he knows of cases nearly of that age and still good. There is no tar or oil in the composition, and it can be laid for four cents per square yard. It can be applied in any weather and never gets slippery. It is also claimed that after a year's time the use of tar injures the road and causes the surface to deteriorate.

We notice from our exchanger that new compositions are constantly being tried, and up to date not one seems to be wholly satisfactory. As in the clipping quoted above, tar is complained of as injuring the road. Others, again, contain substances that when used, the washing of the roads into water courses is very injurious to trees and vegetation. And it may be said that in all cases it is a costly process. However, we may live in hopes that sometime we may discover a method that will answer the purpose, and not bankrupt the neighborhoods where used. Very probably it will come by improving our road building.

Mitchell, Zephirin & Company, builders, Point Claire, Que., Origene Mitchell registered.

The B. C. Gazette gives notice of the incorporation of the following companies: Fort George Supply Company, Limited, capital \$50,000, incorporated to carry on business as lumbermen, sawmill men and dealers in lumber, shingles, etc.; Standard Glass Company, Limited, capital \$25,000, incorporated to deal in paints, oils, plate, sheet and ornamental glass, etc.; Slocan Lake Lumber Company, Limited, capital \$100,000; the Port Haney Waterworks Company, Limited, capital \$10,000; Ward Electric Company, Limited, capital \$10,000; the Sullivan Fireproof Wall & Partition Company of Canada, Limited, capital \$40,000; G. E. Gibson Company, Limited, capital \$50,000, incorporated to carry on the business of contractors, builders and dealers in all kinds of machinery and supplies; the Shortreed Shingle Company, Limited, capital \$10,000; the McLelan Lumber Company, Limited, capital \$50,000.

Contract Record

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Municipal Progress, Advance Information

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Vol. 24

Toronto May 4, 1910

No. 18

Prompt Settlement with Contractors

A good percentage of the Toronto contracting community should feel grateful to City Engineer Rust for his action in bringing to the attention of the Committee of Works the hardships of contractors operating with a limited capital. During the greater part of the year all progress estimates issued to contractors after passing through the Works Committee have to pass the Board of Control and council, and frequently it takes between three and four weeks for the city treasurer to pay over the money to the contractor. During the summer months these progress estimates are paid immediately upon passing the Board of Control, and, as Mr. Rust pointed out, this system should be enforced throughout the year. If this were accomplished the reformed method would not only reflect better business on the part of the authorities but would also be a material advantage to contractors of comparatively small capital. It does not take very long to get a great deal of money tied up in the contracting business and it would seem that the civic authorities at any rate should set a good example in regard to prompt settlement.

A Word in Season

It is better to be less exacting in the matter of taking and completing a contract, because there will be occasions that may be the means of securing further business if there is policy used by the contractor. It is not to be presumed that the contractor must be imposed upon, and that he should do things that are in themselves costly to him, but there is a line between this stand and that of permitting your customers to exact conditions of you that will mean your loss. There are so many times when the matter can be adjusted to the satisfaction of all parties that it would be well to bear in mind the

importance of arranging in advance, so far as it is possible to do, the exact terms of a contract, and the stipulated price of such extras as are almost sure to come with every contracting job, even though it be a minor undertaking.

Inform Architects of New Goods

There is nothing that will help these manufacturers who specialize in fancy and other high grade face brick so much as to keep all their different products conspicuously before the minds of the architects who have in hand work likely to involve the use of such brick, and the same, of course, applies to terra cotta and other clay products for use in such structures that call for architects. The architects that are worth while are not only wide awake, but they are seeking all the time for different effects and new things in face and color, for improved ideas in products that will help in fireproofing, or in any other of the problems that are confronting the architects from time to time. A good architect is also a busy man, and, while you may have placed before him at some time a full line of products, do not take it for granted that he is going to keep this in mind all the time. There are lots of other people offering things to the architect. There are many other things before his mind besides your own product. So, if you get the attention your offerings deserve, you must see that they are kept before the eyes of the architects more or less continuously, not offensively or intrusively, but invitingly. Do not rest secure in your imagination on the fact that you sent samples of brick to some architect last year or year before, or sent a pamphlet neatly illustrating the full line, but keep after them again this season and every other season. In some lines of manufacture, it is found to pay well to maintain what is called a staff of detail men who exploit the company's goods, but particularly the newer articles, to people who are expected to specify them.

Untimely Interference with the City Engineer

When you come to think of it, the city engineer is up against a hard thing in this country. In order to make a real success of his work he must be blessed with an extraordinary combination of good qualities. He must have the wisdom of Solomon, the diplomatic genius of Bismarck—and the patience of Job. These things are suggested by a remark that City Engineer Rust, of Toronto, was constrained to make last week: "What's the good of having an engineer if you do not depend on his judgment?" This protest was called forth by a suggestion from a controller that an independent engineer should be engaged to make tests as to whether piling or grillage should be used in the construction of the Don siphon. Upon this question rests the decision as to whether the contract for the work will be awarded to a Toronto or a Philadelphia concern. Apart altogether from the merits or demerits of the case, such a suggestion is a reflection upon the capability and integrity of the official, and is untimely at such a juncture. What, indeed, is the good of a city engineer without confidence in his judgment?

Mr. T. Aird Murray, consulting engineer, Toronto, has received from Mayor Geary a letter conveying the thanks of the city authorities for the valuable suggestions offered in connection with the treatment of the city water. Mr. Murray's suggestion, which was adopted with great success, was to introduce chloride of lime into the waterworks tunnel.



1.—Storage Yard for 36-inch, 54-inch and 72-inch Reinforced Concrete Pipe made on the Site of the Work

Progress on the Toronto Filtration Plant

Third of a Series of Articles Describing the Details and Methods of this work—Of Special Interest to Municipal Engineers and Contractors

CONTRACTORS: Messrs Dill, Russel and Chambers, Toronto

While the climatic conditions during the winter months naturally hampered the progress of the work and materially increased the cost, the progress made on the filtration plant since the publication of our last article (see "Contract Record," Dec. 1) was such as to call for commendation from the consulting engineer, Mr. Allen Hazen, of New York City, upon that gentleman's visit to the works early last month. Some idea of the strides that have been made in this work may be obtained by a careful comparison of the pictures shown here with those published in our issues of Sep. 29th and Dec. 1st last.

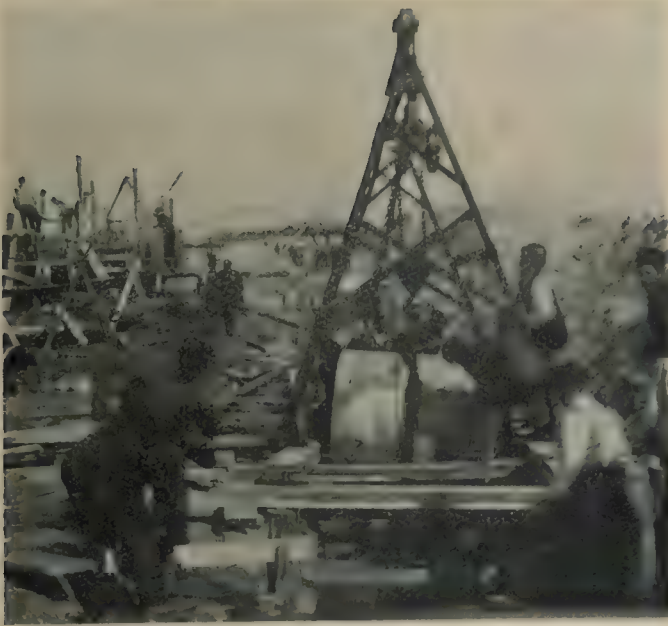
We show another view of the storage yard and site of manufacture of the reinforced concrete pipe used in this work. The illustration conveys an excellent idea of the large quantity of this material that it has been necessary for the contractors to have at hand. When the picture was taken, the storage yard contained about 1,100 feet of 72-inch reinforced concrete pipe, 540 feet of 54-inch pipe and 1,500 feet of 36-inch pipe, of which approximately 70 per cent. has been laid up to date. The expeditious manner in which the pipe has been

turned out at Toronto Island is worthy of special note.

During the winter period the main attention of the contractors was concentrated upon those portions of the work, the early completion of which will enable the project to be pushed ahead with greater rapidity during the coming season. The most important problems in connection with this winter work were the difficulties encountered in transporting men and materials to the site of the work; more particularly before the ice on the bay was firm enough to support the men and teams crossing, and during the breaking-up period of early spring. The contractors maintained the water level in the drainage canal surrounding the work to the low point explained in article of Dec. 1st. The damp condition of the sand, however, affected the depth to which the frost took effect and, naturally, considerably increased the cost of all the excavation work done during this period. Excavation was made for the different sized reinforced concrete pipe lines, also for a multitude of smaller tile and cast iron pipe and for a portion of the filter beds. The foundations were put in for the second regulator house. These found-



2.—General View of part of the westerly half of Filter Beds and Central Court, showing Regulator House Foundation in foreground and Concrete Floor of Filter Beds in middle distance to right.



3.—“A” Frame Travelling Gantry used in lowering the 36-inch Concrete Pipe. (Designed by the Contractor, Mr. C. W. Dill.)

dations were carried down to a depth of approximately 7 feet 6 inches below lake level. At the site of the pumping station the foundations were put in to a depth of about 14 feet below the lake level, and the superstructure of the building has been erected. All of this work was carried out in heavy reinforced concrete. The construction of forms for the floors, piers and roofs of the filter basins and other preparatory work of a detail character was also accomplished.

As the weather permitted, concrete was also laid in the floor of the filter basins, the idea being, as in the former case, to afford every opportunity for the expeditious handling of the main filter works during the busy season. By an inspection of the accompanying views it will be seen that two of them are dated February 25th, 1910. At that time the scene of operations, despite the low temperature, was a hive of activity.

During these early months, the contractors have also been planning the lay-out of their extensive plant for the handling of the work for the season. A large screening plant, with capacity of over one full day's work, has been erected on the lake shore. A system of tramway



4.—36-inch Main Drain connecting with Pumping Station.

lines has been installed for the prompt and effective handling of materials to the screens and storage bins, and from these out to the concrete mixers on the work.

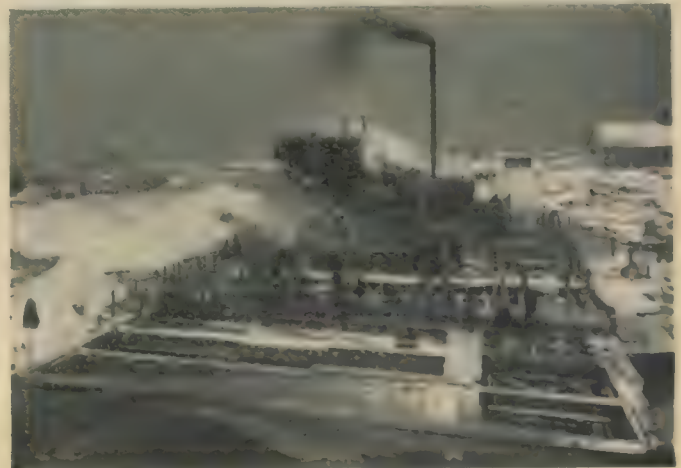
The depth of excavation over the filter beds does not warrant the use of any method of machinery, economically, and this excavation is being handled by teams and wheel scrapers, the character of the material being well adapted for economical handling in this way, the only difficulty being the confined area within the drainage canal and the consequent lack of storage space.

In one of these pictures will be seen a section of 72-inch concrete pipe being lowered into place by means of a large derrick, and in the other, work is progressing on the 36-inch main drain between the filters, laid about 9 feet below lake level. From illustration No. 7 may be obtained an excellent idea of the method of outside jointing and bends. These bends were afterwards constructed of heavy reinforced concrete in special forms.

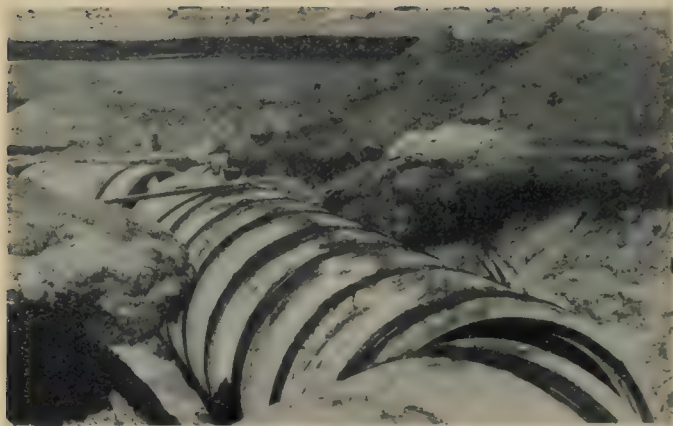
Special interest is attached to illustration No. 3, showing the “A” frame travelling gantry used in lowering the 36-inch concrete pipe. This gantry was designed by the contractor, Mr. C. W. Dill, when laying the 36-inch cast iron pipe line, about $3\frac{1}{4}$ miles in length, from



5.—Lowering into place the 72-inch Reinforced Concrete Pipe by means of a large Derrick.



6.—Foundation of the Main Pumping Station. (The bottom of the Pump Well is about 15 feet below lake level.)



7.—72-inch Concrete Pipe Line, the Main from Regulator House to Pure Water Reservoir—Showing Method of Outside Jointing and Bends

the corner of College and Bathurst streets, Toronto, to the city reservoir

The permanent office and laboratory building which is constructed entirely of reinforced concrete, is now nearing completion. Its appearance is all that could be desired and the structure reflects excellent workmanship, which has called forth expressions of the highest praise from engineers and contractors who have seen it. An illustration of this building, together with recent views of other interesting portions of the work, will be published in an early issue.

The force employed at the Toronto filtration plant during the winter season average about 100 men. This has now been augmented by about 60.

Cincinnati Filtration Plant—Cost of Construction

The following table showing the total and unit costs of the main features of the work done in the construction of the water purification plant at Cincinnati, Ohio, is prepared by Mr. J. W. Elms, the superintendent:

(Capacity of plant: 112,000,000 gallons in 24 hours.)

Work	Total cost.	Cost per million gallons of capacity for 24 hours.
Preparation of grounds	\$ 33,359.67	\$ 297.85
Pipe lines between settling reservoirs and head-house	55,354.77	494.24
Head and chemical house	144,989.85	1,267.77
Coagulation basins, gate houses and pipe lines	304,913.05	2,722.44
Filters, filter house, piping, sand and gravel	592,112.30	5,286.71
Piping, valves and gate-house between filters and clear-water reservoir	29,701.91	265.20
Clear-water reservoir	121,362.39	1,083.59
Total	\$1,278,793.94	\$11,417.80

Sewage Disposal Ideals*

By W. C. EASDALE, M.R. San. Inst.

Ideals are useful in stimulating efforts towards the attainment of the nearest approach to perfection. As general principles, the ideal should be to consider effi-

ciency first and cost second. All engineers should refrain from taking part in competitions of any kind. The ideal site for sewage-works is one which is sufficiently far removed from dwellings to prevent any possibility of nuisance arising, and it should be at such a level that the sewage can reach it by gravitation. Where this is not possible, only that portion of the sewage should be pumped which will not gravitate. The subsoil of the site should be suitable, if not for irrigation, at any rate for the final process after treatment in tanks and filters. In selecting the system of treatment, the chief factors to be considered are the character of the sewage to be treated, the extent to which it must be purified, and the fall available at the works. The ideal grit chamber is one that will arrest all the mineral matters in the sewage, but none of the organic matter, and it should have special facilities for the removal of the deposit. Screens, if used, must be designed in such a way that they will arrest the matters they are required to intercept, but allow all others to pass, and not readily become choked. There are so many types of tanks that it is extremely difficult to choose the most suitable type. The question is raised as to whether it is essential to have septic action as a preliminary process in all cases. The ideal method is such that it is adapted to the particular char-



8.—Toronto Filtration Plant.—The 36-inch Main Drain in the Central Court between the Rows of Filters, Laid about 9 Feet Below Lake Level

acter of the sewage to be dealt with, and will produce the most suitable effluent for the filters, while at the same time reducing the quantity of sludge to the minimum, and preventing the possibility of nuisance from smell. In the construction of tanks attention must be given to the rate of flow through them, and special care must be devoted to the provision of every facility for the removal of sludge. In the design of contact beds the ideals to be attained are to make them absolutely watertight, to provide a self-cleansing gradient on the floors, and a false bottom over the whole area, and also to select the best material and see that it is properly graded. Another important point is to arrange them so that they can be operated in the proper manner. With regard to percolating filters, the ideals as to floors, false bottoms, and material laid down for contact beds, apply with equal force. The question of distribution is of prime importance, and the author considers that continuous distribution, where possible, is more efficient than intermittent. Humus settling tanks or fine-grain filters are necessary, in order to produce the ideal final effluent. From the general constructional point of view the ideal works should be executed in such a manner that while

*Extracted from paper read before the Society of Engineers (Br.) by Mr. W. C. Easdale, M.R. San. Inst.

they are constructed throughout in a substantial manner, and of materials which are the best of their kind, they should contain nothing which has not a direct bearing upon their efficiency in the production of a satisfactory effluent, and their maintenance in a good condition at the least possible outlay for repairs.

The Grand Trunk Pacific

One of the largest railway undertakings at present under way is the construction of the Grand Trunk Pacific Railway. Ground for this transcontinental road was broken at Fort William, Ont., on Sept. 11, 1905, and now, rather more than $4\frac{1}{2}$ years later, out of a total mileage of main line and branches of approximately 7,900 miles, there have been completed or are under construction approximately 4,800 miles, or 60 per cent. of the entire mileage authorized by the company's charters. Of the main line from Moncton to Prince Rupert, a distance of 3,550 miles, a total of 2,000 miles has been placed under construction, on which there has been laid 1,795 miles of track which in some cases is made up of disconnected sections, and is therefore not all continuous. That portion of the line, however, from Winnipeg to Edmonton, 793 miles, has been constructed and has been in partial operation by the construction department for the past 18 months, and within the past 90 days the track has been completed continuously from Edmonton westerly to Wolf Creek, 122 miles, thus completing the track laying on that portion of the line designated as the prairie section, Winnipeg to Wolf Creek, 915 miles. The track laying was also recently completed from Winnipeg to Fort William, thus making a continuous line from Fort William, via Winnipeg and Edmonton, to Wolf Creek, 1,360 miles, which, however, cannot be completed for practical operation for some months, as considerable work is required to be done on the easterly and westerly ends of the line, to put it in a suitable condition for the movement of regular trains. The other portions of the main line on which the rails have been laid are situated at different points east and west of the city of Quebec. During the past year contracts have been let for the construction work from Wolf Creek, Alta., westerly to Tete Jaune Cache in the Rocky Mountains, 179 miles, and there are at present engaged on this section of the line 1,000 teams and a large number of men. Similar forces are also engaged on the construction of the line from Prince Rupert, the terminus of the Pacific coast, easterly to Aldemere, B.C., 240 miles. In addition the

provincial governments of Saskatchewan and Alberta passed acts at the sessions of their legislatures in 1909, authorizing guarantees for the construction of branch lines by the Grand Trunk Pacific Railway Company in these provinces to the extent of 680 miles, comprising branch lines from the main line of the Grand Trunk Pacific Railway to Yorkton, Regina, Battleford, Calgary, Lethbridge, McLeod and Coutts, the construction of which is at present under way. At the session of the Saskatchewan Legislature in December, 1909, an act was passed authorizing the guarantee of the construction of additional branch lines by the Grand Trunk Pacific Railway in that province, to the extent of 475 miles, comprising lines southeasterly to the United States boundary line, from the main line of the Grand Trunk Pacific Railway to Prince Albert, and from Regina westerly to Moose Jaw, Calgary, etc., and the construction of these will be undertaken during the present year.

Concrete v Brick

Unquestionably concrete and cement and kindred material is gaining in favor, says "Brick." This condition is emphasized in some of the suburban districts of New York, where concrete or cement houses are becoming more and more common. Everyone knows that cement is not as good as brick. Even those who specify it admit that; but they also declare that the cost of brick construction is so heavy that they cannot afford it. Possibly there is some truth in this assertion; though cost should be considered as a relative term, and the man who wants a good house, one to last unblemished a lifetime or longer, will make no mistake in specifying brick. What cement and concrete will do after some years have elapsed it is impossible to say. They have not been used long enough to afford any opportunity of judging. It is, however, a condition that appeals very forcibly to the man of moderate means who wants to own his home, and undoubtedly the brick trade will suffer to some extent from this condition. The future may adjust the differences, but for the present brick men must seek some means of offsetting the influence which injures them and their business.

The disaster which occurred at the City Hall, London, Ont., some ten years ago, was nearly duplicated last week at the Austro-Hungarian Synagogue at Montreal. The Passover service was in progress and the building was crowded to the doors when the floor collapsed, dropping about two feet. The situation was saved by the rabbi, who managed to clear the church without having a panic. The synagogue, which is a handsome structure, was built about a year and a half ago. The collapse of the floor is attributed to overcrowding.

It is stated that a considerable amount of building is held up at Brandon, Man., owing to the high prices of building prevailing in that city. Commenting upon this, the Brandon "Sun" says: "It is the same old story. For several seasons people have been waiting for prices to come down in order to go ahead with proposed work, and each year the prices advance. They are sure now and they will be worse still if they wait another year. The fellows who get cold feet we shall always have with us, like the poor."

Bricklayers employed at the Dominion Steel plant, Sydney, N.S., are asking an increase in wages of seven cents an hour. The pay at present is \$3.80 for a day of ten hours, and the men ask for \$4.50.



9.—Toronto Filtration Plant—The 72-inch Pure Water Pipe Line Showing Method of Lowering and Placing these Pipes, each of which weighed about 5 Tons

"Roxborough" Apartment House, Ottawa

An Attractive, Well-Appointed Structure Embodying the Latest Developments in this Class of Design—Interesting Details of Various Contracts

Architect: MR. H. C. STONE, Montreal, Que.

The Roxborough Apartment House, now nearing completion at Ottawa, presents many features of interest to the architect and contractor. The building is situated in an ideal position opposite Cartier Square, Ottawa, and is being erected by the Imperial Realty Company, Limited.

One of the main considerations in the design of this building was to afford every occupant the maximum amount of light and air; another was to avoid inside rooms. These results were obtained by the square four-winged plan. In the Roxborough apartment house the gloomy unsanitary centre court makes way for an arrangement that is infinitely preferable from both hygienic and æsthetic standpoints.

In its general treatment, the Roxborough apartment house, with its massive foundations, eight storey walls of pressed brick and cut stone, is a credit to the Federal capital. The skeleton of the building is of steel.

The terra cotta tile employed in the construction of the floors and partitions renders all rooms absolutely sound proof. This provision removes the cause, in so far as "The Roxborough" is concerned, for a very common source of objection to apartment house life. A special effort was made to give every apartment the privacy of an individual building.

Not only is provision made for the comfort of the tenants, but also for their health. Whatever may be the fashion elsewhere, the proprietors do not intend residents at "The Roxborough" to be fed with bacilli from the Ottawa water. An approved type of filtration plant has been installed in the building and every drop of water—even that supplied to the baths—is filtered.

Construction Work—The preliminary excavation work was commenced a year ago by Messrs. Holbrook & Sutherland, of Ottawa, who had the contract for excavating, stone, brick and terra cotta work. At various periods of the year this firm alone had as many as 50 and 60 men at work. The walls were completed before the close of 1909.

In planning the foundations, sufficient strength was provided to carry even double the number of storeys originally intended. A portion of the walls are built of

silicate and the balance is carried out in red clay brick.

Plumbing and Heating—This contract was carried out by Mr. M. M. O'Connell, of Ottawa. The Webster Modulated Heating System is installed. It consists of two 70 h.p. high pressure boilers, carrying from 80 to 100 pounds of steam. The boilers are fed by automatic stokers. One of the principal claims made for the Webster system is simplicity. The heating is controlled, absolutely, by the occupant of the room. The pressure carried in the heating mains is less than one pound. Four hundred radiators were required to heat the various rooms. These were all of sufficient size to maintain a temperature of 70 degrees during the severest weather.

The plumbing work represents the last word in workmanship and materials. The plumbing fixtures bear the trade mark of the J. L. Mott Iron Works, New York.

The refrigerating system in the basement provides each apartment with a modern refrigerating plant. About seventy refrigerator boxes are installed.

Interior Woodwork—The interior woodwork and finish is by W. C. Edwards & Company, Limited. The floors are of first quality red oak. The doors are of red oak and are designed in one large panel the full size of door, these panels being five-ply to prevent warping. All the woodwork in the building is finished in solid oak with the natural wood finish. The hall panelling extends from the floor to the ceiling and is ornamented by large pilasters adorned with carved capitals.

Plastering—The plastering was executed in creditable style by Mr. Chas. Hunt, of Ottawa.

Painting, Glazing and Decorating—This contract was awarded to Mr. W. J. Carson, who had to supply some 500 plate glass windows, with glass from the well known English firm of Pilkington Bros., Limited.

Other Features of the Work—The contract for tile for flooring, fireplaces and walls was awarded to A. K. Mills & Son. The bathroom walls are tiled with 6-inch by 2-inch white enamel tile, while the floors are laid with 3-inch hexagon white vitrified tile. There are 67 fireplaces in the building. The mantels are made of the best Canadian red oak. The hob grates installed are from W. H. Jackson of New York. Knoxville grey Tennessee



The New "Roxborough" Apartment House, Ottawa, Ont.

marble is used for all the corridors and staircases, also for wainscoting and benches in the main vestibule.

The hardwood floors throughout the building were treated by the "Simplex" method, the contract for which was awarded to Floor Finishers, Limited, Ottawa.

The sandstone employed in the construction of the first two storeys of the Roxborough was supplied by the Laurentian Stone Company, of 85 Duke street, Ottawa (quarries at Hull and Gloucester). This stone was brought in the rough from Ohio, the large blocks being cut into the required size and prepared for the building by the Laurentian Company, who also prepared and placed the Stanstead granite base upon which the sandstone rests.

The crushed stone and cement used in the building were supplied by Wright & Company, Hull, Que. About 4,000 barrels of cement were required. The artificial stone used in the trimmings was supplied by the Canadian Art Stone Company, Limited, Toronto. The workmanship and durability of this stone is claimed to be equal to the best sandstone and is said to effect a great saving in cost. The sheet metal work and roofing was executed by the Modern Machine Company, Ottawa.

The building is equipped with a local telephone exchange and a private 'phone is installed in each apart-



Typical Floor Plan, Roxborough Apartment House, Ottawa, Ont.

ment. A roof garden, now under preparation, will be an attractive feature during the summer months.

Mr. James Mather, architect, of Ottawa, was associated with Mr. H. C. Stone, of Montreal, in supervising the construction work.

W. G. McClelland, secretary-treasurer, gives notice that, dated from May 1st, 1910, the corporate name of Sand & Dredging, Limited, Toronto, was changed to Sand & Supplies, Limited. The business carried on by this concern is of a more comprehensive nature than was indicated in the old title, hence the change. The offices and yard of Sand & Supplies, Limited, are located at Spadina avenue dock, Toronto. The company supplies sand for all purposes of construction and has every facility for furnishing water washed sand, crushed granite, limestone, cement, tile and other lines.

Construction work at Sault Ste. Marie is seriously hampered by shortage of labor. On one piece of work at the new structural steel mill, 20 laborers and 30 carpenters are wanted, while laborers and mechanics are wanted on other sections of the job. One company has received advices from Germany saying that a detachment of masons is leaving there in the course of a day or so.

Third Annual Convention Royal Architectural Institute

The third annual convention of the Royal Architectural Institute of Canada will be held at Winnipeg, August 24th to 27th, 1910. There is now under preparation a most interesting programme, containing items of interest to the whole profession throughout the Dominion, and every Canadian architect is cordially invited to all the sessions and entertainments of the Assembly. Reduced transportation rates have been secured from the railways and the occasion offers an excellent opportunity to visit the western metropolis.

The Business Side of Architecture

At a meeting of the Royal Institute of British Architects, held last month in London, a valuable paper was read by Mr. Alfred Hudson, barrister-at-law, from whose remarks we cull the following:

"One of the first matters with which an architect will have to deal when he confers with his employer is the question of cost, and to this all his ideas must be made subservient. For this purpose he must be trained to measure and estimate, and he must learn the value of different materials. It falls to the lot of very few architects to find clients of unlimited means, and it is still more rare to find even such clients willing to disregard questions of cost. Another example of equally necessary instruction is the proper specifying of the materials and the various works which are required to be carried out. This is a matter in which very great foresight is required, besides a thorough knowledge of every kind of detail. One of the first essentials in the student's instruction should be to teach him to describe accurately the various materials and methods of construction upon which he is receiving instruction during the course of his studies. It is not uncommon to find that a specification has been copied from an obsolete model describing materials which have ceased to be sold or manufactured."

Building permits issued at Fernie, B.C., during the first three months of the current year totalled \$120,000, as compared with \$560,000 for the corresponding period of 1909. During March, 1910, permits were issued to the value of \$35,000, as against \$200,000 for March, 1909. The high figures for 1909 are, of course, attributable to the great activity that followed the big fire in Fernie in 1908. The city is now practically rebuilt. Mr. G. H. Boulton, city clerk, looks for a total of about \$250,000 for the balance of the year.

We have received from the publishers (44 Leicester Square, London, Eng.), a copy of the April number of the "Studio." The "Studio" is a most attractive magazine devoted to fine and applied art, and its perusal affords one a great deal of pleasure. In the current number are contained several articles of special interest to architects and those interested in kindred lines. The photographs which are used to illustrate "Recent Designs in Domestic Architecture" are particularly interesting, representing, as they do, some of the most beautiful of this kind of work to be found in the old country. In the continued article, "Architectural Gardening," illustrated after designs by C. E. Mallowa, F.R.I.B.A., and F. L. Griggs, one may find many pleasing and tasteful suggestions.

Mr. Robt. Walsh, contractor and builder of Pieter, Ont., died last week in that town at the age of 78 years.

The Place of Burnt Clay in Architecture

Strides made in Brick Manufacture—Fireproofing Tile and its part in the Evolution of the "Sky-Scraper"—Satisfactory Modern Methods

By F. W. FITZPATRICK

Recent excavations at Bisya, in Central Babylonia, uncovered portions of a brick temple that was built in 4500 B.C. The cementing mortar had crumbled away, but the bricks themselves were still perfect. Nearby are other brick relics of the time of Sargon, the first Semetic king of Babylonia, or about 3800 B.C., and an entire tower was unearthed whose bricks were still perfect and bore in legible characters the name "Dungi" that established the date of its construction as 2750 B.C. Go back to history as far as you can and you will find that soon after man ceased to inhabit caves and wooden hut-shelters he began to build of brick. In other words, the art of brickmaking is as old as is our civilization.

In places where easily quarried stone was available or in the neighborhood of great forests, naturally those materials were largely used in the earliest buildings, but even there brick did not lag far behind. And to brick and the vessels and urns and cylinders of burnt clay are we indebted for the accuracy of dates, and, indeed, much of the history of those earlier times. Everything of wood of those days has, of course, rotted, burned and been entirely destroyed; monuments and records of stone and of granite and of marble have crumbled and decayed and the inscriptions placed upon them are well nigh undecipherable, so with the writing or painting upon papyrus, leather and the woven textures, all of which have been dealt with harshly by the hand of old Father Time. Not so with burned clay! Time and the elements, even fire, have had no appreciable effect upon it. As a brick left the kiln six thousand years ago, so is it to-day, the one virtually imperishable, everlasting material known to man.

In our own country we at first brought over a few bricks from England, but soon began to work our local clay beds and, profiting by what we knew of English and German methods, it was not long before our bricks were in every way equal to those of foreign production.

Strides Made in Brick Manufacture

We may not have created any great novelty in the ceramic arts, but we have certainly made wondrous strides in the direction of mechanical perfection as far as manufacturing of brick and the other clay products is concerned.

In early times here, brick was the accepted material, the fashionable thing for our buildings. Stone was sparingly used for trimmings, steps and such details. Then, as we grew in wealth and it became the fashion to lavish expenditure upon our structures, domestic and otherwise, we had to have marble and granite and stone. The man who could afford but brick resorted to a stucco coating over it (painfully marked off to resemble stone pointing) to conceal his poverty. Later, brick began to be favored again in certain classes of buildings only, however, and pressed brick of perfectly matched color and shape had to be supplied. The result was monotonous in the extreme and such wall surfaces looked for all the world as if they were kalsomined. In the past few years brick has come into its very own again. We are using straight kiln products, are not over anxious for evenness in color and shape and resort to brick not as a cheaper substitute for stone, an expedient, but because of its adaptability, its inherent beauty, its artistic effects, its lasting qualities and its resistance to fire.

And in that last named quality brick has no competition. To the layman a great granite structure is the symbol of the fullest expression of resistance to time and all attacks, the

epitome of man's structural ability. Yet, let there be a fire within or near by that building and you'll see that granite spall and crack and literally explode—for each little crystal contains a minute drop of water, that, under heat, becomes steam and at a certain point can no longer be held in its shell, and, there being no safety valve, that diminutive boiler really explodes. There is no sadder looking wreck than a granite building that has passed through fire. Marble is of much the same texture and offers as little resistance to fire; sandstone likewise, and everyone knows what becomes of limestone that has been burned. Whether the fire be in a regularly constructed lime kiln or is fed with the fittings and contents of a store makes little difference, lime is the invariable result of burnt limestone. How silly it is to build a structure that is supposed to be fire-resisting of any of those materials. And iron and steel act equally badly in fire; they do not burn as does wood, but they twist and bend and warp out of all semblance of their original shape and any load they carry is let down, dropped. Of all building materials brick is pre-eminently the really fireproof one and the only one to be used wherever any structure or part of a building may in the least way be exposed to fire. It passes through such intense heat in its manufacture that no other fire, even of conflagration intensity, has the slightest effect upon it. The only danger is that the mortar in the joints may be destroyed, but if those joints be reasonably narrow and the cement a high quality, there is so little of that cement surface exposed the possibility of its disintegration all the way though is remote indeed.

In building fireproof buildings 30 and 40 years ago, they used brick arches between heavy iron floor beams. This made fire-resisting construction, but not absolutely fireproof, for the under side of the beams were exposed. Then, too, the weight was excessive and the construction therefore very costly. Yet, property was ever advancing in value and buildings thereon of only six or eight storeys produced inadequate returns. The tall building was a necessity, but there was no proper means of building it. The skyscraping steel skeleton frame was evolved, but, unprotected from fire, one might as well carry up ten, twenty storeys of wooden construction and expect safety.

Fireproofing Tile and the Evolution of the Sky-Scraper

It was stated that nearly all our work in this ceramic art was founded upon the antique. One detail, however, is essentially American, brand new, without precedent in antiquity or anywhere else and all our very own, and that is fireproofing tile, the hollow tile one sees piled in great heaps in front of the best and most modern fireproof buildings while the latter are under construction. And to that tile do we owe the modern, fireproofing tall building. For with it we are enabled to cover every particle of the steel work, to protect it from fire, and to build our floors of great weight-carrying capacity, of extreme lightness and of absolute resistance of fire. Until that tile was evolved, about 30 years ago, our tall buildings existed only in the vivid imaginations of some of our most progressive engineers and architects, it was the link that had been missing.

Those floor arch blocks are of a size to be easily and quickly handled. A solid block of similar size would be too heavy, would add tremendously to the weight and cost of buildings and, moreover, the insides would never be burned as densely

as the outer layer of such a block, a fatal defect. Formed of thin webs and divisions as are these tiles, the kiln-fire burns them thoroughly inside and out, in every part, and to a uniform density. They are formed in arch stone shapes, with a key, as has every arch, set in cement, they give all the lateral resistance a floor needs, the depth to ensure stability and a carrying capacity that is surprising. The inner air spaces form great sound deadeners and also contribute to the fire-resisting qualities of that tile. To-day all sorts and shapes are made, forms to protect every kind of steel column, other forms to protect beams and girders and trusses, tiles for partitions, tiles for furring, for roofs. All these are properly scored and roughened so that they will hold the plastering that is applied on those partitions and ceilings, and there are provisions made for the steel tie rods that are necessary, for the running of plumbing pipes, wires and the endless minutiae that goes into a building, the details that the layman wots not of, that are all hidden in the very vitals of the building, and yet are so essential.

The invention of this hollow tile was the greatest single step that has ever been taken in the evolution of our modern tall building, it, as we have noticed, made that building possible. Chicago was the first to use such tile, then New York, and now the entire country. Millions of tons have been made and used in the 30 years since its invention. It has been introduced into other countries, though they do not build as high as we do, and here, too, it is now being used in small and low buildings, whenever the best is desired. The tall building is the most salient feature of our architecture, it has compelled us to adopt a certain character of design, has forced us to get away from certain hackneyed precedents of European schools and given us an individuality of style and construction that places us apart from and above—in more than one sense—all other nations. The tall building was made possible, feasible, a reality and not a dream, by the invention of fireproofing tile.

Reinforced Concrete as a Competitor

Of late years reinforced concrete has come to the fore and chiefly as a competitor of that hollow tile for fireproofing purposes. Various vicissitudes have attended its development. Of all systems of construction, it requires the greatest care, it is monolithic, so that as a whole it can only be as strong as its weakest detail; it is almost invariably used where tile is deemed too expensive, therefore the temptation to do it cheaply is always present; it is so dependent upon mixing and the amount of water used and the quality of cement, and all such minute details, that only an expert chemist should make it, so as to secure anything like uniformity, standard accomplishments, instead of which the cheapest of unskilled labor is generally deemed all that is necessary. Therefore, it is not surprising if many and fatal collapses have occurred and that where the very best is desired tile, that long since has passed through its experimental stages, is still invariably used for fireproofing. Recognizing the structural possibilities of well done reinforced concrete instead of steel, many of the highest authorities commend the system that use concrete for the structural members, columns, girders, etc., of a building, but that encase and protect these in turn from fire with hollow tile. The floors are built of tile blocks set apart and concrete poured in the spaces, forming concrete supporting beams that carry the load, but are not exposed at any point to the attack of fire.

The making of hollow fireproofing tile has been reduced to an exact science. Every contingency is foreseen and provided for, the tile is standardized, it is tested, it is handled by only skilled workmen and every day new uses are being found for it, and it is further perfected to meet those new requirements. The latest is an all-tile house, the outer walls, the floors, the roof, the partitions, absolutely eliminating wood and even steel, save in reinforcing rods, etc., in all the struc-

tural parts. Men everywhere who really appreciate the advantages of living in a house that cannot be destroyed by fire are turning their attention to this form of domestic construction. In New Jersey there is an entire settlement springing up of wholly tile houses; in Chicago and all about us there are houses being erected, ideal houses, safe, low priced, beautiful and virtually everlasting.

Satisfactory Methods of Modern Practice

In constructing large buildings, especially commercial ones, men have grown wise enough to use fireproofing methods in the structural parts, and as little combustible materials in others as is compatible with proper economy. Where they have not sense enough to do so voluntarily, building laws generally compel them. It is in the construction of houses, where people do more or less what they please, that wood is still used more than far-sighted judgment would justify. There was a time when such construction was made inevitable by economy, but in the last 20 years timber has gone up over 100 per cent., while the prices of brick and tile and cement, by reason of improved methods of manufacture, have been cheapened so much that, all things considered—durability, repairs, warmth in winter and coolness in summer, insurance, freedom from vermin—a fireproof house means a better investment ultimately than a wooden one. There are cases where even the first cost of a fireproof house is less than it would have been had it been built of wood. As a general proposition the country, over the additional cost of first class brick and tile construction, is anywhere from five to ten per cent. more than for wood. In the ordinary dwelling there are floor joists, cross-bridging, a rough floor, paper, or other deadening material, and a finished floor—all combustible, the whole costing something like 25 cents a square foot, including the plaster on the ceiling below. In fireproof construction, using hollow tile in monolithic wide spans, covered with an asbestolithic or other incombustible plastic flooring, and the under side plastered, there is an expenditure of from 26 to 28 cents. Is not the use of wood in private dwellings a habit which ought rapidly to disappear?

It is disaeparing, and very largely because of the devastation of our forests, wood is fast becoming prohibitively expensive. Not an undisguised blessing, for so long as wood was cheap we used it, and our cities burned up; without it and with a modicum of good sense, we will turn and have turned our attention to non-inflammable substitutes for the frame buildings of our fathers. And this perfecting of hollow fireproofing tile may also be taken as an example of an application of the truism that human ingenuity may be always depended upon to step forward at the right time and place and give use that which is needed most.—"Brick"

Enduring Qualities of Brick

In uncovering the fine stone bridge over the moat at Hampton Court Palace, some interesting discoveries have been made. In the wall of the north wing two large archways have been revealed, evidently designed to bring the water into the moat; and on the south side have been found some curious brick steps leading by an archway into the moat from a subterranean way underneath the rooms now occupied by Lord and Lady Wolsey. There is much, says Mr. Ernest Law, in the "Times" of March 25th, which points to the waters of the moat being utilized to flush the vast system of arterial drainage which was one of the main features of Wolsey's palace. The brickwork of both the moat wall and the main building, though buried for 200 years, has mostly been found in as satisfactory a state as the stonework of the bridge. Where it was otherwise, it has been carefully patched with the old Tudor bricks. Tens of thousands of these unrivalled for their texture and their varied tones of rich color, extending from dark purples and crimsons

to bright rose—have been collected from the debris and put aside for the restoration.

Maintenance Cost in Ditching

The cost of maintaining ditches often receives less attention from the engineer in charge of their construction than it should. The amount of repair work may be very considerably reduced by careful designing.

A uniform rate of fall is, of course, the ideal to be arrived at in establishing the grade line; but this cannot often be secured. Humps are less objectionable in the grade than are sags, because if water containing suspended matter passes down a ditch over a sag to a flatter slope the deposit of sediment at the sag will give trouble.

Open ditches should be at least 8 feet wide at the bottom. For narrower construction, tile should be used. The narrower the ditch, the greater the chance of the flow being interfered with by sediment. The cross-section should be as near as possible to the shape of the letter U, but with legs slightly inclined. Step slopes are to be preferred to flat ones.

Concrete bridges should not be used across ditches that may require cleaning with a floating dredge. Steel bridges that can be lifted and replaced will be more economical in the long run.

Branches of the main ditch should form an acute angle with it, and care should be given to the construction of outlets to avoid deposits. Annual maintenance work should be done to avoid more expensive reconstruction. For this, hand work is best, because least destructive. Where scrapers are used it is a good plan to lift them out with derricks to avoid injury to the slopes by teams.

Sewage Disposal Works, Birmingham, Eng.

An interesting paper relating to the above undertaking was recently by Mr. John D. Watson before the Institution of Civil Engineers. In the course of his address Mr. Watson said that the works described in his paper had reference to a drainage area in Birmingham and the surrounding district of nearly 100 square miles, with a population of about 950,000. The system of sewage treatment formerly adopted was a combination of lime precipitation and land irrigation, but in conducting experiments in 1900 on biological methods of treatment it was found that Birmingham sewage was capable of purification by the septic tank process, and the excellent results obtained from further experimental work decided the Board to advance on biological lines. There had now been constructed a biological plant, including upwards of 50 acres of bacteria beds, storm-water tanks, etc., at an actual cost, exclusive of land, of £400,000. This had been done, not because the principle of purification by land irrigation was regarded as bad in itself, but because the Board felt it to be their duty, as representing the public, to see that their works were made as good as possible in the light of modern discoveries, even though it should be necessary to superimpose a new work upon one which had so recently been characterized as the best available. The average dry-weather flow as measured in 1908 was 27,000,000 gallons, and the estimated average volume of liquid trades waste discharged into the sewers per day was 4,000,000 gallons. The influence of this trade waste upon the average flow was shown markedly by the comparative paucity of micro-organisms; for while London sewage contained an average of five to six million organisms per cubic centimetre, the Birmingham sewage had an average of only 500,000. Analysis brought out the fact that the more metal works were connected with a particular sewer the fewer the organisms in the sewage. He had a distinct preference for the percolating type of bacteria bed, the only serious drawback to the adoption of that system in a very large installation being the difficulty of distribution. He

was of opinion, however, that this could be overcome by spraying the sewage under pressure. The pumping station was equipped with motor-driven centrifugal pumps, and sufficient pressure was obtained to give about 20 feet. A storm-water basin had been constructed to impound 13,000,000 gallons of sewage. In spite of the cost of substitution of one method of treatment by another, the rate per tenement had not materially increased, being 4.32d. in the pound for the last financial year, compared with 4.21d. in 1901-2.

Cost of a Concrete Roadbed

The following interesting and suggestive comparison of costs for concrete and ballasted roadbeds is presented by "The Engineering Record":

The concrete of the Delaware, Lackawanna & Western Railroad in its new Bergen Hill tunnel was designed by Mr. Lincoln Bush, and was described in the "Engineering Record" of Oct. 17th, 1908, and April 3rd, 1909. A detailed account of its cost and the estimated cost of a ballasted roadbed for the same tunnel, as well as comparative annual expenses, were recently published in the "Railroad Age Gazette." The estimated cost of a ballasted track for a length of 4,280 feet, including two lines of 12-hole conduit, tile drains and creosoted ties, was \$14.62 per linear foot of double track, while with the conduits omitted the estimated cost was \$10.15. With this type of roadbed adopted, the amount of tunnel excavation and the cleaning up of muck cost the same as for ballasted track, but the tile drains and ditches for them were eliminated. The railroad company furnished concrete materials, and their cost, plus \$3.50 paid to the contractor, made the total cost \$6.25 per cubic yard. The actual cost of the roadbed as built, including the conduits, was \$14.26 per linear foot of double track, while with the cost of the conduit construction subtracted, the figure is \$13.18. The maintenance of the roadbed requires one inspector at night and one during the day, at a total cost of \$90 per month, while the ballaster roadbed of the old Bergen Hill tunnel, which is the same length as the new tunnel, requires a gang of laborers, a foreman, and a watchman with a payroll of \$565 per month. Capitalizing the investments for ballasted track and for the concrete roadbed at 4 per cent. and adding the difference in the cost of maintaining, the saving due to the concrete roadbed, as built with conduits, per year per mile of double track, amounts to \$7,107.32. With the conduits omitted, the saving would be \$6,389.42.

"Standard" Sanitary Goods

Reference was made in a recent issue of the "Contract Record" to the decision of the Court of Appeal in the case of the Standard Sanitary Manufacturing Company, of Pittsburgh, Pa., versus the Standard Ideal Company, of Port Hope, Ont., the court confirming the decision of the Superior Court restraining the defendant from using the word "Standard" in connection with enamelled bathtubs, lavatories, sinks, and other enamelled ware. It is therefore of interest to note the announcement of the incorporation of the Canadian Sanitary Manufacturing Company, Limited, with a capital of \$1,000,000 to acquire the business and assets of the Standard Ideal Company, Limited, of Port Hope, Ont., and carry on the manufacture of enamelled ware, plumbers' supplies, etc. The charter of the new company is a broad one.

Building permits issued last month at Fort William represented a total of \$250,000. For April, 1909, the figures were \$1,119,000. This sum, however, included the permit for the \$942,000 elevator plant constructed on the G.T.P. terminal property. There is notable activity in residence building at Fort William this season, according to the report issued by Building Inspector McNamara.

Small Concrete Blocks in Roadway Work

Methods of Manufacture and Results Obtained in Service—Details of Cost for Guidance in Estimating on Similar Construction

The New York State Highway Commission authorized the expenditure, some time ago, of \$2,250 for the purpose of experimenting with small concrete blocks as a roadway pavement. The blocks consisted of 2-inch cubes made of different materials and laid on Ridge Road, northwest of Rochester. The method of manufacture and the results obtained in service were the subject of a paper by Mr. George C. Wright, consulting engineer, before the recent convention of the National Association of Cement Users. The data, Mr. Wright explained, were largely taken from a report of Mr. J. Y. McClintock, county engineer of Monroe County, to the Highway Commission. The following data are taken from Mr. Wright's paper.

The advantages expected from this type of pavement are as follows: Comparative freedom from dust, smoothness of surface, good footing for horses and wheels, pliability permitting of changes in the base due to freezing and thawing, and movement due to the contraction and expansion. As these cubes could be supported on any suitable local stone or gravel, the cost per mile for first class road would, Mr. Wright thinks, be very much below that of ordinary paving brick and more lasting than any of the asphaltic or bitulithic mixtures, and further, the maintenance would be simplified and reduced in cost.

On Ridge Road, the original trap-rock surface, 2-inch thick, was worn completely off at the centre and nearly so at the sides of the 16-foot macadam roadway, leaving exposed the good solid lower course of rather large size broken Medina sandstone, resting on a good gravelly foundation.

General Methods Employed

The existing surface was somewhat rough and knobby, and over this was spread as thin a layer as possible of screened gravel, which was rolled down with a 12-ton roller, so that in spots it was 2 inches thick and in other places, over the knobs, it was no measurable thickness. The resulting surface had a crown of about 4 inches in 16 feet width.

On this bed so prepared was placed directly a wearing coat of 2-inch cubes for a width of 15 feet, being laid close together by hand, the edges being held up temporarily by 2-inch planks laid lengthwise with the road. On the cubes was spread a small amount of fine, somewhat loamy, gravel, which was broomed in, after which the heavy roller was slowly passed over the whole of the surface, forcing the cubes to take a full bearing on the supporting gravel. The edges and roller wheel were supported by the planks, then the side-planks were pulled up and moved ahead and coarse gravel, $\frac{3}{4}$ to 1½-inch, was placed along the sides next to the cubes on the shoulder for a width of about 2 feet. Outside of this a finer gravel was spread, feathered off to a width of about 3 feet, more of the fine loamy gravel was spread on the top and broomed and flushed in until the space between the cubes was thoroughly filled, the gravel on the shoulders was wet and the whole surface thoroughly rolled with the heavy roller.

A stretch of road 1,800 feet long was surfaced with cubes. On 1,600 feet Portland cement gravel concrete cubes were used, on 200 feet vitrified shale cubes, 2¼-inch in size, were used. For a length of 100 feet a 6 x 9-inch concrete sunken curb was used in place of the gravel shoulders. On 100 feet the joints between the cubes were filled with Portland cement grout instead of the fine loamy gravel. For 60 feet, on which the joints were filled with the fine gravel, light asphaltic road oil was sprinkled over.

A machine for making cubes which is an adaptation of the ordinary cement brick machine, was furnished: This machine made 68 cubes at one operation, resting on a wooden tray, and the tray was carefully placed on a drying rack without disturbing the freshly made cubes. The cubes remained in the racks 24 hours and were then dumped in a pile. This pile was thoroughly sprinkled twice each day. The number of cubes made the first day was about 7,000, but within a few days the same gang was able to make 26,000 with ease.

Cost Data and Other Information

Various sizes of screens, from ½ to 2-inch, were tried, but it was found that the ½-inch screen gave a product that could best be handled in the machine. Experience showed that the concrete had to be rather dry in order to avoid settling and bulging of the cubes before the concrete set. Seven men and a foreman did all the work. The amount of cement used averaged 2.2 barrels to a cubic yard of concrete.

The area covered with cement cubes was 2,652 square yards, upon which was laid all of the 730,000 cubes manufactured, except about 5,000 kept for repairs.

The cost per square yard of the cubes laid was as follows: cement, 0.088 barrels, \$0.121; cost of factory, \$0.107; labor of manufacture, \$0.161; gravel at 50 cents per cubic yard, \$0.024; carting, \$0.027; laying, \$0.072; total cost per square yard laid, \$0.512. There were placed on shoulders 219 cubic yards of gravel, covering 1,800 square yards, costing \$2.12 per cubic yard rolled in place, or 26 cents per square yard.

In considering these figures as the basis for estimating cost, Mr. Wright pointed out, there might be reductions made in cost of cement by using a reduced quantity, and in the cost of carting; the cost of the factory might be distributed over many more square yards; the cost of labor might be reduced by the use of a concrete mixer and other labor saving devices; the cost of gravel in pit is usually nearer 10 cents per cubic yard than 50 cents. The cost of laying was very much reduced as the men became experienced, and this could be still further reduced by paying for it on the basis of piece work.

Mr. Arthur Priddle, of San Francisco, inventor of the Inner bond steel bar for concrete reinforcing, was recently in Toronto making arrangements for the manufacture of this bar in Canada.

A section of the Vancouver city council has been raising an outcry against "sky-scrapers." At a special meeting of that body last week it was decided not to alter the 160-foot limit in the present by-law.

The Minister of Railways has given notice of the annual railway subsidy resolutions. This year they are all revotes. In all, 44 votes are proposed, and on the basis of \$3,200 to the mile the total will amount to \$8,862,400.

Vancouver's building total for the first three weeks of April totalled over a million dollars. During the whole of April, 1909, the permits reached \$783,490. During the current year, so far, the permits issued aggregate four and a half millions.

The Building Trades Council of Vancouver has issued to the master builders of that city a solemn warning that on and after May 2nd it is intended "to enforce a more strict recognition of trade union conditions on all buildings in Vancouver and vicinity, either in course of erection, repair or alteration."

Satisfactory Arrangement of Piping System for Steam Heating

When a building is equipped with a hot water service the source of supply is from a hot water generator, in the form of a tank, with a coil of pipe, through which is circulated either high or low pressure steam.

If the boiler plant is operated at high pressure, and the water of condensation returned to the boiler through a pump and receiver, the hot water generator is connected up as shown. That is, the high pressure steam connection from the boiler is carried to a point near the tank where a reducing valve is inserted, the object of which is to have any desired pressure below the maximum, consequently any desired temperature of steam to do the heating. The pressure reducing valve is by-passed, so if at any time it is necessary to make repairs it may be done without interrupting the hot water service. There is also a low pressure connection from the heating system, which is made the full size of the tank coil, the service may be continued when the boilers are operating at low pressure for heating purposes only.

The steam passing into the coil is very rapidly condensed, and the water of condensation flowing to the trap from whence it is discharged to the receiver of the pump and by the pump returned to the boiler.

The trap is by-passed so the water from the coil may flow directly to the pump receiver when the pressure in the coil is equalized by the reducing valve with the pressure on the heating system, or it may be allowed to run direct to the sump, or blow-off tank, when for any reason it is so desired.

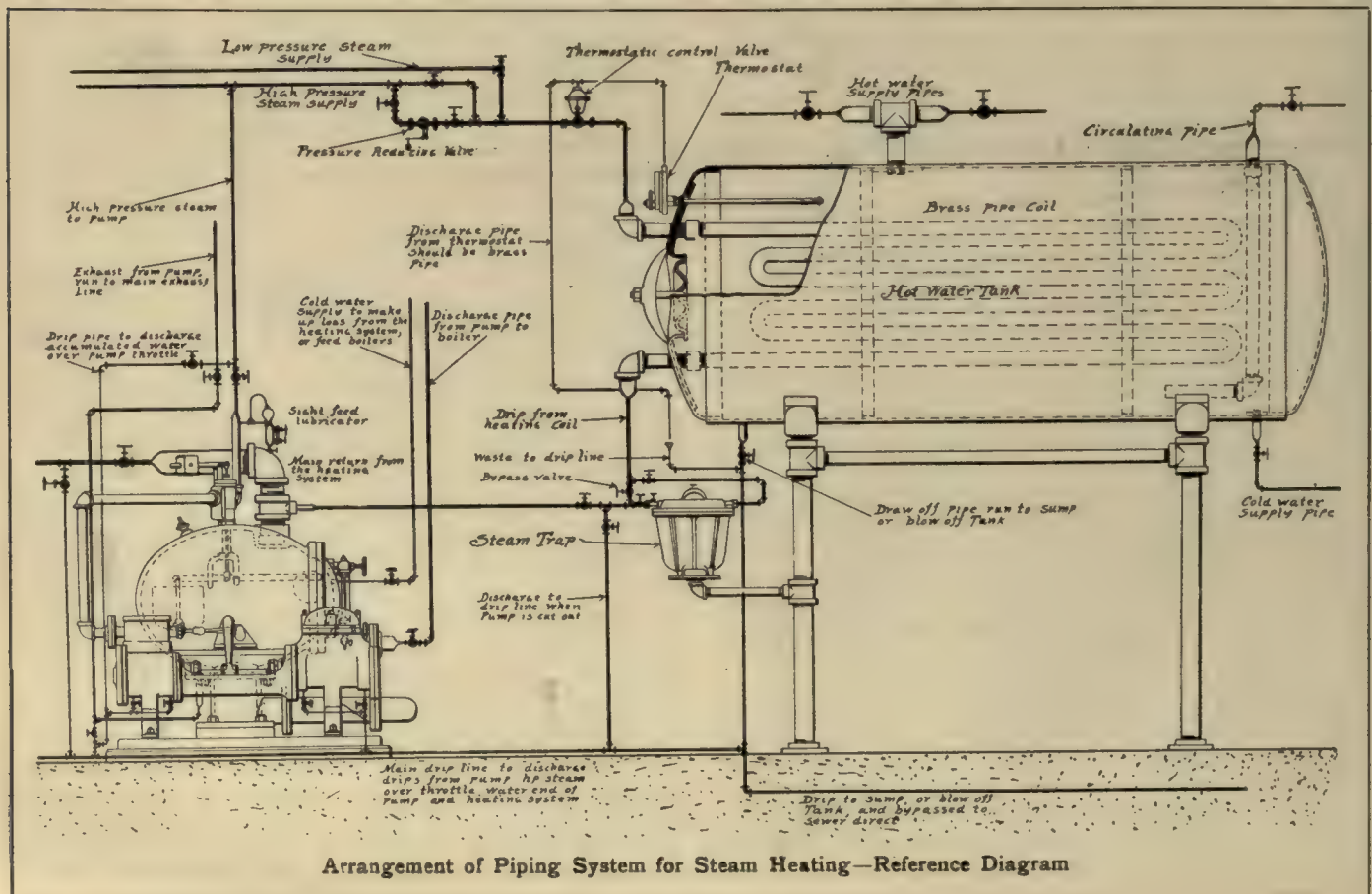
The temperature of the water in the tank is controlled by the thermostat, the connections to the throttle valve and waste being made as shown.

The various steam exhaust, drip and cold water con-

nections to the pump and receiver are shown with their necessary controlling valves as usually made by the steamfitter.

Effects of Wind on Ventilation

The effect of wind on ventilation and heating was the subject of a paper read by H. W. Whitten before the American Society of Heating and Ventilating Engineers. The most apparent effect, Mr. Whitten states, is the leakage of air through crevices, while the least apparent but nevertheless important effect is the outflow of warmed air through crevices in the sheltered side of the building, caused by an area of low pressure in the lee of the building, which acts as a partial vacuum. As the pressure of the inside warm air is naturally outward, the combination of this pressure with the partial vacuum outside produces a greater loss than is sustained on account of leakage, assuming the aggregate amount of crevices on each side to be equal. The author then describes a few typical tests made by him and others in this connection, some of which are given here. A room situated on the east side of a rectangular school building, with a northwest wind blowing 14.5 to 15 miles per hour and an outside temperature of 33 degrees, showed an average rate of supply velocity of 817 feet per minute and a vent velocity of 340 feet per minute, giving a loss of 477 feet per minute. The inlet was 8 feet above the floor and the outlet at the floor, both being of equal size and on side of the room opposite the windows. An air test showed 10 parts of carbon dioxide in 10,000. A test of another school building with wind at 18 miles per hour and outside temperature of 30 degrees, the building being heated and ventilated by the gravity indirect system, showed an average loss of 20 per cent. from the supply ducts and an addition of 60 per cent. to the vent velocity in rooms on the windward side. Rooms on the leeward



Arrangement of Piping System for Steam Heating—Reference Diagram

side of the building showed an addition of 30 per cent. to the supply velocity and a reduction of 62 per cent. of the vent velocity. Another test was performed in a high school building. After shutting down the fan the supply ducts were closed in the rooms on the exposed

side of the building and, with all doors and windows close, it was found that as much air was being removed from the vent ducts as the fan system was supposed to supply. During this test the outside wind was of moderate velocity.

Rule-of-Thumb Methods in Brick Making

And the Consequences Thereof—Competition of To-Day Demands Detailed Records and Constant Study of Principles Underlying Operation of Plant

We have on several occasions compared the manufacture of bricks and other clay products to domestic cookery, in that a similar amount of skill is required in the various processes of preparing the raw materials into a suitable paste, and in the baking or heating necessary to convert them into a marketable product. The comparison may be pushed still further by comparing the ordinary housewife with a professional baker. The former uses cups and spoons as measures, and the quantities obtained in this way often vary as much as 20 per cent. from the correct amount, whilst the baker works with accurate weights and measures, and consequently his results are more certain than are those of the ordinary cook, for the simple reason that he proceeds on a more systematic plan.

In clayworking it often happens that after a firm has got into a serious difficulty with its manufactures, it does what it should have done years before, and obtains the right kind of information as to the best method of working, instead of relying on traditional methods which may be all right for a time, but which must, sooner or later, fail.

In former times, when the prices of bricks and tiles were far better than at present, the traditional methods of working were sufficient, because from a given clay-hole the material most suitable for the purpose might be taken out and the rest left behind, but with the keener competition of modern times, such careful selection is made far more difficult, and some attempt must usually be made to use all the material direct; for the success of many yards depends on the utilization of what 20 years ago would have been considered as "waste" or unsuitable.

The traditional methods of working are all right so long as materials continue to be constant in composition, but a comparatively small change in either the clay or the fuel will often work havoc, unless it is accidentally detected at once. The detection can only be accidental, for by the very nature of the case a works run on rule-of-thumb methods has no means of checking an unexpected alteration of this sort.

A remarkable instance recently came to light in this way. A firm of fire brick manufacturers, who had sold their goods chiefly for export, tendered for an important municipal contract, but found that their bricks came so badly out of the tests that some doubt was expressed by the municipal officer as to whether a non-refractory brick (i.e., a buff building brick) had not been accidentally submitted. Analysis of the brick and of the various clay deposits showed that a seam which was considered to be excellent fire-clay had run out, and a new seam in the same position in the mine was entirely different in composition, though very similar in texture. Similar changes in composition are constantly found in deep mine clays, though the change in texture often gives the miners some clue.

Modern methods of clayworking must be kept so fully up-to-date, if the present competition and low prices are to continue, that three methods of work must be continually in use: (1) Frequent investigation of the raw materials (including the coal); (2) Constant study of the principles underlying the working, with attempts to bring the actual practice more closely in agreement with the theoretically best methods; and (3) the maintenance of sufficiently detailed records, so that the results of all previous successes and failures may be readily accessible when needed.

Many clayworkers at the present time have made various "improvements" and changes from time to time, and in several instances it is very difficult to ascertain how far difficulties have resulted from the material and how far they are due to changes in the method of treatment. The problem can, of course, be solved by making numerous and often costly tests, but these might have been avoided had the firm insisted on full records being kept of any change, no matter how slight, in either the materials used or the treatment to which they were subjected.

This matter of records is far more important than is commonly realized, and one firm of brickmakers owes its present prosperity and the successful weathering of a great crisis simply to the fact that, when things became critical, the records available enabled the difficulty to be overcome in a few weeks, whereas several months would have been needed in their absence. The clay had "run out," the Government Survey-records were not sufficiently detailed at this place to show with the necessary accuracy the run of the clay, and much costly boring would have been necessary but for the fact that the rough survey of the ground which could be made from the carefully made notes of the manager of the clay-hole enabled an up-cast to be detected, and the corresponding down-cast to be located. No rule-of-thumb working can avail in cases of this kind.

The Quebec Harbor Commissioners have given their carpenters and laborers an increase which amounts to about 25 cents a day.

At Brantford, Ont., during the first three months of 1910 permits were issued to the value of \$26,670. During the first quarter of 1909 the total was \$15,505. For March, 1910, and March, 1909, the totals were \$11,470 and \$10,315 respectively.

At a meeting of architectural draughtsmen held recently in Winnipeg for the purpose of discussing certain clauses of the bill recently passed by the Manitoba Legislature in regard to the examination and registration of architects, there was formed the Manitoba Association of Architectural Draughtsmen. Subsequently a committee was appointed to take up with the Manitoba Association of Architects a number of points which the draughtsmen consider inimical to their interests.

Canadian City Engineers

Mr. Jas. A. Bell, St. Thomas, Ont.

The subject of this sketch was born in the township of Loto, Middlesex county, Ont., in 1851. He was articulated, in 1872, to Mr. W. G. McGeorge, C.E., O.L.S., and passed his final examination for the degree of O.L.S. in 1875. In 1887 he was elected a member of the Canadian Society of Civil Engineers. Mr. Bell has served St. Thomas as city engineer for two periods aggregating a quarter of a century. As previously stated in these columns, he will retire at the end of the present year in order to give more time to his extensive private practice, which he has been building up since 1876. The two periods during which Mr. Bell has held office as city engineer of St. Thomas are from 1881 to 1891 and from 1896 to the present time. Mr. Bell has been county engineer



Mr. James A. Bell,
City Engineer of St. Thomas, Ont.

of Elgin since 1882. In this capacity he has had charge of all public works carried on in the county of Elgin. In 1882 Mr. Bell surveyed and located the present line of the Michigan Central Railway, from Essex to Windsor, and from Welland to Niagara Falls. The following year he had charge of construction on the Cantilever Bridge, under Mr. A. R. Trew, C.E. Some idea of the extent to which Mr. Bell has been consulted by municipalities throughout Ontario may be gathered from the fact that he designed and built the waterworks systems at St. Thomas, Paris, Milton, Aylmer and Tilbury, also the original sewer system and sewage disposal plant at St. Thomas. In private practice Mr. Bell is a member of the firm of Bell & McCubbin, civil engineers, whose specialty is municipal work.

The Winnipeg Stone Company is suing Messrs. Senechal & Smith for \$10,000 which they claim to be the balance due on work executed by them in connection with the building of St. Boniface Cathedral, for which the defendants were the contractors.

Personal News and Notes

The resignation is announced of Mr. R. W. Farley, M.Can.Soc.C.E., city engineer of Hull, Que.

A builders' exchange has been organized at Moose Jaw, Sask. The new institution will be affiliated with the Winnipeg exchange.

Mr. James Bacon, harbor commissioner for the G.T.P. at Prince Rupert, has resigned with a view to engaging in private practice.

Mr. T. A. Kennedy, contractor, Fort William, Ont., has just returned to that city after an extended trip to western Canada and the coast.

It is interesting to note that Property Commissioner R. C. Harris, of Toronto, has also been placed in charge of the street cleaning department of that city.

Mr. David Adams has been appointed assistant city engineer of Vancouver, B.C. Mr. Adams was seven years under the city engineer of Glasgow, Scotland.

Mr. Alexander C. Potter, C.E., the New York expert who has been engaged to supervise the design of a sewerage and waterworks system for Edmonton, Alta., arrived in that city last week.

Mr. C. R. Coutlee, of the Ottawa branch of the Canadian Society of Civil Engineers, will deliver an address before that body on May 4th dealing with the water power possibilities of the Ottawa river.

It is with much regret that we have to report the death of Mr. C. L. McIntosh, treasurer of the J. I. Case Threshing Machine Company, Racine, Wis., which occurred in Naples, Italy, on April 19th.

Mr. Arthur A. Ridler, who was formerly connected with the Roadway Department at Toronto under City Engineer Rust, has secured a position on the engineering staff of the Constructing & Paving Company, Toronto.

Mr. P. L. Fraser, secretary of the Builders' Exchange, is captaining one of the teams that are out to raise \$600,000 for new Y.M.C.A. buildings at Toronto. It is gratifying to note that half the amount was subscribed in the first 24 hours.

City Engineer Rust, of Toronto, accompanied by Mayor Geary and Alderman McCarthy of that city, left on the 28th ult. for Boston in quest of information relating to subways and with a view, possibly, to engaging an expert engineer in this connection.

Mr. J. W. Hynes, the Toronto architect, left the city last week for Rochester to attend the Second National Conference on Civic Planning. Accompanying Mr. Hynes were Dr. C. R. Dickson and Mr. J. E. Fetherstonhaugh. All were delegates from the Guild of Civic Art.

The London Concrete Machinery Company, Limited, 19 Marmora street, London, Ont., are now making arrangements for the erection of a new plant about eight times the size of their present establishment. This firm has built every season since its organization, but within the last year they have added several heavy lines of concrete machinery, such as mixers, crushers, etc., and their business has increased four-fold during the past year. Within the last few months it has been necessary for them to have a large part of their work done in other shops by contract, and on this account the directors have decided to secure about two acres of land and proceed immediately to build a new plant. Their present building, although new and commodious, will, no doubt, be used for other manufacturing purposes.

Contractors' Electrical Tower Crane

A tower crane of unusual design, which has attracted much interest amongst builders and contractors of the old land, has lately been put into commission on the building operations in connection with the extension to the British Museum at Bloomsbury, London, Eng. It was specially designed and built by Geo. Anderson & Company, Limited, of Carnoustie, Scotland, whose Canadian office (located at 157 Craig street west, Montreal) has supplied us with interesting particulars.

As will be seen from the accompanying cut, the tower is composed of three sections, the divisions being made at the platform which carries the motors and operating machinery, and at the platform carrying the sole plates for the two jibs. As a whole, the tower may be regarded as being made up of



Electrical Tower Crane Designed and Erected by Geo. Anderson & Co., Limited

four corner posts, each having a rectangular section of 4 feet by 3 feet at its base, and 18 inches square at the highest point. The vertical length of each post is 98 feet 6 inches from the base to the highest point, and they are composed of four angles each, diagonally braced on all four sides with flats and gussets; similar bracing being employed to connect the four corner posts into a main tower. Half way up each of the three sections into which the main tower is divided, a diaphragm of stiff angles and plates is introduced, thus giving the tower increased rigidity towards resisting torsional forces.

The base of the tower is 21 feet by 19 feet 6 inches section, and is carried on a six-wheel truck built of steel beams, angles and channels. A 10 h.p. motor is mounted on the truck,

and transmits power to the wheels through cut steel spur gears and worms, for travelling.

At the top of the first section, which is 39 feet from the ground, the operator's platform is situated. On this platform, two separate winches are stationed, each performing the hoisting operation and raising, lowering and turning of the jib on its own side of the tower. These machines are driven by individual motors of 20 h.p. each. All motions of the crane are controlled from the operating floor.

At the top of the second section, 75 feet from the ground, is a platform of rigid design, built of beams, angles and plates. This platform carries the sole plates, sockets and turning gear for the two jibs, on opposite sides of the tower.

The top of the tower has a rectangular section 6 feet 6 inches square, and is roofed over with steel plates. At the end of a cross beam carried at this point, are the steel links, together with the jib and hoist rope pulleys, so arranged that they radiate with the turning movements of the jibs. Each jib is of lattice steel construction, and measures 45 feet in length. They are both designed to swing through an angle of 180 degrees.

All points of the tower are reached by means of steel ladders which run between the different platforms in the interior of the structure. Twelve tons of ballast were used with this crane, distributed at the four corners of the travelling trucks, inside the corner posts, in lots of three tons each.

The crane is very easily handled. At the maximum radius of each jib, which is 40 feet, a load of 3 tons can be raised at the rate of 85 feet per minute, using the jibs simultaneously. At a 17-foot radius, the crane will hoist a load of 8 tons, the hoisting speed in this case being 36 feet per minute. The time taken to bring the jibs from the maximum to the minimum radius is 45 seconds, and to turn them through their greatest angle of 180 degrees takes 30 seconds. The travelling speed of this crane is arranged for 50 feet per minute.

This crane is doing excellent service in dispatch and placing of material, and in saving labor. A great feature in the use of a crane of this type is the freeway that obtains all over the building operation, doing away with all derrick obstructions, and allowing of the completion of the work from the ground up.

Longitudinal Reinforcement in Concrete Columns

At the recent convention of the National Association of Cement Users, a paper on the above subject was read by Sanford E. Thompson, consulting engineer, from which we take the following:

Of the three common methods of strengthening concrete columns, so as to reduce the size below that which would be required by an ordinary mixture of plain concrete—namely, a rich mixture, longitudinal reinforcement and hooping—each has its advantages and limitations.

By increasing the percentage of cement there is an increase in the strength of the concrete per square inch of section. By inserting vertical steel, this receives a share of the compression and thus permits heavier loading. By hooping or banding, the ultimate strength is increased and the column is rendered more ductile.

The writer has presented on previous occasions the limitations of hooping, which, although very effective, is increasing the ultimate strength of the column, does not greatly advance the point of the first beginning of the failure, because the hoops do not get into action until the concrete begins to crush and expand laterally, so as to put tension on the hoops. Columns with longitudinal reinforcement imbedded in them to reduce their size are apt to be more expensive than plain concrete columns of equal strength, but the occasional criticisms that vertical bars do not add to the strength of the

column are absolutely unfounded by either theory or text. On the contrary, both theory and experiments show that the longitudinal reinforcement properly placed does actually increase the strength of the column.

The principle is very simple. When a load is placed on a column of any material whatever, it is shortened by a small amount, but this shortening within working limits is substantially in proportion to the load placed upon it; that is, within a column of any homogeneous material if the working load is doubled, the amount of shortening is also doubled. Now, if vertical steel bars are imbedded in concrete, they also must shorten with the concrete when the load is applied, and therefore they relieve the concrete of a portion of its load. It is physically impossible to prevent such vertical steel taking a part of the load unless the steel slips or buckles, and since the power of resistance of the steel bars to shortening is greater than that of the concrete, the load necessary to shorten them is proportionately greater than would be required for concrete of the same area. The action of structural steel reinforcement is similar, provided the bond between the steel and the concrete is perfect. This bond is more difficult to obtain with vertical structural steel than with vertical bars, and tests with latticed angle-bar reinforcement have indicated a less effective increase of strength with this structural steel than with vertical bars.

Considering then only columns with bar reinforcement, the question is whether these vertical steel bars do slip or buckle. Evidently they cannot slip if the ends are securely held by the concrete, and this is always the case if they are properly butted or lapped for a sufficient length. As to buckling, tests have proved conclusively that vertical bars, such as are used in columns, when imbedded in concrete will not buckle until the elastic limit of the steel is reached, and beyond this point, of course, no steel or other material is expected to do any service. Many of the tests at the Water-

town Arsenal, for example, were made with vertical bars imbedded in columns 12 inches square and 8 feet long, with absolutely no loops or horizontal steel of any kind placed around these vertical bars to hold them in place; that is, the bars 8 feet in length were placed in the four corners of the columns—in some tests only 2 inches from the surface, and simply held in place by the 2 inches of concrete itself. There was no sign whatever of buckling until the compression was so great that the elastic limit of the steel was passed, when, of course, nothing further could be expected of it.

These tests at the Watertown Arsenal and, so far as the writer has been able to discover by examining all the experiments on record, all other tests of full size columns made in this country further bear out the fact that vertical steel bars imbedded in concrete increase the strength of the column, and it can be further shown that these tests bear out the theory by which the strength of the combination of steel and concrete may be computed and is computed in practice.

The Hassam Paving Company, of Worcester, Mass., have opened a branch office at 515 Quebec Bank Building, Montreal, in charge of Mr. C. M. Edwards. The company is among the large American sidewalk and street pavement contractors, and they have opened a Montreal office to look after their Canadian trade in the Provinces of Ontario and Quebec.

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Alexandria, Ont.

Tenders are being called by this municipality until May 16th for macadamizing, etc. See advertisement in this issue.

Brampton, Ont.

Tenders will be received until May 16th for the following debentures: \$2,600 30-year sewer construction; \$33,849 30-year local improvements; \$15,224 20-year sidewalks and local improvements. These debentures all bear 4 1-2 per cent. interest. J. Blain, town clerk.

Carlyle, Sask.

A by-law will probably be submitted to raise \$20,000 by debentures for the installation of a water supply.

Chilliwack, B.C.

The by-law to raise debenture loan of \$10,000 for the purpose of road improvement was defeated.

Delta, B.C.

Tenders will be received until May 13 for \$135,000 waterworks debentures.

Dauphin, Man.

Tenders are being received until May 16th for purchase of 2-year 5 per cent. debentures to raise \$75,000 for waterworks and sewers. J. W. Johnston, secretary-treasurer.

Fernie, B.C.

The issue of debentures for \$41,000 for extension of sewerage system was not authorized on the 5th inst. Those for the improvements of streets and for surface drainage were ratified.

Fredericton, N.B.

City Engineer Feeney and Ald. Mitchell, chairman of the roads and streets, are going to Somerville, Mass., and other towns, to inspect the methods of making tarvia pavement.

Ingersoll, Ont.

A by-law to expend \$55,000 on the waterworks was carried.

Mariposa, Ont.

A by-law has been passed to issue \$3,850 drainage debentures. Jesse B. Weldon, clerk.

Montreal, Que.

The Private Bills Committee of the Quebec Legislature has authorized the city to borrow \$5000,000 for the establishment of a filtration plant.

Tenders will be received until May 18th for the construction of sewers as follows: Sherbrooke street, 3rd section, from St. Lawrence boulevard to Bleury street; Sherbrooke street, 6th section, from Drummond street to Guy street; Laurier Ward, main sewer, from St. Lawrence boulevard to St. Laurent road and along St. Laurent road to sewage farm. John R. Barlow, city surveyor.

The city waterworks department will install a new six million gallon turbine pump during the present season at a cost of approximately \$30,000.

North Toronto, Ont.

A by-law authorizing the issue of debentures to the amount of \$25,000 will be submitted on June 4, to extend the waterworks system, etc.

Ottawa, Ont.

Tenders addressed to the Chairman of the Board of Control will be received until May 12th for asphalt pavement on Bank and O'Connor streets. Specifications, etc., at office of City Engineer Ker.

Tenders addressed to the chairman, Waterworks Committee, will be received until May 31 for supply and delivery of ten 42 inch cast iron flexible joints. Plans, etc., at office of City Engineer Ker.

Orillia, Ont.

Tenders are being called by this municipality until May 16th for sewage sedimentation tanks. See advertisement in this issue.

Outremont, Que.

Tenders addressed to J. Kruse, secretary-treasurer, will be received until May 18th for the construction of 3 x 4 1-2 foot trunk sewer on Pacific avenue, Durocher street, Van Horne avenue, to Outremont avenue, about 3,200 feet; 3 x 2 foot sewers on de l'Epee street, from Laurier avenue to St. Viateur street, about 1,800 feet; 3 x 2 foot sewer on Maplewood avenue, about 800 feet. Plans and specifications may be seen at the town hall.

Prince Albert, Sask.

Tenders are being called by this municipality for sewer extensions. See advertisement in this issue.

Tenders were received for construction of \$10,500 lineal feet of concrete sidewalk as follows: J. Craig, Prince Albert, 18c.; Western Pavers, Limited, Winnipeg, 18 1-2 cents; City Engineer, 17 cents. The pavement will be constructed by day labor.

Prescott, Ont.

Tenders are being called until May 21st for construction of sewers, etc. See advertisement in this issue.

Peterborough, Ont.

The Peterborough Hardware Company will supply cement at \$1.65.

A by-law will be submitted to raise \$30,000 for sewage and drainage purposes. T. A. S. Hay, city engineer.

Port Arthur, Ont.

Those who tendered on the paving were the National Paving & Contracting Company of Winnipeg, the Warren Bituminous Paving Company of Toronto, and Messrs. Stewart & Hewitson, of Port Arthur. The National Paving Company quoted prices on sheet asphalt, while Messrs. Stewart & Hewitson quoted prices on sheet asphalt and block asphalt. The Warren Bituminous Paving Company figured for concrete block paving.

St. John, N.B.

Comptroller A. P. Macintyre is calling for tenders until the 25th inst. for street

pavements. (See advertisement in this issue).

Engineer Murdoch has been instructed to call for tenders for water mains. Estimated cost, \$38,000.

St. Catharines, Ont.

Tenders addressed to Chairman of the Committee of Works will be received until May 12th for the construction of sewers. D. Benzie, city engineer.

Stratford, Ont.

City Engineer Ferguson estimated the cost of the proposed pavements at \$122,379.71.

The city council is considering a paving scheme involving \$122,379. Details follow: Birmingham, Gore to St. Andrew, Taralithic, \$13,233.05; St. Patrick, Erie to Birmingham, Taralithic, \$2,545.97; Cambria, Erie to Front, via Gore, Westrumite, \$22,477.76; Wellington, St. Patrick to Cambria, brick, \$10,693.40; Waterloo, Ontario to Mornington, brick, \$12,112.17; Albert, Waterloo to Front, Westrumite, \$9,447.58; Albert, Front to King, Westrumite, \$10,935.78; Brunswick, Waterloo to Front, Westrumite, \$8,972.52; Water, Nile to Queen, Westrumite, \$9,114.05; Nile, Ontario to Water, brick, \$3,229.64; Front, Ballantyne to Shakespeare, brick, \$19,617.79. Total, \$122,379.71.

Toronto, Ont.

The Board of Control are calling for tenders until May 17th for asphalt, bitulithic, vitrified block, asphalt block concrete pavements; concrete curbs and walks and sewers. G. R. Geary, chairman.

Virdee, Man.

Tenders are being called by this municipality for construction of cement sidewalk, also supply of cement. See advertisement in this issue.

Vancouver, B.C.

City Engineer Clements' plans for extensions for section south of False Creek have been approved by the Board of Works.

Winnipeg, Man.

Tenders are being called by the Board of Control until May 19th for construction of asphalt pavements on the following streets: Market avenue, Lombard avenue, McDermot avenue, Gunnell street, Tecumseh street, Henry avenue, full width on Rietta street, Louise street, Harvard avenue, Dromore avenue, Ethel avenue, Yale avenue, Academy road, Walnut street, Lavinia avenue, Ellice avenue, McGee street, Purcell street, Charles street, Grove street, Derby street, Salter street, Boyd avenue, Inkster avenue, Aberdeen avenue.

AWARDED.

Annapolis Royal, N.S.

J. Ayer & Co., of Bridgetown, has been given the contract for the construction of a wood stove pipe flume, 49 inches in diameter and 600 feet long, at \$2,200. The Pedlar People offered to install a 14 1/2 galvanized iron 48 inch flume for \$3,000.

Chatham, -Ont.

E. M. Graves, of Cleveland, Ohio, was given a contract by Chatham Township for

the construction of large outlet drainage work. The tenders were as follows: E. M. Graves, Cleveland, Ohio, \$25,457; Gilmour Bros., Toledo, Ohio, \$28,989; Chatham Dredging Company, Chatham, \$30,200; Windsor Dredging Company, Windsor, \$31,350; Connelly & McDonnell, Stratford, 25 cents a cubic yard.

Moose Jaw, Sask.

W. F. Heal, city clerk, sends us the following information regarding the awarding of contracts on May 2nd for trenching and laying 7,100 feet of sewer pipe. P. Kilkenny, of Moose Jaw, was awarded the contract at \$9,822. H. G. McVean, also of this city, tendered at \$11,398. This was erroneously reported in issue of April 27th.

It is stated that the council have accepted the tender of Kettle River Company for 3-inch creosote wood blocks, 16 pound, at \$106,064.

North Battleford, Sask.

The contract for the cast iron pipes for the waterworks extension was awarded the Canada Iron Corporation, Limited, the contract for the hydrants and valves to the Canada Foundry Company, Limited, and Wm. Newman & Company, of Winnipeg, secured the contract for the trenching, pipe laying and filling for the waterworks and sewerage extensions. The amount to be expended on this work, together with the McManus contract, which was completed last year, will amount to \$50,000.

Ottawa, Ont.

N. Lett, secretary, Board of Control, sends us the following list of tenders for asphalt pavement on Wellington street, from Queen to Broad streets: Barber Asphalt Paving Company, \$22,190 (accepted); Union Construction Company, Ottawa, \$23,197; Ottawa Construction Company, Ottawa, \$24,000; City Engineer, \$24,804.

Saskatoon, Sask.

The following tenders were received for concrete sidewalks: The Western Pavers, Limited, Winnipeg, \$56,395 (accepted); Forest City Paving Company, Regina, \$56,512; Saskatoon Concrete Company, Saskatoon, \$69,360; Batchelor, Marshall & Skarin, Calgary, \$76,332.50.

Selkirk, Man.

The contract for concrete walks, amounting to eight thousand dollars, was awarded to the Western Pavers, Limited, of Winnipeg.

Sault Ste. Marie, Ont.

C. J. Pim, town clerk, sends us the following list of tenders for cement walks: D. Jamison, Sault Ste. Marie, for the whole, \$26,240.87; for Section A, \$18,870.89; for Section B, \$14,369.98. W. H. Harvey, Deseronto, for the whole, \$25,843; for Section A, \$10,790; for Section B, \$13,063. Maple Leaf Artificial Paving Company, Simcoe Ont., for the whole, \$21,445; for Section A, \$10,500; for Section B, \$14,500. McPhail & Wright, Sault Ste. Marie, for the whole, \$24,000; for Section A, \$11,473.56; for Section B, \$13,723.33. Town Engineer, for the whole, \$25,170; Section A, \$11,430; Section B, \$13,740. Contract was given to the Maple Leaf Artificial Stone Paving Company at \$21,445. This company had contract last year and gave good walks.

Railroads, Bridges and Wharves

Arichat, N.S.

Tenders addressed to N. Tessier, secretary, Department of Public Works, Ottawa, will be received until June 2nd for the construction of wharf and warehouse here.

Plans, etc., at above department, and at the offices of C. E. W. Dodwell, district engineer, Halifax; E. G. Millidge, district engineer, Antigonish, N.S., and on application to local postmaster.

Colchester, Ont.

Tenders addressed to N. Tessier, secretary, Department of Public Works, Ottawa, will be received until June 3rd for the construction of an extension to the pier here. Plans, etc., at above department and at the offices of H. J. Lamb, district engineer, London; J. G. Sing, Toronto, and on application to local postmaster.

Florenceville, N.B.

Tenders are being called by the Department of Public Works until June 13th for constructing superstructure for bridge. Plans at above Department. John Morrissey, Chief Commissioner, Fredericton, N.B.

Foxwarren, Man.

A by-law authorizing the council to borrow \$5,000 to build a bridge over the Assiniboine river at Lazare was carried on the 3rd inst.

London, Ont.

Arthur E. Hourd, business agent for the C. P. R., has closed a deal for over \$100,000 worth of land in the east end near Quebec street, which will be used for shops, roundhouse, station, office buildings, etc. The company are also arranging for a downtown station. Besides these schemes there is a rumor that the C. P. R. will acquire the London & Port Stanley Railway.

Montreal, Que.

Thos. J. Drummond, president of the Lake Superior Corporation, is authority for the statement that the Algoma Railway will probably be extended 150 miles to connect with the C. P. R. Probable cost, about \$4,000,000.

Ottawa, Ont.

The C. P. R. has filed plans involving an outlay of about \$1,000,000 for an underground line through the city connecting the Central Station near the foot of the Rideau Canal with the company's union station in the northwestern part of the city.

Port Hope, Ont.

It is announced that the C. N. R. will run into Port Hope the station being on Ontario street.

Quesnel, B.C.

Hon. Thos. Taylor is reported as having stated that the erection of steel bridge over the Fraser river will be proceeded with immediately.

Sherbrooke, Que.

The double tracking the Grand Trunk eastward will be continued from St. Rosalie to Richmond and this city. Engineers are now at work gathering data as to the bridge and other mechanical work necessary.

Vancouver, B.C.

Two survey parties, under Mr. J. Early, will start locating a portion of the proposed line of the British Columbia & Alaska Railway Company, which was incorporated at the last session of the Provincial Legislature. R. Smith and H. B. Robertson, Vancouver, who are interested, are representing New York capitalists.

Winnipeg, Man.

R. J. McKenzie is authority for the following outline of proposed work for the C. N. R.: Oak Point branch to be extended 70 miles (Cowan Construction have contracted); Greenway and Wakopa branch extended to Deloraine, contract awarded; Goose Isle branch, 25 miles; Ochre river

line, some 70 miles up west short of Lake Manitoba.

AWARDED.

Montreal, Que.

The Atlantic, Quebec & Western Railway have given to the Dominion Bridge Company a contract for all the steel superstructures on the line.

Vancouver, B.C.

R. G. Hutchinson has been awarded the contract for the construction of traffic bridge across the east branch of the Squamish river above Newport.

Woodstock, Ont.

F. J. Ure, county engineer, sends us the following list of tenders for bridges and arch, Plattville: The Hunter Bridge & Boiler Company, Kincardine, \$3,200, for steel and concrete floor abutments \$776 (accepted). Other tenders: A. Hill & Company, Mitchell, \$2,785, without floor, bridge not up to specification; Petrolia Bridge Company, \$3,850, without floor; B. McManus & Company, Hamilton, \$3,393; Hamilton Bridge Company, \$3,300, without floor. Concrete arch: M. M. Hiles, Atwood, \$898 (accepted). Other tenders: T. J. & W. Bezley, \$1,539; Andrew Bain, Embro, \$1,052; Pipe & Campbell, Ayr, \$1,097.

Winnipeg, Man.

It is reported that the contract for the construction of the steel portion of the Pembina street subway has been awarded to the Dominion Bridge Company at \$32,000.

N. Boyd has been awarded the contract for extension of Greenway and Wakopa branch for the C. N. R.

Public Buildings, Churches, Schools, etc.

Aylesford, N.S.

F. M. McMahon, who received tenders until April 30th for erection of Methodist Church here, writes that plans will likely have to be modified owing to tenders received being too high.

Brandon, Man.

There is every likelihood that a new opera house will be erected here this summer. Local capitalists are interested.

Calgary, Alta.

It has been decided to submit a by-law for \$100,000 to be used in the building of the Calgary university.

Chatham, N.B.

Construction work on the new hospital building is being carried out by day labor. Tenders may possibly be called at a later date for several trades. Wm. E. Doran, architect, Montreal.

Cranbrook, B.C.

A by-law will be submitted to authorize the sale of joint government and municipal buildings, and the proceeds thereof to be devoted to purchasing a site and erecting new municipal buildings.

Eastview, Ont.

The by-law to issue debentures for \$12,000 for new school has passed its third reading.

Brechin, B.C.

Tenders for school house here will be received until May 19th by the Minister of Public Works, Victoria, for the erection of a school house here. F. C. Gamble, public works engineer.

Fernie, B.C.

The expenditure of \$7,000 on schools was ratified by the ratepayers.

The congregation of Christ Church, Ang-

lean, are contemplating erecting a church shortly.

Headingley, Man.

Tenders addressed to C. W. Johnstone, secretary-treasurer, will be received until May 21st for the erection of school here.

Humboldt, Sask.

The town is having plans prepared for a town hall.

Moose Jaw, Sask.

The city council of Moose Jaw has decided to grant \$25,000 towards a farmers' market building in the city.

Tenders addressed to the hospital board will be received until May 12th for all work in connection with the erection of a Nurses' Home here. Elliott & Gorman, architects.

Messrs. Barney Groves, of Regina, and H. Humber, of this city, have submitted a plan for the erection of a theatre. Probable cost about \$35,000.

Mimico, Ont.

Tenders are called until May 14th for erection of brick school. E. J. Lennox, architect. See advertisement in this issue.

Midland, Ont.

Competitive working sketches are being called until May 28th for 4-roomed brick public school. See advertisement in this issue.

Montreal, Que.

A building site has been purchased on St. Catherine street, near Snowdon Junction, on which a home and school for the Hebrew orphan children will be erected. Estimated cost, \$50,000. Those interested, Messrs. Mortimer B. Davis, Mark Workman, M. Vineberg and A. Pierce.

Mr. Jos. Denis is the lowest tenderer at \$45,400 for the construction of the new Baril School of the Hochelaga School Commissioners.

The Syrians of Montreal are contemplating the erection of a Greek Orthodox Church, "The St. Nicholas," and are asking the Quebec Legislature for incorporation.

The National A. A. A. are considering the purchase of grounds at present under lease and erecting thereon a suitable club house. Mr. A. Lecours, president; H. Lebeau, secretary.

North Toronto, Ont.

A by-law to issue \$17,000 school debentures will be submitted to the ratepayers shortly.

Niagara Falls South, Ont.

Tenders will be received until May 21st for the purchase of \$12,000 public school debentures at 5 per cent. J. E. Jones, township clerk, Box 201.

Orillia, Ont.

The Presbyterian Church have sanctioned the expenditure of \$35,000, part of which will be used on the erection of a new Sunday School building.

Outremont, Que.

Messrs. Gauthier & Daoust are preparing plans for a very extensive college building to be erected here for the Jesuit Order. It is not definitely decided whether this work will be proceeded with this year.

Ottawa, Ont.

The Board of Control has recommended the purchase of a site on Cumberland street for the fire hall.

Tenders closed on May 11th for the several trades required in the erection of church for Bell Street Methodist Church. Plans, etc., at office of J. P. MacLaren, architect, 104 Sparks street.

St. Hyacinthe, Que.

Tenders will shortly be asked for the construction of a three storey brick extension, 100 feet by 50 feet, for the Patronage St. Vincent de Paul. J. O. Turgeon, architect, 55 St. Francois Xavier street, Montreal.

Simcoe, Ont.

A joint meeting of the town council and public library board was held last week to discuss the site for the proposed new library building.

Toronto, Ont.

Tenders are being called until May 13th for several trades required in the erection of Oakwood High School; alterations to Joseph Workman School and to St. Clair Avenue School. See advertisement in this issue.

A new school is being urged by the Spadina Heights Ratepayers' Association. Mr. Bradshaw, secretary.

Permit has been issued to Yonge Street Methodist Church, \$45,000.

Victoria, B.C.

Plans are being prepared for the new theatre. Estimated cost, \$85,000. Manager, G. A. Calvert.

The Government are looking for sites for a border line isolation hospital to be erected in the vicinity of Phoenix. Another such hospital will probably be located at or near Kamloops.

Vancouver, B.C.

The Exhibition Association have decided to erect a new Machinery Hall. Estimated expenditure, about \$20,000. Mr. Roy, secretary.

Permits were issued to the Central Mission for a six storey block, \$75,000; also to the Salvation Army for servants' home, \$7,000.

Winnipeg, Man.

The Assiniboine Lawn Bowling Club will erect a club house at an estimated cost of \$3,000. Directors, J. T. Haig, Dr. H. S. Anderson and others.

Competitive plans are invited by the building committee of the St. Charles Country Club for the new club building. E. H. Macklin, secretary. W. Percy Over, 47 Canada Life Building, secretary Manitoba Association of Architects.

The following are some of the members on the building committee for Westminster Church; Charles Hyslop, William Brydon, J. H. G. Russell, architect, has submitted plans.

AWARDED.

Brandon, Man.

The contract for the erection of the new Knox Presbyterian Church has been awarded to John Forbes, this place.

Bedford, Que.

Tenders for the erection of a Roman Catholic Church have been awarded as follows: Masonry, Elkins & Norris; wood work and other trades, Verrett & Desautels, of Sherbrooke, Que. Estimated cost of same, \$30,000. J. O. Turgeon, architect, 55 St. Francis Xavier street, Montreal.

Beaverton, Ont.

Messrs. R. Almond, of Toronto, were awarded the contract for the erection of new Town Hall here, \$13,175. Building is to be completed by January 1st, 1911.

Edmonton, Alta.

J. A. Lockerby has the plumbing, heating and ventilation contract for the new Seventeenth Street School, \$16,000.

Davidson, Sask.

K. J. Roseborough, this place, was awarded the contract for the erection of

solid brick town hall, \$13,700. Other tenderers, E. S. Estlin, Winnipeg, 14,757.55; V. Desautel, Davidson, \$15,250; G. N. Hughes, Saskatoon, \$14,289; E. J. Rud & Company, Saskatoon, \$18,459.95.

Flesherton, Ont.

Mr. David Stevid, of Chesley, has been awarded the contract for the new high school building here. Total cost, including heating plant, is estimated at about \$13,000.

Kildonan, Man.

The ratepayers of East Kildonan authorized the erection of new school buildings. Estimated cost, \$11,000. Peter McCalman has the contract. Two more wings will be built next year.

Montreal, Que.

Further contracts have been awarded in connection with the erection of the additional wing to McGill University as follows: Plumbing, heating and ventilating, James Ballantyne; carpentry work, Geo. Roberts. Messrs. Brown & Vallance, architects.

Contracts have been awarded as follows for the erection of the Kensington School at Notre Dame de Grace for the Protestant School Commissioners: Excavation, brick work and masonry, Robert Bros., Westmount; carpentry work, Laird, Paton & Son, Limited; painting and glazing, J. A. Alexander; roofing, Metal Shingle & Siding Company, Limited; lathing and plastering, Gray & Wighton; plumbing, hot water heating and ventilating, Geo. E. Woodward & Company.

The contract for the construction of the public bath in St. Henry Ward has been awarded to Mr. Langevin, general contractor. Alphonse Piche, architect.

Orillia, Ont.

The contract for the new Roman Catholic Church has been let to Mr. John Bogue, of Peterboro, at \$50,500. The building will be built of Longford stone.

Ottawa, Ont.

N. H. H. Lett, secretary Board of Control, sends us the list of tenders for city hall alterations, which supplements that of last issue:—Masonry, T. C. James, Ottawa, \$7,350. Carpentry, Alex. Christie, Ottawa, \$9,604; T. A. Shore, Ottawa, \$11,500. Plastering, John J. Green, Ottawa, \$4,400; J. Sutherland & Son, Ottawa, \$5,143; Jas. McLaughlin, Ottawa, \$5,996. Heating, Currie & Livock, Ottawa, \$5,920. Electric wiring, P. E. Marchand & Company, Ottawa, \$1,090; McCallum & Company, Ottawa, \$1,507.85. Galvanized iron, McFarlane & Douglas, Ottawa, \$1,087; McKinley & Northwood, Ottawa, \$650. Ornamental iron, Dennis Wire & Iron Company, London, \$5,777.27 (accepted); Modern Machine Company, Ottawa, \$7,850; Canada Foundry Company, Ottawa, \$7,400. Vault Door, J. & J. Taylor Safe Works, Toronto, \$280. Vault doors and elevator not yet decided.

The Board recommended the awarding of the following tenders: Hopewell Avenue School—Masonry, brickwork and concrete, A. Garvoek, \$25,000; carpentering, J. and C. Low, \$8,548; plastering, A. Bowman & Sons, \$1,150; painting and glazing, W. J. Carson, \$1,570; roofing, John Tweedie, \$245; electrical work, Marchand & Donnelly, \$1,189; heating, Currie & Livock, steel boiler, Webster system, \$4,175; plumbing, J. R. McLennan, Mott's closet, \$3,458; ventilation, Sheldons, Limited, Multivane Fan, \$1,100; galvanized iron work, Modern Machine Company, \$900; closet partitions, Joseph R. Smith, \$282; terrano flooring, Terrano Flooring Company of Canada, Limited, \$931.75; total, \$48,548.75. Breeze Hill Avenue School—

Masonry, brickwork and concrete, A. Garvock, \$25,500; carpentering, J. and C. Low, \$8,373; plastering, A. Bowman & Son, \$1,075; painting and glazing, W. J. Carson, \$1,445; roofing, John Tweedie, \$240; electrical work, Marchand & Donnelly, \$1,163; heating, Currie & Livock, steel boiler, Johnston system, \$4,415; plumbing, J. R. McLennan, Mott's closet, \$3,423; ventilation, Canadian Buffalo Forge Company, standard fan, 5 h.p., \$992; galvanized iron work, Modern Machine Company, \$700; closet partitions, Joseph R. Smith, \$282; Terrano flooring, Terrano flooring Company, of Canada, Limited, \$915; total, \$48,523.

St. Timothee, Que.

The contract for the furniture, Roman Catholic Church, has been awarded to Paul Demers. J. O. Turgeon, architect, 55 St. Francis Xavier street, Montreal.

Toronto, Ont.

The Sanitary Floor Company of Toronto have been awarded the contract for laying their marble flooring and wainscoting in the new picture theatre, 324 Yonge street.

Mr. W. W. Peay, 130 Lisgar street, has been given the contract by the Board of Control to tear down and remove exhibition buildings, including Webb dining hall, the women's building, and the poultry building at \$705.

The contract for the construction of a new poultry building on the Exhibition grounds has been awarded to C. Hitch & Company, 100 Queen street west, at \$36,027.

Vancouver, B.C.

Contracts for the new school offices were awarded as follows: General contract, Ferro Construction Company, \$36,640; heating, S. A. Wye, \$1,830; painting, W. Wood, \$685; total, with excavation (\$807.50), \$39,992.50.

Residences

Brantford, Ont.

A building permit has been issued to Mr. W. A. Clark for a brick dwelling, cost \$2200; Mr. H. Hall, for a brick dwelling, \$2,000.

Brandon, Man.

Building permits have been granted to Flavell and Hills for the erection of four frame residences on Sixteenth street, \$10,800; Cecil M. Twiss was also granted a permit for the erection of a brick veneer residence, \$4,000.

Edmonton, Alta.

J. C. Calhoun has a permit for residence, \$7,000.

Hamilton, Ont.

Permits have been issued to W. T. Pringle, two frame dwellings, Lottridge street and Case street, for S. Chappel, \$2,000; Murray & Connor, brick dwelling, Holton avenue, for T. A. Hunt, to cost \$2,400; I. G. Thomson, brick dwelling, Ravenscliffe avenue, to cost \$5,000; E. R. Paterson, brick dwelling, Hess street, for T. Ramsay, to cost \$2,500.

Montreal, Que.

Plans have been prepared for a residence in Terrebonne, Que., for A. D. Pilton, and tenders will shortly be received for same. J. O. Turgeon, architect, 55 St. Francis Xavier street, Montreal.

Mr. Eugene Payette, is preparing plans for the alterations to a house on Colonial avenue.

Tenders will be received until May 14th for the construction of a residence on Westmount boulevard for Mr. J. A. Camier-

on. Messrs. Saxe & Archibald, architects.

Tenders for the construction of Mr. J. M. Wilson's residence have been received but no awards have as yet been made. Messrs. Saxe & Archibald, architects.

Tenders for the erection of a residence on McGregor street for Mr. H. P. Walker will be received until May 13th. J. B. Resther & Sons, architects.

Plans have been prepared for additions to the Prince Apartment House and for the construction of the Magic Apartment House, corner Guy and St. Luke streets, for Mr. J. S. Prince, who is superintending the construction. Mr. Wm. E. Doran, architect.

New Westminster, B.C.

Plans have been adopted for the new parsonage for the congregation of Queen's Avenue Methodist Church. Estimated cost, \$6,000.

Ottawa, Ont.

Mayor Hopewell has taken out a building permit for a garage to be located on Queen street. It will be of concrete, fire-proof construction, and will cost \$12,000.

Outremont, Que.

Mr. J. O. Turgeon, architect, 55 St. Francois Xavier street, Montreal, is preparing plans for two semi-detached residences to be erected for Mr. L. P. Deslonchamps.

Sydney, N.S.

Contractor F. L. Dixon has begun the construction of a dwelling for F. B. Townsend. Cost, \$2,500.

Permits have been issued recently as follows: T. Chappell Bros. & Company, Limited, for George McLeod, to cost \$3,000; R. C. Bulley, for the erection of a dwelling on George street, \$2,200.

Winnipeg, Man.

Tenders addressed to E. D. Tuttle, architect, will be received until May 13th for residence on Wolesley avenue.

A permit has been issued for apartment house, 140 feet frontage, 124 depth, \$400,000. Architects, Holman & Prain.

AWARDED.

Brantford, Ont.

J. Bartle has the contract for the erection of residence for Mr. H. Cockshutt.

Montreal, Que.

Tenders have been awarded as follows for the erection of a residence on Sherbrooke street for Mr. Prefontaine: Excavation and masonry, O. Lemay; brick work S. Rochon; wood work, A. Mercure; plumbing, P. Latourelle. Messrs. J. B. Resther & Sons, architects.

Nanaimo, B.C.

C. R. Hardy, of Parksville, has the contract for the erection of houses required for the Salvation Army settlers in French Creek near here.

Outremont, Que.

Mr. J. O. Turgeon, architect, 55 St. Francois Xavier street, Montreal, has awarded the following contracts in connection with the erection of six cottages for Mr. Alex. Saurette. Masonry and brick work, O. Archambault. Tenders for other trades will be called later.

Business Buildings and Industrial Plants

Arnprior, Ont.

The creamery was damaged to the extent of about \$2,500. Owner, Mr. A. Russell.

Brandon, Man.

Tenders close on the 11th inst. for con-

struction of freight shed here for the C. P. R. F. Lee, division engineer.

Brandon, Man.

The C. N. R. it is stated, intend to erect a store house at an estimated cost of \$20,000.

Bella Coola, B.C.

It is stated that another saw mill will be erected here.

Brantford, Ont.

Tenders will be called at once for the erection of factory for the Crown Electrical Manufacturing Company. Mr. Mosely, secretary-treasurer.

Calgary, Alta.

A project is under way to float a company to undertake the erection of a first-class hotel to cost about \$1,000,000.

T. Revillion, of Edmonton, has purchased the corner of First street west and Seventh avenue, where he will build a seven storey office building. Revillion Freres, of Edmonton, Paris and London, also bought 100 feet on Eighth avenue west for a large departmental store.

Campbellford, Ont.

The building owned by W. Hubble was destroyed by fire on the 3rd inst. Total estimated loss, \$2,500.

Canora, Sask.

Tenders addressed to J. H. Bossons, architect, will be received until May 16th for the erection of a solid brick hotel for N. Cohen. Plans, etc., at office of the architect, Dauphin Man.

Edmonton, Alta.

J. H. Rudy has prepared plans for a warehouse for O'Farrell & Kelly.

Halifax, N.S.

James Hillis & Sons' foundry was damaged to the extent of about \$20,000 on the 3rd inst.

Elmira, Ont.

Work on the new factory for the Dominion Felts, Limited, will, it is stated, begin at once.

Gananoque, Ont.

D. F. Jones manufacturing Company are planning to make additions to their plant.

Hamilton, Ont.

A building permit has been issued to W. H. Coope for brick additions to International Harvester Company, \$14,000; also to Wm. Cross, two 2 storey store buildings, King street, \$3,500.

Kinnear's Mill, Que.

Frizzell Brothers' store and buildings owned by R. Garry were destroyed by fire on the 3rd inst. Loss, \$10,000.

London, Ont.

The Bolt Works plant will, it is stated, be enlarged under the new management of T. S. Hobbs.

Montreal, Que.

It is stated that plans have been completed for the erection of the new C. P. R. station at Mile End, for which a large amount has been voted by the executive.

It is stated that the Workman property on St. Catherine street, between St. Alexander and Bleury street, has been leased to a syndicate of Montrealers, who will erect a modern restaurant building and bachelor apartments. Mr. F. Truassch, of the Lipton Cafe, St. James street, is interested.

A new milling company has been organized with capital of \$2,000,000. The company intend to erect a flour mill with a daily capacity of 2,500 barrels, to cost \$300,000 on the Lachine Canal bank near

Atwater avenue. Mr. G. A. Grier and Lieut-Col. Labelle are the interested parties.

The Maloney Mono-rail System Company has been organized with a capital of \$200,000, and it is stated that shops will be erected at Montreal, Levis, Toronto, Ottawa and Medicine Hat.

Tenders have been received and tenders will shortly be awarded for the construction of buildings at King Edward Park, Isle Gros Bois. Theo. Daoust, architect, 90 St. James street.

Messrs. T. Pringle & Son, Limited, are preparing new plans and specifications for the Holland Varnish Company's proposed plant.

No awards have been made in connection with construction of the Wabasso Cotton Company's new plant, the proprietors having not definitely decided to proceed with the work. Messrs. T. Pringle & Son, Limited, architects.

Mr. Alphonse Content, architect, is preparing plans for an extensive hotel building to be erected on St. James street to replace a large existing structure. No definite announcement could be made at present, but we understand this is to be a large and modern hotel building.

Tenders will be received until Monday, May 16th, for the construction of four modern store buildings, St. Andre and St. Catherine streets, for Mr. C. Ruddy. Mr. W. E. Doran, architect.

Invited tenders are being received for the construction of two stores on Rachel street for Mr. L. N. Dupuis. J. B. Resther & Sons, architects.

Messrs. Lande Bros., 234 St. Lawrence boulevard, have purchased property with frontage of 62 feet on St. Lawrence and 62 feet on St. Dominique with depth of 151 feet. It is reported that they will erect a 5 storey warehouse and office.

Invited tenders are being received for the carpentry work, plumbing, painting and plastering for the erection of a business block containing two stores and two dwellings, Amherst and Beaubien street, for J. L. Legault. Messrs. J. B. Resther & Sons, architects.

Tenders for the construction of the Yorkshire Insurance Building have been received but no contracts have been awarded to date. Messrs. Saxe & Archibald, architects.

Morrisburg, Ont.

The Morrisburg Tack Manufacturing Company after the erection of the tack factory will erect one for the manufacture of nails.

Norwood, Ont.

The following are some of the losers in the fire here: E. J. King, proprietor King's Hotel; B. W. Leverett, W. A. Richardson, J. E. Thompson, K. G. Thomson. Estimated total loss, \$100,000.

Ottawa, Ont.

W. E. Noffke, architect, is preparing plans for an 8 storey office building on Sparks street, to be erected for James Hope & Sons. It is stated that the building will be started this summer.

Port Hope, Ont.

The block owned by R. Deyell was destroyed by fire on the 3rd inst. Total estimated loss, \$23,000.

Prince Rupert, B.C.

Sol. Cameron is to build a five storey hotel of steel and concrete. A refrigerating plant is to be established at Seal Cove, Prince Rupert.

Port Moody, B.C.

The Emerson Lumber Company have sold their property, the terms of sale giving use of property for three years. It is reported that they intend erecting on another site a large mill.

Peterborough, Ont.

W. H. Denham has a permit for the new elevator to be erected for the Quaker Oats Company \$90,000.

Rossland, B.C.

The saw mill, planing mill, etc., owned by J. S. Deschamps, were destroyed by fire on the 28th ult. Estimated total loss, \$35,000.

Strathroy, Ont.

The 3 storey Dominion block was destroyed by fire on the 5th inst. T. Statham & Son are the heaviest losers.

Summerland, B.C.

The blacksmith and woodwork shops of Messrs. Shields & Hatfield here were destroyed by fire recently. Loss, upward of \$4,000.

Toronto, Ont.

Mr. David Elliott, of the Elliott Manufacturing Company, will establish a paper mill in Ashbridge's marsh.

Vancouver, B.C.

The plans of the A. B. C. Elevator & Wharf Company, it is stated, include the erection of large grain elevators at New Westminster, Prince Rupert and this city, and also cold storage plant and wharves here or in New Westminster.

Victoria B.C.

Building permits have been issued to Messrs. Lee Ohong & Company for a brick building on Broad street for offices, to cost \$4,000.

It is stated that Mr. Alvo Von Alvensleber, German Consul, will erect at Sooke a large hotel on the Jackson-Bostock property.

Windsor, Ont.

The ratepayers approved of the expenditure of \$20,000 in inducing industries to locate here.

Winnipeg, Man.

E. L. Drewry is preparing for the erection of a large 60 x 150 modern stable in connection with the Redwood manufacturing plant. Cost, about \$30,000. H. Matthews, architect.

Mr. Barber is the Canadian manager for the B. F. Nelson Company, Minneapolis, which is considering the establishment of a branch warehouse here.

Blackwood Brothers' brewery and warehouse, on Colony street, was almost completely destroyed by fire on the 2nd inst. Estimated total loss, \$100,000.

J. J. Vopni, contractor, has the contract for the erection of 3 story stone building, corner of William avenue and Nena street, for the Logberg Icelandic Newspaper Company.

W. W. Blair is the architect for the 7 storey factory to be erected for the Great West Saddlery Company. Noted previously.

Tenders addressed to Jordan & Over, architects, Canada Life Building, will be received until May 14th for all trades required in the erection of a brick building for the Union Bank of Canada.

AWARDED.

Edmonton, Alta.

Contracts for the Dominion Bank and the National Trust blocks were awarded last week to Claydon Bros., of Winnipeg.

Fort William, Ont.

M. H. Braden, of this city, has been awarded the contract for the new C. P. R. shops here.

Montreal, Que.

The contract for the steel work, Rossburg Building, extending from St. Lawrence to St. Charles Borromeo street, has been awarded to the Dominion Bridge Company, Limited. Mr. Eugene Payette, architect.

The Structural Steel Company, Limited, have been awarded contracts for structural steel work and erection, Alexander street school, for the Protestant School Commissioners, and also for the new warehouses of the Anglo-Canadian Leather Company.

The contract for excavation in connection with the additions to the Place Viger station has been awarded to John Stewart & Company, general contractors. W. S. Painter, C. P. R. architect.

The general contract for alterations to the building of Messrs. Dymont & Duffield adjoining the Orpheum Theatre on St. Catherine street has been awarded to Mr. C. E. Deakin. Messrs. Finley & Spence, architects.

Mr. C. E. Deakin has been awarded the general contract for alterations to the property at 403 St. Catherine street west for Messrs. Dunlap, Cooke & Company, furriers. Messrs. Munroe & Lead, architects, Hamilton, Ont.

The general contract for the erection of a three storey fireproof store building, northeast corner of St. Catherine and Visitation streets, for Mr. N. Ethier, has been awarded to Carriere Freres, general contractors. L. R. Montbriant, architect.

Moose Jaw, Sask.

The contract for the large extensions to the C. P. R. freight sheds at this point has been awarded to the Carter, Halls, Aldinger Company.

Sydney, N.S.

The Dominion Iron & Steel Company, Limited, recently placed the contract for a new mill with the Morgan Construction Company, of Worcester, Mass.

Vancouver, B.C.

Mr. Jonathan Rogers will erect the addition to the Royal Bank, southeast corner Hastings street and Westminster avenue.

Power Plants, Electricity and Telephones

Ingersoll, Ont.

A by-law was carried to buy the electric light plant for \$39,800.

Merritt, B.C.

At a meeting of the Merritt Electric Light & Water Company it was decided to install a modern electric lighting system costing over \$15,000.

New Westminster, B.C.

B. C. E. R. Company is planning the construction of another new line. The new road will, it is understood, be built from a point on the Chilliwack division some twenty-five or thirty miles from this city.

Neepawa, Man.

On May 18th a by-law will be submitted to ratify agreement between the government for the transfer and sale of the telephone plant to the government.

Port Arthur, Ont.

Tenders addressed to Hon. Adam Beck, chairman, Hydro Electric Power Commission, will be received until May 25th for construction of transformer station building.

(Continued on page 30)

Tenders and For Sale Department

Tenders for Concrete Bridge and Floor

Tenders will be received up to the hour of letting at 2 p.m. on TUESDAY, MAY 19TH NEXT, for (1) 35 Feet Concrete Arch, near New Dundee; (2) Concrete Floor on Bridge, near Ayr, according to plans prepared by Bowman and Connor, civil engineers. For further information apply to F. Vickert, Esq., Princeton, or to

HERBERT J. BOWMAN, C.E.,
County Clerk, Berlin.

19

City of Vancouver

Tenders for Garbage Destructor Plant

Tenders will be received by the undersigned up to 3.00 p.m., TUESDAY, THE 31ST OF MAY, 1910, for the installation of a Garbage Destructor Plant at the Bridge street yard, on the south side of False Creek in the City of Vancouver, British Columbia. The plant must be capable of destroying not less than seventy tons of mixed garbage per day of twenty-four hours.

Tenderers will be required to submit plans and specifications with their proposals and furnish a satisfactory bond and guarantee that the destructor will fulfill all the provisions of the specifications.

The tendered price is to include the erection of the stack and all necessary buildings.

A deposit of an amount equal to 5 per cent. of the contract price must be made with each tender by marked cheque payable to the City Treasurer.

The lowest or any tenders not necessarily accepted.

W. McQUEEN,
City Clerk.

19

City of Winnipeg

Tenders for Construction of Brown and Brant Street Over- head Bridge

Sealed tenders, addressed to the Chairman, Board of Control, Winnipeg, and marked on the envelope, "Tenders for Brown and Brant Street Bridge," will be received at the office of the undersigned up to 11 o'clock a.m., on TUESDAY, JUNE 28TH, 1910, for the following works:—

(a) Construction of Concrete Piers, to be completed on or before the fifteenth day of November, 1910.

(b) Erection of Steel Superstructure and floors, with two lines of street railway tracks, to be completed on or before the first day of June, 1911.

Plans, specifications and forms of tender, together with conditions governing tenders as prescribed by law, may be obtained at the office of the City Engineer, Winnipeg. The lowest or any tender not necessarily accepted.

M. PETERSON,
Secretary.

Office of the Board of Control,
Winnipeg, April 30th, 1910.

19

Notice to Contractors

Sealed tenders addressed to the undersigned will be received up to 3 o'clock p.m. on THURSDAY, THE 26TH DAY OF MAY, 1910, for the construction of Concrete Abutments, containing approximately 80 cubic yards, for a steel bridge in the Township of Onondaga, in the County of Brant. The site of the bridge is about two miles from Onondaga Station, G. T. R., and the same distance from the Village of Middleport.

Tenders must contain the composition of the concrete.

Contract will be awarded then if satisfactory.

S. J. McKELVEY,
Township Clerk,
Tuscarora P.O., Ont.

19

19

Notice to Contractors

Sealed tenders, marked, will be received by the Town Clerk up to 5 o'clock p.m. on WEDNESDAY, 18TH MAY, 1910, for the building of a brick Town Hall.

Plans and specifications may be seen at the Clerk's office.

Tenders may be for the whole works or for parts thereof.

A certified cheque to the amount of five per cent. thereof, payable to the order of the Town Treasurer, must accompany each tender.

Lowest or any tender not necessarily accepted.

J. C. ECKFORD,
Town Clerk,
Southampton, Ont.

19

Town of Fort Frances

Sealed tenders will be received by the Corporation of the Town of Fort Frances, addressed to W. H. Elliott, Clerk of Fort Frances, Ont., until 8 o'clock p.m., on THURSDAY, THE 26TH DAY OF MAY, 1910, for the construction and completion of the following contracts in the extension of the sewerage system of the said Town of Fort Frances, viz.:—

"A." All labor for the construction of the extension to the sewerage system, and certain materials thereof.

"B." The supplying of vitrified tile pipe and junctions.

"C." The supplying of cast iron manhole covers, catch basin covers, and flap valves.

Copies of plans and specifications and forms of tender may be had upon application to the undersigned, the Clerk of Fort Frances.

H. WILLIAMS, Mayor.
W. H. ELLIOTT, Town Clerk.
Fort Frances, April 21st, 1910.

19

Town of Virden

Supply of Cement

Tenders addressed to the undersigned will be received up to 12 o'clock noon, on MONDAY, THE 23RD DAY OF MAY, for the supply of 800 barrels (more or less) of cement, to be used in the construction of cement sidewalks.

Tenders to state price for same f. o. b. cars, Virden.

A marked cheque or cash deposit equal to 5 per cent. of price for same must accompany each tender.

The lowest or any tender not necessarily accepted.

J. F. C. MENLOVE,
Secretary-Treasurer.

Dated at Virden, Man., this fourth day of May, A.D. 1910.

19

Tenders

will be received at the office of the undersigned up to 12 o'clock noon, SATURDAY, MAY 14TH, 1910, for tearing down and removing buildings on property southeast corner of Gerard and Parliament streets. Specifications may be seen at office.

JAMES L. HAVILL, Architect,
108 Mail Building,

19

King and Bay street, Toronto.

TO CONTRACTORS

Separate and lump tenders will be received until MAY 14TH for the necessary trades in connection with the erection of a Brick School House in School Section No. 12, Homer Avenue, Mimico, Ont.

Plans and specifications can be seen and all necessary information obtained at my offices, 164 Bay street.

19

E. J. LENNOX, Architect.

Town of Orillia

Sewerage Works

Tenders will be received by the Town Clerk until 8 p.m. on MONDAY, MAY 16TH, 1910, for Sewage Sedimentation Tanks.

Plans and specifications may be seen at the Town Hall, Orillia, or at the office of the Chief Engineers, 204 Mail Building, Toronto.

No tender necessarily accepted.

W. C. GOFATT, ESQ., Mayor, Orillia, Ont.
C. E. GRANT, ESQ., Town Clerk, Orillia, Ont.

CHIPMAN AND POWER, Chief Engineers,
Toronto, Ont.

19

Board of Education

Toronto

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received until

Friday Noon, May 13th 1910

for the several trades required in the

Erection of Oakwood High School, St. Clair Avenue,

Alterations to Joseph Workman School, Coolmine Road,

Alterations to St. Clair Avenue School.

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, Chairman of Committee,
W. C. WILKINSON, Sec.-Treas.

19

Bridge Tenders

Sealed tenders will be received by Wm. Purves, Township Clerk, Columbus, Ont., up to noon, on SATURDAY, MAY 28TH, for the construction of Two Reinforced Concrete Bridge of 32 feet and 22 feet spans, near Oshawa.

Plans and specifications may be seen and information obtained from the Clerk, or from Hiram Gifford, Reeve of East Whitby, Cedardale, or from the engineers.

BOWMAN AND CONNOR,
36 Toronto street, Toronto.

20

COMPETITIVE PLANS

Competitive working sketches will be received by the undersigned up to and including MAY 28TH NEXT, for a four-roomed brick public school building with modern conveniences.

It is desired that the building be so planned that additional accommodation may be conveniently added to it when circumstances demand.

Address
THOS. I. TRUEMAN,
Secy.-Treas. Public School Board,
Midland, Ontario.

20

Macadamizing Tenders

will be received at the office of the undersigned, Alexandria, until 6.30 p.m. on MONDAY, MAY 16TH, instant, for the macadamizing of a part of Main street, Alexandria, extending about 1875 lineal feet, and containing about 4,745 square yards, according to plans and specifications to be seen at the office of the undersigned. Tenderers are requested to state whether their tenders include, or do not include, their supplying the necessary road machinery and equipment.

E. H. TIFFANY,
Town Clerk.

Alexandria, May 3, 1910.

19

Town of Outremont

Tenders for Sewers

Tenders will be received by the undersigned up to WEDNESDAY, NOON, THE 18TH DAY OF MAY, 1910, for the construction of a 3 x 4½ foot trunk sewer on Pacific avenue, Durocher street, Van Horne avenue to Outremont avenue, about 8,200 feet; a 3 x 2 sewer on de l'Epee street, from Laurier avenue to St. Viateur street, about 1,800 feet; a 3 x 2 sewer on Maplewood avenue, about 800 feet.

Plans and specifications may be seen at the Town Hall.

A deposit of 10 per cent. is required.

J. KRUSE,
Secretary-Treasurer.

Outremont, 5 May, 1910.

19

Town of Wingham

To Well Contractors

Tenders will be received by the undersigned up to 19TH MAY, 1910, for the supply of material and sinking of two artesian wells eight inches in diameter.

Specifications may be seen at the office of the secretary in Wingham, or at the office of the engineers, Davis and Johnston, Berlin, Ont.

Contractors must satisfy the Commission of their experience and ability to execute successfully the work contemplated.

The lowest tender not necessarily accepted.

I. A. MORTON, Secretary,
Board of Water Commissioners, Wingham, Ont.

19

Town of Virden

Concrete Sidewalks

Tenders addressed to the undersigned will be received up to 12 o'clock noon, on MONDAY, THE 23RD DAY OF MAY, for the construction of 15,000 lineal feet (more or less) of cement sidewalk, four, five and six feet in width.

Specifications and other information may be obtained at the office of the undersigned.

A marked cheque or cash deposit equal to 5 per cent. of cost price for same must accompany each tender.

The lowest or any tender not necessarily accepted.

J. F. C. MENLOVE,
Secretary-Treasurer.

Dated at Virden, Man., this fourth day of May, A.D. 1910.

19

Hydro-Electric Power Commission of Ontario

Tenders for Transformer Station, Port Arthur, Ontario

Tenders will be received up to 9 a.m. WEDNESDAY, MAY 25TH, 1910, for the construction of Transformer Station Building. Superstructure, Port Arthur, Ont., all according to plans and specifications to be obtained at the offices of the Commission, Continental Life Building, Toronto, or at the City Engineer's office, Port Arthur. Separate tenders for structural steel work will receive consideration.

Plans and specifications may be obtained upon a deposit of \$5, which deposit will be promptly refunded upon receipt of tender, or the return of plans and specifications.

Certified cheques to the amounts called for in the "Instructions to Bidders" must accompany each tender.

The lowest or any tender not necessarily accepted.

Tenders must be sealed and addressed to Hon. Adam Beck, Chairman Hydro-Electric Power Commission, Continental Life Building, Toronto, Ontario.

(Papers inserting this advertisement without authority will not be paid for same.)

19



Perth Avenue Fire Hall

Bulk tenders, or separate tenders, for the several works mentioned below, in connection with the above building, will be received by registered post only, addressed to the undersigned, up to noon on TUESDAY, 17TH MAY, 1910.

1. Concrete Paving, etc.
2. Hardware.
3. Sliding Poles.
4. Covers for Sliding Pole Openings.
5. Metal Weather Strips.
6. Stable Fittings.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with or tender may not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.

City Hall, Toronto, 5th May, 1910.

19

Tenders for Paving

The City of Saint John Invites Tenders for

Paving, etc., in Main, Pond, Smythe, Nelson and St. John streets, according to plans and specifications to be seen and forms of tender obtained at the office of the City Engineer, Room No. 3, City Hall, duplicates of which are on file in the office of the "Contract Record," 594 Confederation Life Building, Toronto.

A cash deposit must accompany each bid, the amount being as stated in each specification.

The city does not bind itself to accept the lowest or any tender.

All tenders must be addressed to the Common Clerk, Room No. 3, City Hall, who will receive bids until noon of TUESDAY, THE 31ST DAY OF MAY, A.D. 1910.

ADAM MACINTYRE,
Comptroller.

WM. MURDOCH,
City Engineer.

St. John, N.B., May 7th, 1910.

21

City of Prince Albert Tenders

Sealed tenders addressed to the undersigned and marked "Tenders for Extensions" will be received until noon on SATURDAY, THE 14TH DAY OF MAY, 1910, for the construction of extensions to the water and sewerage systems of the City of Prince Albert, comprising approximately the following work:—

4,585	Lineal Feet 10-inch Water Main.
984	Lineal Feet 8-inch Water Main.
3,895	Lineal Feet 6-inch Water Main.
6½	Tons Special Castings.
19	Valves.
13	Hydrants.
535	Lineal Feet 24-inch Storm Sewer.
667	Lineal Feet 18-inch Storm Sewer.
580	Lineal Feet 8-inch Storm Sewer.
3,056	Lineal Feet 8-inch Sanitary Sewer.
13	Man Holes.
1	Flush Tank.
1	Lamp Hole.
16	Catch Basins.

Plans and specifications may be seen and forms of tender obtained at the office of the City Engineer of the City of Prince Albert after May 2nd, 1910.

C. O. DAVIDSON,
City Clerk.

Dated at Prince Albert, April 27th, 1910.

19

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—TRAVELLING SALESMAN to represent firm manufacturing bank, office and store fittings. Must be competent to make sketches, etc. Man having experience in architect's office preferred. Apply, Box 974 "Contract Record," Toronto. TF

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra.

WANTED POSITION AS SUPERINTENDENT, to take charge of concrete or railway construction work. I am thoroughly experienced in this line of work. Address, Box 978, "Contract Record," Toronto, Ont.

Miscellaneous

Advertisements under this heading two cents a word per insertion.

AGENTS WANTED—United States manufacturers of a well known waterproofing compound wish to get in touch with reliable firm or individual to represent them in Canada. This would be a desirable opportunity for an energetic young architect or engineer. Box 970 "Contract Record." 20

Town of Virden Overseer

Applications will be received by the undersigned up to 12 o'clock noon, on MONDAY, MAY 23RD, for the position of Overseer for the construction of cement sidewalks during the season of 1910.

Applicants must state past experience and salary expected, and enclose references.

J. F. C. MENLOVE,
Secretary-Treasurer.

Dated at Virden, Man., this fourth day of 19
May, A.D. 1910.

Town of Prescott Sewer Construction

Sealed tenders will be received by the undersigned up to noon of SATURDAY, MAY THE 21ST, 1910, for the construction of "Sewers, Septic Tank and Outlet" in connection with the sewerage system of the Town of Prescott.

Plans and specifications may be seen and forms of tender obtained at the office of the Town Clerk, Prescott, or at the office of Morris and Moore, Pembroke, after Monday, the 9th day of May, 1910.

Tenders must be made on forms supplied, signed and sealed, and marked on outside "Tender for Prescott Sewer," accompanied by an accepted cheque for one thousand dollars on a chartered bank of Canada, made payable to the Town Treasurer of the Town of Prescott.

F. W. ELLIOTT,
Chairman Sewerage Committee,
Prescott, Ont.

20



Temiskaming and North- ern Ontario Railway Commission

Sealed tenders addressed to the undersigned and endorsed on envelope "Tender for Steel Tank," will be received up to NOON ON TUESDAY, MAY 17TH, 1910, for all Labor, Tools, Equipment and Material for the manufacture and erection, including all fixtures above the foundation, of a fifty thousand imperial gallon steel tank at North Bay Junction, Ont.

Specifications may be seen at the office of Chief Engineer, North Bay, or the Secretary-Treasurer, 25 Toronto street, Toronto.

Lowest or any tender not necessarily accepted.

A. J. McGEE,
Secretary-Treasurer, 25 Toronto St.,
Toronto, Ont.

Toronto, May 10th, 1910.

P.S.—Papers inserting this advertisement without authority it will not be paid for it. 19

John M. Walkley & Company, electricians, Montreal, Que., have dissolved.

Alex. Cushing & Company, lumber merchants, St. John, N.B., have assigned.

W. C. Martin & Company, hardware merchants, Rossland, B.C., are closing out.

James Wilson & Company, painters, Hamilton, Ont., have dissolved, C. Wilson continuing.

Power Plants, Electricity and Telephones

Continued from page 27)

ing, superstructure. Plans, etc., at offices of the Commission, Continental Life Building, Toronto. See advertisement in this issue.

Regina, Sask.

The by-law to grant street railway franchise to J. W. DeC. O'Grady, of Winnipeg, was defeated.

Wellington, B.C.

B. C. E. R. is contemplating the construction of an aerial tramway to connect its Lone Star mines with its Wellington property. The proposed tramway will be about seven miles in length. Newman Erb is president of the company.

AWARDED.

Fort William, Ont.

Stewart & Hewitson were awarded a contract for rock and screenings at \$1.35 a cubic yard, by the Fort William Street Railway Company.

Toronto, Ont.

The American Sewer Pipe Company were given the contract for supplying conduit required by the city in connection with the hydro-electric system at the following prices per duct foot: Butt joint, round bore, .0590 cents; square bore, .0635 cents.

Welland, Ont.

David Dick & Sons, Limited, have the contract for the building 150 miles of Hydro-Electric line from St. Thomas to Berlin, and Ingersoll to London.

Miscellaneous

Hanover, Ont.

On June 22nd the county council of the county of Tay will consider a by-law to raise \$20,000 4 1-2 per cent. local improvement debentures. John Rutherford, county clerk.

Halifax, N.S.

The following tenders for supply of lumber for 1910-1911 were received: Rhodes, Curry & Company, \$1,370.96; J. McInnes & Sons, \$1,361.43; Brookfield Bros., \$1,342.17. The latter was recommended by the Board for acceptance.

Leamington, Ont.

Tenders addressed to A. Baird, C.E., will be received until May 28th for improvement of Big Marsh drainage system, Pelee Island. Plans, etc., at office of above mentioned.

Montreal, Que.

Recent building permits include: T. J. Bissillon, 446 Sherbrooke west, two houses containing nine dwellings, \$20,000; F. Gauthier, 572 Marie Anne east, two houses containing two dwellings and two stores, \$6,800; F. Therrien, 373 Dorion, two houses containing eight dwellings, \$6,000; H. Labelle & Company, Notre Dame street west, one house, one store and one warehouse, \$10,500; Jos. Lanctot, 330 Mt. Royal, one house containing three dwellings, \$10,000; St. Nicolas Syndicate, Syrian Orthodox Church, \$8,300; J. A. Vaillancourt, 155 Marquette, two houses containing five dwellings, and one store, \$7,500; Bloomfield Bros., 17 Notre Dame west, four houses containing four dwellings and four stores, \$8,000; Geo. Hall Coal Company, 112 St. James street, one coal elevator, \$9,000; T. Sauve, 1161 Simard street, two houses containing six dwellings and one store, \$6,000; School Commissioners St. George, St. Urbain street, one school, cost \$35,000; N. Therriens, 74 Villeneuve, two houses con-

taining six dwellings, \$7,000; E. G. Rivet, 141 Clarke, one house containing two dwellings, \$3,400; M. Dupuis, 65a St. Andre, one house containing three dwellings, \$2,500; Jos. Dupuis, 65 Delinelle, one house containing three dwellings, \$2,500; E. Dupuis, 107a St. Philippe street, one house containing three dwellings, \$2,500; Felix Libercent, 1084 St. Dominique street, two houses containing six dwellings, \$6,000; F. C. Marquis, 505 Laval, one house containing three dwellings, \$4,600; Arsene Lamy, 1023 St. Hubert, one house containing three dwellings, \$7,000; Arsene Lamy, Limited, Drolet street, house, store and warehouse, \$9,000; Jos. Charlebois, 290 Rivard, two houses containing six dwellings, \$5,000; Lucio Lebeau, 1260 Des Erables, two houses containing six dwellings, \$5,000; Guaranteed Pure Milk Company, 815 St. Catherine west, one house containing four dwellings, three stores and one factory, \$40,000; M. Simister, 108 Durocher, alterations to two houses, \$4,000; J. A. Jarry, 817 St. Joseph Boulevard, alterations to two houses, \$6,000.

Ottawa, Ont.

The supplementary estimates for fiscal year ending March 31, 1911, include also St. Peter's Canal, repairs, \$25,000.

Regina, Sask.

The by-laws involving an expenditure of \$484,500 for public improvements were endorsed by the ratepayers.

Toronto, Ont.

Tenders will be received until May 17th for year's supply of lumber required by the Property Department. G. R. Geary, chairman, Board of Control.

Recent building permits issued were:—Mr. Frank, 2 pairs semi-detached 2 storey brick dwelling, corner Howland and Simpson, \$7,000; E. B. Rogers, 2 1-2 storey brick dwelling, 32 Wells Hill avenue, \$10,000; J. S. A. Whealey, 5 detached 2 1-2 storey brick dwellings, Bowden, \$14,000; C. O. Douglas, 2 storey and attic brick dwelling on Maynard and King, \$6,500; W. A. Murray Company, sub-basement, near Victoria on Colborne, \$5,000; Amos Schunk, 3 storey brick apartments, on Palmerston and Herrick, \$20,000; Alex. Patterson, 2 storey and attic brick dwelling on Parkwood, \$9,000; Harton Walker, 2 storey and attic brick dwelling, on Edgar, \$6,000; J. C. Boukh, 2 1-2 storey brick dwelling, on Russell Hill road, \$7,000; Thos. West, 1 storey brick addition to factory, on Esplanade, \$11,000; G. T. Wolfe, 2 storey and attic brick dwelling, High Park boulevard, \$5,600; Chas. Henderson, 2 storey and attic brick dwelling, High Park boulevard, \$7,000; J. A. Taylor, 1 pair semi-detached 2 storey brick dwellings, Eastern, \$4,000; W. S. Grimshaw, 4 attached 3 storey brick stores and dwellings, on College, \$14,000; Mrs. J. Denovan, 2 storey and attic brick dwelling, corner Schofield and Highland, \$6,800; Board of Education, 3 storey brick school, Kimberley, \$35,000; John Hughes, 1 pair semi-detached 2 1-2 storey brick dwelling, Constance, \$5,400; G. M. Bryan, 3 detached 2 1-2 storey brick dwellings on Park road, \$13,000; Dr. Mason, 2 1-2 storey brick dwelling on Binscarth, \$4,000; Stone, Limited, addition to factory on 461 King street west, \$35,000; Alex. Morris, 2 storey and attic brick dwelling, Warren road, \$8,000; A. & A. Grant, 1 pair semi-detached 2 storey brick dwelling, Lansdowne, \$5,000; Dominion Bridge Company, 1 storey brick and steel addition to shop on Sorareen, \$5,000; J. T. Turner, 1 pair semi-detached 2 1-2 storey brick dwellings on Dearbourne, \$5,000; Jas. Henderson, 3 attached 2 storey brick stores and dwellings on Queen west, \$11,000; J. J. Boland, 1 pair semi-detached

2 storey brick dwellings on Symington, \$5,000; J. A. Hambleton, 1 pair semi-detached 2 1-2 storey brick dwellings on Crawford, \$6,000; Hugh Rose, 2 storey brick dwelling on 121 Concord, \$4,500; Swift & Wyatt, 1 pair semi-detached 2 storey brick dwellings on Grandview, \$4,000; J. S. Eby, 2 storey brick store and dwelling on Roncesvalles, \$4,500; C. Heehn, 1 pair semi-detached 2 storey brick dwellings, Balmoral, \$4,000; M. J. Doyle & Son, 1 pair semi-detached 2 storey brick dwellings on Royce, \$4,000; J. G. Bemrose, 2 detached 2 1-2 storey brick dwellings on Humberstone, \$5,400; J. L. Bartlam, 2 1-2 storey brick dwelling on Wright avenue, \$4,500; Haindie Bros., 3 attached 2 storey brick dwelling on Winnifred, \$5,600; J. O'Donnell, 2 storey brick dwelling on south side Dundas, \$4,000; Mary Baldwin, 3 detached 2 1-2 storey brick dwellings on Mavety, \$6,900; R. C. Vaughan & Son, 2 storey and attic brick dwelling on Russell Hill drive, \$7,000; J. R. Gifford, 1 pair semi-detached 2 1-2 storey brick dwellings on Sparkhall, \$4,650; A. H. Garrett, 3 attached 3 storey brick stores and dwellings, College and Grace, \$12,000; G. Marshall, alterations to 1 pair, 26 Burnfield avenue, \$4,000; M. T. Mace, 3 attached 2 storey brick dwellings, Gerrard east, \$7,000; Thos. Holmes, 2 pairs semi-detached 2 storey brick dwellings on west side Dundas, \$8,000; P. McConvey, 1 pair semi-detached 2 storey and attic brick dwelling on Manning, \$4,400; A. G. Love, 2 storey brick store and dwelling, Dovercourt and Van Horne, \$6,500; J. M. Johnston, 2 storey brick tenement house, corner Davenport and McAlpine, \$4,000; Mrs. J. H. Haffa, 1 pair semi-detached 2 storey brick dwellings on 171a and 171b Howland avenue, \$5,000; Wm. Morgan, 1 pair semi-detached 2 storey brick dwellings on Shaw, \$4,500; R. E. McDonagh, 1 pair semi-detached 2 1-2 storey brick dwellings on Havelock, \$5,000; Cossaway & Charlebois, 2 detached 2 storey brick dwellings on College, \$7,000; Heintzman & Company, alterations to store on 195 Yonge, \$30,000; W. Stubbings, 1 pair semi-detached 2 1-2 storey brick dwellings on St. Clarens, \$4,500; J. A. Orr, 2 detached 2 storey and attic brick dwellings Sunnyside and Wright, \$5,000; Tuero & Monzon, 1 pair semi-detached 2 1-2 storey brick dwellings on Sparkhall, \$5,200; Mr. Bollons, 2 detached 2 1-2 storey brick dwellings on Constance, \$6,500; G. Knaggs, 2 detached 2 storey and attic brick dwellings on Triller, \$8,000; Gold Medal Manufacturing Company, 6 pairs semi-detached 2 storey and attic brick dwellings on Carlaw, \$30,000; J. R. Galbraith, 1 pair semi-detached 2 storey brick dwellings, corner Emerson and Armstrong, \$5,000; R. S. Tickner, 1 pair semi-detached 2 storey brick dwellings on Dovercourt, \$4,000; H. Wright, 2 1-2 storey brick dwelling, corner Marmaduke and Roncesvalles, \$4,000; Thos. Morris, 2 detached 2 storey and attic brick dwellings on Willoughby, \$5,000; Chas. Jolliffe, 1 pair semi-detached 2 storey and attic brick dwellings on 441-3 Gladstone, \$6,000; R. Broudie, 1 pair semi-detached 2 storey brick stores and dwellings on College, \$4,300; Geo. A. Griffith, 2 storey and attic brick dwelling on 414 Dovercourt road, \$5,000; Robt. Kerr, 1 pair semi-detached 2 storey brick dwellings on Lansdowne, \$4,000; G. H. Weale & Sons, 1 pair semi-detached 2 storey brick dwellings on Winnifred, \$4,000; J. E. Peterkin, 1 pair semi-detached 2 storey brick dwellings on Garden, \$4,000; D. B. Bowerman, 2 storey and attic brick dwelling on 15 Whitney avenue, \$9,000; R. Robson, 2 pairs semi-detached 2 storey brick dwellings on Wallace, \$8,000; J. W. McAlpine, 2 1-2 storey brick dwellings, on south side Hogarth, \$4,500; R. C.

Bustard, 2 1-2 storey brick dwelling on 43 Dunvegan road, \$4,500; Merchants Fire, 3 storey brick office building, near Church, on Adelaide east, \$25,000; A. A. Barthelmes Company, 5 storey brick factory on Noble and Strickland, \$46,000; T. A. Fleming, 2 pairs semi-detached 2 storey brick dwellings on 297-303 Evelyn avenue, \$8,000; R. C. Bustard, 2 1-2 storey brick dwelling on 60 Rowanwood avenue, \$4,500; Rev. C. C. Darling, 2 storey and attic brick dwelling on Palmerstone boulevard, \$6,000; Caplan Bros., 3 storey brick store and dwelling on 187 McCaul street, \$6,000; R. A. Shields, 5 attached 2 storey brick dwellings on Howland, \$10,000; H. Rann, 1 pair semi-detached 2 storey brick dwellings on Albermarle, \$4,500; Weismiller & MacKenzie Bros., 3 storey brick store and dwelling on Queen street west, \$7,500; Graydon & Doner, 1 pair semi-detached 2 storey brick dwellings on 96-98 Lucas street, \$4,000; Albert Littler, 2 detached 2 storey and attic brick dwelling on 559-561 Brock avenue, \$5,200; D. L. Smith, 2 1-2 storey brick dwelling on Pacific, \$4,000.

Vancouver, B.C.

Building permits include: Vernon Bros., 2640 Point Grey road, three houses, \$9,000; D. A. McMillan, 2830 Dock street, three houses, \$8,000; W. J. Wienmoth, 2277 Third avenue west, two houses, \$4,400; A. Shoeman, 2781 Point Grey road, \$2,650; School Board office building, Hamilton street, \$40,000; Jefferson & Clapham, Victoria drive, two houses, \$4,000; M. E. Acteson, 2103 Sixth avenue west, \$4,500; St. Saviour's Church rectory, Semlin drive, \$3,000; J. Trick, 557 Eleventh avenue east, \$3,000; S. J. Steeves, 1285 Thirteenth avenue west, \$4,000; Imperial Oil Company, addition to warehouse, \$15,000; J. E. Guinet, Parker street, two houses, \$4,000; G. R. Lonergan, four frame dwellings, Nanaimo street, \$5,600; John Knight, three frame dwellings, Cotton drive, \$6,600; Dr. Hall, Davie street, \$5,000; Sullivan Company, Seymour street, \$3,000; Knudson & Dunlap, 154 Tenth avenue east, \$4,085; R. L. R. Maitland, 2030 Haro street, \$4,600; S. Henderson, 1106 Pender street, \$6,000; W. J. Wenworth, frame dwelling, 2273 Third avenue, \$4,400; Mrs. D. Love, frame dwelling, 1330 Victoria drive, \$2,000; A. Shoeman, frame dwelling, 2781 Point Grey road, \$2,650; Vernon Bros., frame dwelling, 2640 Point Grey road, \$9,000; F. Moyer, 4 Thirteenth avenue, \$3,000; J. E. Guinet, 1434 Parker street, \$2,000; M. E. Blackwell, 1848 Third avenue west, \$4,300.

Wingham, Ont.

Tenders are being called by this municipality until May 19th for the sinking of 2 artesian wells, etc. See advertisement in this issue.

Winnipeg, Man.

Recent building permits include: C. S. Tupper, house, Assiniboine avenue, \$16,000; A. S. Knight, hotel, Higgins avenue, \$46,000, three storey brick and stone, 82 x 71 feet; C. Midwinter, house, Harbison street, \$2,500; A. W. Walsh & Company, house, McMillan, \$3,000; H. Galbraith, house, Banning street, \$2,500; Olafson Grain Company, elevator, southeast corner of Tweed and Roland, \$6,000, capacity 30,000 bushels; T. H. Goodman, two houses, Morley, \$3,000; W. J. Christie, store, corner Main and James street, \$3,500; Regent apartment block, west side Osborne street and Assiniboine river, \$330,000; Wallace & Aikins, Buell avenue, \$4,800; J. H. Dickie, Chestnut street, \$4,700; V. Patton, northeast corner McMan avenue and John street, \$6,000; Mark Fortune, Wellington crescent, \$30,000; West End Realty

Company, Lipton street, 2 dwellings, \$3,600; West End Realty Company, west side Banning street, 2 dwellings, \$3,600; Jonasson and Hall, Beverley street, \$2,500; F. W. Alloway, 407 Assiniboine avenue, fire proof garage, \$2,500; J. H. Wye, dwelling, Ingsaway, \$6,000; J. Matthews, 4 dwellings, Morley avenue, \$12,000; E. Bremner, dwelling, Telfer street, \$8,400; Sparrow Bros., dwellings, Yale avenue, \$7,000, 1 dwelling \$7,200; Oblate Fathers, printing office, northeast corner Margaretta street and McDermot avenue, \$6,000; B. C. Cockshott, dwelling, Harbison street, \$2,800; W. W. Fleming, dwelling, Arlington street, \$3,600; J. T. Watson, dwelling, Simcoe street, \$2,000; J. T. Watson, 2 dwellings, Home street, \$4,000; D. D. Wood, stone crushing plant, Ross avenue, \$8,000; B. Cohen, two dwellings, Anderson street, \$3,600; H. Picken, dwelling, Toronto street, \$2,500; I. Isenberg, 3 houses, Fleet street, \$7,500; I. Isenberg, house, Aikins street, \$2,500; B. Donnen, dwelling, Cathedral, \$2,400; B. Donnen, 2 dwellings, Bannerman, \$4,800; Ogilvie Milling Company, addition to oat meal mill on the south side of Higgins avenue, \$10,500; Vulcan Iron Works Company, blacksmith shop, Mead street, \$12,000; G. A. Eastman, warehouse, 40 by 60 feet, 3 stores, Young street, \$14,000; F. J. Joslin and Wm. Toole, two houses, Atlantic avenue, \$2,400; G. S. Smith, 2 houses, Jessie avenue, \$4,000; A. Macdonald, two houses, Horne street, \$6,000; F. D. Buras, 3 houses on Beresford avenue, \$7,500; R. Shane, house, Aubrey street, \$3,600.

AWARDED.

London, Ont.

The Waterous Company, of Brantford, was awarded the tender for a fifteen ton road roller to cost \$3,000.

Tapering Concrete Chimneys

The majority of the numerous reinforced concrete chimneys that have been built are cylindrical in shape, due to limitation in the design of the forms, and where a variation in diameter is made this has been effected by an offset. Recently, however, says Engineering News, some special designs of form construction have been devised which permit the building of tapering stacks without excessive cost for this feature of the work. The forms, which are 5 feet high, consist of sets of rings, steel plate forming the surfaces, and long bolts by means of which the adjustments of diameter and wall thickness are made. The rings are of sufficient diameter to enclose the base of the chimney, and are made of heavy angles bent to varying radii and spliced into complete circles. The radial bolts must be long enough to permit of their extending into the chimney surface when the diameter is smallest (at the top of the chimney). The diameter of the rings remains constant, standard sets of form rings being carried in stock for various sizes of chimneys. The steel sheets are of standard size, and are filled out with split sheets, made interchangeable. The sheets are secured by flat-head stove bolts to vertical stiffeners on the outer surfaces of the forms, except at one rib, where the adjustment is taken up. The varying diameter is obtained by means of the long radial bolts which turn through small angles attached to the steel rings, and end in malleable clips which grip steel bands on the outside of kered wood strips which press the sheets in to the desired radius. Permanent centres are kept at the base of the chimney and on the scaffold above, and each section of the chimney is plumbed. Thus perfect alignment is secured throughout the construction.

Qualifications of the Builder's Foreman

Desiderata for the Position : Thorough Technical Training, Ability to Preserve Harmony the Possession of "Influence" and Discipline

BY ALFRED SEARLE

The advent of machinery and of new methods of construction in the building trade is revolutionizing certain departments in a way which is too obvious to be overlooked and too small to be realized in all its fulness by those most concerned. In days gone by the primary qualification in a builder's foreman was his ability as a workman, and it was recognized that any young apprentice who had sufficient intelligence, and who was skilled at his work, might rise to the position. Within recent years, however, this has been altered so completely that some of the most successful foremen, employed by the largest firms, have only a superficial knowledge of the actual handicraft, and have been chosen more for their shrewdness and general capability of "seeing ways out of difficulties" than for their actual manual skill. Just as the clerk of the works is the technical representative of the architect or owner, so the foreman is the representative of the builder, and for this purpose a man skilled in the reading of plans, quick to see how to overcome those puzzling little problems which are always occurring, and which must necessarily, to a large extent, the unforeseen, and with sufficient personal "force" to have his instructions carried out promptly and satisfactorily, is worth far more, under modern conditions, than the best joiner, mason, or bricklayer who ever lived, if the latter was destitute of the qualifications just mentioned.

The Question of Mechanical Skill

So great has been the change, in fact, that it is questionable whether any serious importance is to be attached to the supposed necessity for mechanical skill on the part of the foreman, and whether the demand of modern building construction is not creating the need for a type of man which cannot be produced as the result of an ordinary apprenticeship to a trade.

The ordinary workman of to-day—especially if he be of the sort out of which the older foremen were made—is a man who thinks much and who does not hesitate to express his opinions. He may have been badly misinformed as to the true state of affairs in the relationship between capital and labor in the modern state, and may have various theories and ideas, either original or imported, as to what should be his true position in life, and if these ideas are sufficiently dominant they may prove as much of a hindrance to his success as a foreman as they were a blessing to him as a craftsman.

For this reason some employers are seriously considering the advisability of employing as foremen men who have been trained specially for the purpose in technical and other classes, but who have not any special skill as workmen. They are doing this because the foreman who is a strong upholder of his trades union is inconvenient from the employer's point of view, and consequently it is easier to get certain kinds of work superintended by men trained apart from the ordinary apprenticeship, than from those who have been promoted in the ordinary way.

This tendency is to be regretted, for it is based on a fallacy as to the fundamental duty of the foreman, and assumes (which is by no means correct) that the foreman's chief work is to keep the skilled and other work-

men profitably employed and to prevent waste of time.

As a matter of actual fact, the foreman's true position is to stand intermediately between the employer and the individual workmen and to see that, as far as possible, the interests of both parties are fully secured. This is by no means so easy as appears at first sight, for the tendency is for the masters to overwork the men, or to make impossible conditions on the one hand, and for the workmen to "slack" and waste time (and therefore money) on the other. Hence one of the primary requisites in the modern foreman must be the ability to judge fairly any complaints or suggestions which must be received from either party, and to give a wise opinion thereon.

This implies the selection of middle-aged men as foremen, for younger ones are apt to fail in appreciation of the men's position, and to be so anxious to please their employers as to have but little influence on those who are, after all, their fellow workers.

Value of "Personal Force" or Influence

Indeed, "influence" is the keynote to the whole position. Without it a man may be extremely clever as a worker or as an organizer on paper. He may have ample knowledge of the technical side of his work, but he cannot get other men to work efficiently. One of the easiest ways for a foreman to lose influence is to prove his incompetency as a foreman, for there is nothing which makes it so easy to ridicule a man as to attempt to show another how to do a piece of work and to fail to do it himself. For this, if for no other reason, it would appear to be always necessary for a foreman to be a good all-round workman. Indeed, it is difficult to understand how a man can justly decide the wage-earning value of a particular operation unless he is able to do the operation himself, and thus know the amount of thought and care, as well as the actual time required.

Quickness of perception and the power to control other men are thus found to be only two out of many important characteristics required in a foreman; a thorough technical knowledge, not only of his own trade, but of all those allied to it. Perhaps if a single characteristic were to be selected as the one of greatest importance at the present time, it would be a sympathetic attitude to both masters and men, for with this a foreman will be able to influence both his employers and those under his charge. He will be able to see that justice is done between the parties, and by the judicious expression of his own opinion, based on his knowledge as a workman and as a technical student of both the trade itself and of economical problems affecting labor and capital, he will prove a valuable aid to the success of the firm employing him, and an equally valuable friend and adviser to those he is employed to direct. A truly sympathetic attitude will prevent him from favoritism on the one hand and excessive harshness on the other, and will be his chief means of carrying out his duty with the least friction. It will enable him to suggest improvements to his employers in matters of construction and arrangements, and to effect economies in costs without undue hardship on the workmen.

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The Empire's Bereavement

In the irreparable loss which the British Empire has sustained during the past week the hearts of all English-speaking people beat as one. That touch of nature which makes the whole world kin has come to us and we are united in a common sorrow. We mourn to-day the death of him who was "of the British Dominion beyond the seas, King," enthroned in the heart of every good Canadian as loyally as in any other British breast. King Edward was possessed of truly kingly qualities and his noble conception of his duty to every portion of the Empire and the able manner in which he carried out that duty have welded another link in a chain which, let us hope, may never be broken. Our sympathies are extended in human tenderness to the Queen-Mother and the other members of the Royal Family and our hopes are placed unreservedly in His Majesty, King George V., in the full confidence that the abilities of the father have been transmitted to the son, even as these in turn were inherent by our late King. Our late King! The words are hard to utter. Truly it were not altogether inappropriate—if somewhat inadequate, to write of him:

"This was a man."

Certified Cheques with Tenders

The introduction into Montreal of the system of enclosing accepted cheques with tenders for city work has proved decidedly unpopular in that city. Last week a number of sewer contractors went to the City Hall and expressed their sentiments. They contended that the new system would be a hardship to many of them as they could not afford to have a great deal of money tied up for any length of time. They suggested that the Board of Control should not insist upon cheques, but should accept bonds from guarantee companies. The controllers promised consideration. Whether this is as far as they will get remains to be seen. Our best wishes for the success of the Montreal contractors will be shared by many in other sections who have experienced the same rub.

To illustrate how a safeguard may be turned into a serious hardship upon the community, the security required to be deposited as a qualification for bidding in the case of Government work in some countries is a large per cent. of the approximate contract price, and this sum is retained until completion of contract. It is apparent that in a very large piece of work there might be but one bidder who could post the required sum as a guarantee. To offset this, the law ordinarily requires more than one qualified bid as a condition to awarding the contract. It will readily be seen, however, that a wealthy bidder could get around this and secure the work at his own price by the simple expedient of making the necessary financial arrangements, and having a dummy bid submitted at a higher figure than his own.

If it is necessary to have temporary security the amount should be determined by the size of the contract and by local conditions. It is a mistake, obviously, to make the amount so high as to exclude from competition the man who can undoubtedly carry through the work, but who may be embarrassed by the necessity for tying up, even temporarily, a large part of his working capital.

Importance of Keeping Well Posted

If the writer learnt his lesson thoroughly, it was Dr. Johnson who asserted his ability to size a man up by a knowledge of his acquaintances. Certainly if we are to judge a man by the company he keeps, he will be found to be up to the minute by a regular perusal of a live publication that has his interests at heart. You probably know a contractor who is always in touch with the newest and best that is offered for sale; who is able to explain to his customers just what has been placed on the market, and why it has the particular advantages that have been claimed for it. This man is the one who keeps himself posted by reading his trade publication.

While this may seem somewhat useless by the man who has not considered it in the light that he should, a little thought on the subject will suffice to prove that the time devoted to the trade journal is so much time devoted to improving one's resources and business.

This is a fact that is now realized to a much greater extent than previously, and on this account the progress made by the contracting fraternity is growing apace with gratifying headway. There will continue to be progress in the same way so long as the contractors feel the need of this method of getting an insight into the development of their business. Once understood, there is no further need to coax the contractor who has learned his lesson. He sees that there is logic in such advice, and his returns have been far greater than the time and small outlay that the trade publication has cost him.



LE ROI EST MORT—VIVE LE ROI

"The King is dead—with knell of passing day
He crossed into that bourne from which
No traveller, howso exalted, may return,
Leaving a nation—nay he left them all
Sorrowing that the world had lost a King indeed.

We who remain—
Following the ancient rule, may shout in time
"Vive le Roi!"—but for a cloud of years
There will remain a pungent sorrow in the words:
"The King is Dead," "

Painting Iron Bridges

J. M., Halifax, N.S., has difficulty in finding a suitable paint for iron bridges. He writes the "Contract Record" as follows:

"For the past two years I have been engaged in looking after the roads and smaller bridges in the Province of Nova Scotia. I have also the painting of the larger iron bridges, and I have had great difficulty in selecting a suitable paint, especially for those bridges along the sea coast. They appear to corrode in a very short time. At present I am testing several paints by making a strong bath of salt and other materials contained in the sea-moisture, as found by analysis of same, but I would not like to put the results in print. I have also been testing petroleum oils with regard to making them waterproof—I have used as much as 8 per cent., but not with as good results as with 10 per cent. Can you help me out?"

It is generally admitted by engineers that properly treated linseed oil is the only suitable liquid to be used in a steel bridge. Having decided on the oil, the next important question is the pigment. It is essential that the pigment be of such a character that it has no chemical action on the oil, by which its life would be lessened. It must be of a fine texture, that it will readily incorporate itself with the oil, so as to brush out into a smooth film of paint.

It is now conceded by those who have made a study of bridge painting and other structural steel work that specially treated graphite possesses all the qualities that make it the most desirable paint pigment. It is inert in its character, and capable of being combined with the oil in such a way that it becomes inseparable under use, and withstands disintegration for the longest period. A paint composed of specially treated graphite, combined with a quality of oil as described, will retain its elasticity for the longest period, conforming to the expansion and contraction of the metal under different atmospheric conditions.

The trouble with so many steel bridges is that the engineers are constantly experimenting with products of a coal tar nature. No such paint possesses qualities that make up a durable or protecting coat for steel. The film of paint hardens quickly and separates itself from the steel, allowing the moisture to get underneath and set up a rust, which may go on unseen for considerable time while the surface may still remain unbroken to any great extent.

Then again, the greatest care must be taken to see that the surface is in proper condition to receive paint and the weather suitable for application. All surfaces should be thoroughly free from all mill scale and rust, which can be removed by cleaning with wire brushes, and all grease, dirt, etc., should be removed by a cloth saturated in benzine. After thoroughly cleaning in this manner, the work should be immediately proceeded with, by giving a thin coat of paint. After allowing it to stand for three or four days, until it is thoroughly dry, the second coat should be applied. No painting should be permitted on damp surfaces or in wet or frosty weather, as poor results are bound to result.

The matter of brushes is another important feature. The use of large flat brushes is not approved because the paint is flowed on, but instead, a round brush should be used, by which the paint is thoroughly brushed into the surface.

Where bridges are in close proximity to salt water an incrustation of salt will quickly appear on the surface of the paint, and while this tends to shorten the life of the paint it will have no bad effect on the steel so long as it does not get under the paint. The paint is applied for the purpose of keeping just such elements away from the steel itself, thereby protecting it, and the life of a paint then depends upon the severity of the exposure. Bridges so situated should be carefully watched so as to determine the time when they need repainting, which will be of more frequent occurrence than where they are situated under exposure not so severe.

The Sherwin-Williams Company have produced a paint in "Metalastic," which is being used with good results. It is

clear, however, that no matter how good the paint is if the surface has been previously coated with some of the coal tar products, or red oxide paints, unless this is first removed and the new paint applied in a proper manner, under suitable weather conditions, the paint will not prove as durable as it would under favorable conditions, in fact, a bad report is almost sure to follow unless all care is taken to see that surfaces are right and weather conditions are suitable.

The Work of Brick Masons at Boston

A comparison of the number of brick laid per mason per hour and the cost of the work (referred to a uniform wage unit) upon the Metropolitan sewerage works, which are largely built by contract, and upon work done by the sewer division of the Boston Street Department by day labor and by contract, is given in a report of Messrs. Metcalf & Eddy to the Boston Finance Commission. The calculations are based upon the assumption of 600 bricks per cubic yard of masonry, and a wage rate of 70 cents per hour, which does not include an allowance for tending masons, handling brick on the surface, or mixing mortar.

The highest cost on the Metropolitan sewers was \$4.23 per 1,000 brick on a 36-inch circular sewer with 8-inch arch and 4-inch invert, built by contract. The next highest was \$3.13 per 1,000 for a 3½-foot sewer where an 8-inch arch only was constructed of brick. The largest sewers, with 4-inch invert, cost on the average only \$1.92 per 1,000 brick for mason labor. On work done by day labor by the city of Boston the next to the lowest unit cost for brickwork was \$9.48 on a drain 12 feet in diameter, with 16-inch brick arch and an invert frame 12 to 16 inches thick. Work done by contract on the Metropolitan sewer, which is comparable to that just noted, done by the city by day labor, cost only \$2.12 per 1,000 brick, or less than one-quarter of the amount where city labor was used. The average cost of four sections done by contract was \$1.92, or about one-fifth of the cost of similar work done by the city. A comparison of the smaller sewers built by the Metropolitan Commission with those built by the day labor force of the city shows that the former cost from \$2.77 to \$4.23 per 1,000 brick and the latter from \$9.04 to \$18.34.

On some of the city work the average for a whole week showed that in some cases as few as 13 bricks per mason per hour were laid; the maximum was 242. On the Metropolitan work the number ranged from 94 to 570. The highest number per hour for the average of an entire job done by the city was 78, whereas the lowest upon the Metropolitan was 165 and the highest 384. Messrs. Metcalf & Eddy call attention to the fact that weeks when no brick were laid have been omitted in computing the hourly rates, and attribute the result not wholly to lack of willingness on the part of the masons, but to poor management on the part of those who were in charge.

Metcalf & Eddy believe, as a result of their investigations, that the total cost to the city of brick masonry in sewers is over \$18 per cubic yard; a fair price to pay for Portland cement concrete, they think, would not be in excess of about \$8 per cubic yard.

Proposed Standard for Cast Iron Pipe

In regard to the above subject the Canada Iron Corporation, Limited, Montreal, write us as follows:

"We may say that over two years ago, we adopted as our standard the specification of the American Waterworks Association, which is the specification that the Canadian Society of Civil Engineers have virtually decided upon as a Canadian standard. This, in our opinion, is the best specification for both the manufacturer and consumer, and it has already been adopted by a great many towns and cities throughout Canada."



40 ft. Concrete Arch with 14 ft. roadway at East Whitby, Ont., cost \$2,160.

Reinforced Concrete Municipal Bridges

With Illustrations of Typical Structures—Economy of Cost, Permanency and other Advantages of this Construction—Notes on Design*

By A. W. CONNOR, of BOWMAN & CONNOR, Consulting Engineers, Toronto.

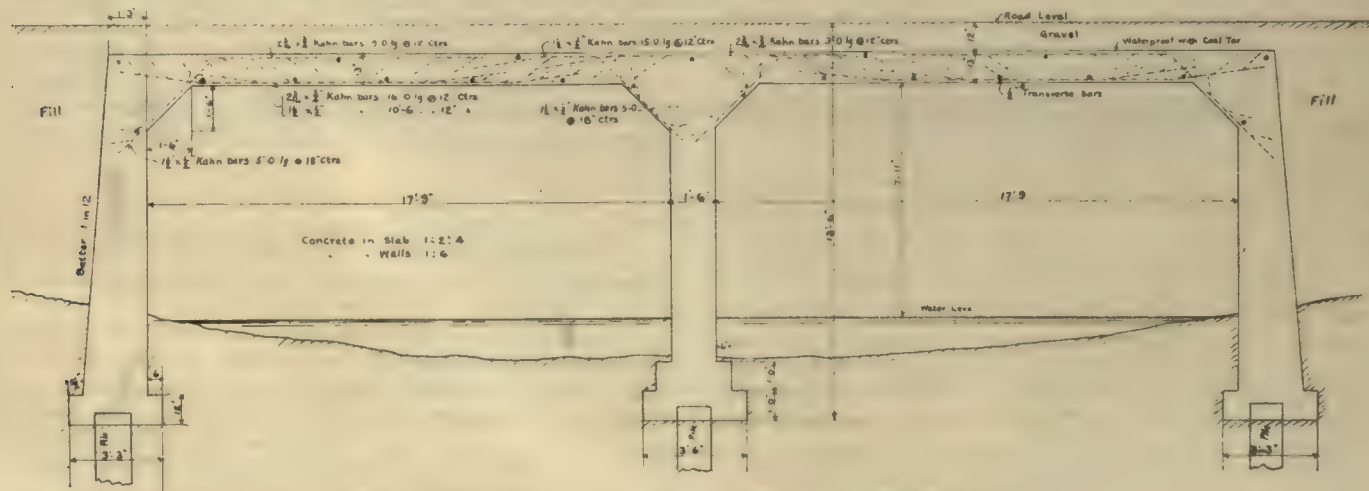
The use of concrete for bridge work has increased very rapidly within the last few years. The municipalities have now become interested in concrete, as they see more and more of its successful use in various structures. While the advance has been rapid, there is every reason to believe that the very popular position which this building material has attained will be maintained.

The concrete bridge appears to have come in as a cheap substitute for the masonry arch, but it was soon realized that it had a status and individuality of its own. It has practically supplanted the masonry arch, except occasionally for facing a concrete structure.

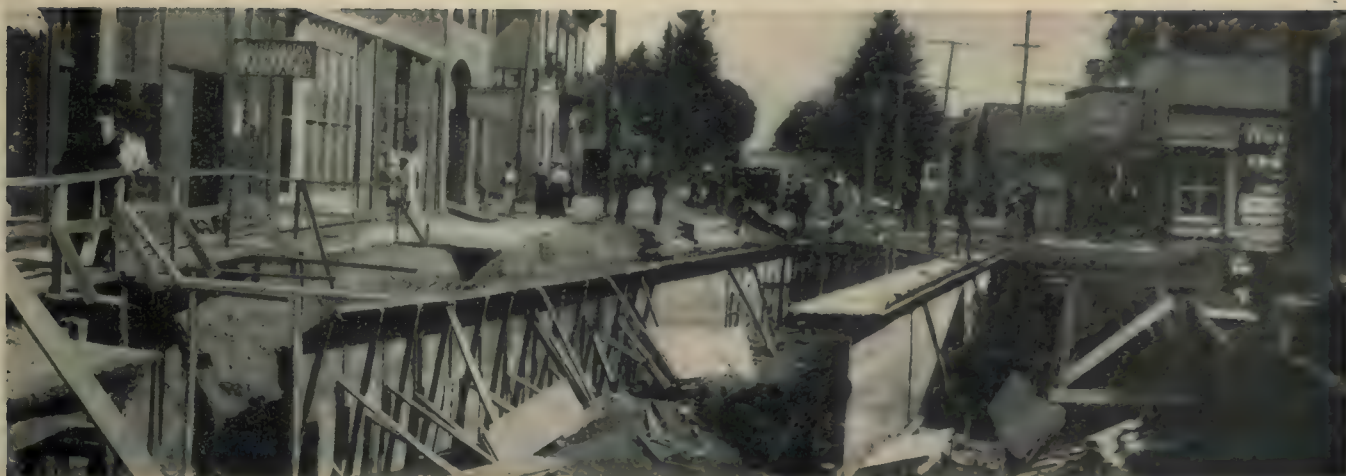
It has also proved a very strong competitor with the steel bridge. Each type of bridge has its own place according to local conditions. For short spans the cement bridge is generally cheaper than the steel bridge with concrete floor and substructure. Where good foundations are obtainable, the concrete bridge has been found to compete successfully up to spans of about 100 feet. Cost is, of course, not the only consideration, and many long span concrete arches have been successfully built, and others and larger ones are contemplated. The

results of these large undertakings will be watched with much interest.

The concrete bridge has much to recommend it. It is a permanent structure, economical in the first cost and requires no expenditure for maintenance. It is perhaps the only structure that improves with age. On account of its greater weight, there is practically no vibration due to moving loads, and floods are unable to dislodge it. It is also fireproof. In most cases the ordinary roadway is built right across, so that one might never notice the bridge in driving over it. This is an advantage in driving cattle across it. Another advantage of the concrete is its superior appearance and its adaptability to architectural treatment. As the concrete bridge is a permanent structure, it seems a mistake to spare the relatively small extra expense in order to improve its appearance, by a little extra care in the surface treatment and by building a concrete railing instead of a cheap gas pipe rail. The reinforcing steel will also outlast the steel in a steel bridge on account of its being protected from rust, and also being subject to less vibration.



Section of Culvert erected at Listowel, Ont.—Length about 311 ft.



Listowel Culvert in course of construction—This culvert was built to replace an old wooden pile structure which carried a small stream down the main street of the town.

The merits of the concrete bridge above mentioned are, of course, conditioned on proper design and careful and honest handling of the materials. No building material can give good results unless it is properly used. Some failures have resulted from the neglect of one or both of these points.

The simple lines of the concrete bridge has led men to think that anyone can draw a plan of a concrete bridge, and that a little steel buried somewhere in the concrete will give it infinite strength. As a matter of fact, the concrete structure requires greater knowledge and experience, and certainly more calculation than a similar steel bridge. The best, as well as the most economical structure, results from careful design, by which every part of the structure is of equal strength and where all the material is so placed as to have its maximum efficiency. This requires both theoretical and practical knowledge of every detail of the construction by the designer. The cheapest plan is always the most expensive in the long run.

The limits of this paper forbid any attempt to describe the methods of calculation, so only a few words will be said. The bridge must be designed to carry its own or the dead load, and the moving or live load. This latter is usually taken as so much per square foot of the floor or of a concentrated load such as a road roller or traction engine. The load assumed will depend on the

present and possible future traffic. Every possible condition of loading must be considered. Paradoxical as it may seem, the full load does not cause the greatest stress in parts of the structure. Another stress that has to be figured on is due to expansion and contraction from temperature changes. The effect of wind and impact has also to be considered, though in the heavy concrete structures these are of less importance. The sum of all the stresses that may result must always be within the safe limit for the steel and the concrete. What those limits should be is not very definite, different engineers differ in their judgment of what will give a sufficient factor of safety. Doubtless further testing and experience will lead the way in this matter, and a specification may be drawn up and generally adopted. Equal attention must be given to the abutments. The thrust from an arch must be calculated, and the size of the abutment determined so as to make it stable and rigid. The higher the arch is above the foundations, the larger will the footings be. Also the flatter the arch, the greater will the thrust be, and the larger the abutments. The bulk of the abutments is sometimes reduced by using reinforced buttresses, instead of the solid construction.

Due care in construction is also essential, in order that the assumptions of the designer may be fulfilled. Carelessness still prevails in this regard, as it is often thought that anyone can mix and handle concrete.



Arch Bridge near Eden Mills, Ont.—Clear span 50 ft; width of roadway 14 ft; cost \$1,450.



Arch Bridge at Eramosa Township—Clear span 60 ft; width of roadway 14 ft; cost \$1,270.

While it can be handled by unskilled labor, it requires skill and vigilance on the part of the foreman and competent inspector. Every batch must be of properly proportioned materials and well mixed and deposited in place. This cannot be too strongly emphasized.

The bulk of materials required are generally close at hand and local labor is also used in the construction. The principal materials used are cement, sand, stone or gravel, water and steel, and wood for the forms and bracing. The method of construction will be dealt with by another speaker. The cement should be the best Portland cement, and it should always be specified that it shall fulfil all the requirements of the Standard Specifications of the Canadian Society of Civil Engineers. The sand and stone or gravel should be properly proportioned and mixed, so that all the voids are filled. If the sizes



42 ft. arch bridge at Durham, Ont.; 40 ft. roadway, concrete retaining walls about 300 ft. long; cost, arch only, \$2,360.

of these materials are properly graded, the less will be the percentage of voids and the less cement may be used. Usually these proportions are specified by volume, regardless of the material used or without stating whether the cement is measured loose or not. This is a mistake. For larger work careful measurements should be made and tests made to determine the proportions to obtain the strongest concrete. The requirements for the various materials will not be dealt with further in this paper.

There is a good deal of controversy as to the best kind of steel for reinforcing concrete bridges. It may be prefaced that steel is used to take up tensile and stresses and the concrete to take up the compression. The steel and concrete will each take up the other stresses also, but each is cheaper in its own field. This is the *raison d'être* for reinforced concrete.

The concrete protects the steel from rust. Into the controversy of the kinds of steel to be used, we cannot enter, but merely mention the principal types briefly. The steel should be made by the open hearth, not by the Bessemer process.

The first division is between high carbon and medium steel. The former has a higher strength and elastic limit, but is more brittle and cannot be so readily fabricated. The medium steel is what is used in steel bridge work, and is less liable to sudden failures. The advocates of high carbon steel, claim that less steel may be used, but it is a question if the higher stresses in the steel, with consequent greater stretching and reduction in area of the steel, will not injure this concrete by producing larger cracks in the concrete (and possibly, therefore, impair its rust-resisting properties), and also have a greater tendency to break the bond of the steel and concrete. It is claimed that this has happened to beams after being in use for some years. The writer considers it best to be conservative, and not allow higher unit stresses until time has justified the higher stress.

The second division is between the various patented shapes of bars made of either high carbon or medium steel. There are the plain unpatented bars, the conjugated bars and bars with stirrups which are patented.

The purpose of the conjugated bar is to increase the bond of the steel to the concrete. The stirrup, whether a part of the bar or rigidly fastened to it, will also do this, and also take up the shearing stresses. That the bond is essential is beyond question, for it is only thereby that the steel can take up its load. This bond must also be continuous for the increment in tensile strength must come from the horizontal shear in the concrete at all points. That plain bars have sufficient bond, and if bent up at the ends of a beam to take up the maximum shear are satisfactory according to tests made, is also true, but laboratory tests are not entirely conclusive, as to the effect of continuous loads and shocks received during a number of years. Steel certainly acts differently under repeated loads. It is felt therefore that a conjugated bar offers a greater security than a plain bar, and stirrups even greater. The conjugations increase the bond. The bond is reduced by moisture, vibration and reduction of sectional area of steel in tension. The stirrups also take up the shearing stresses throughout. Concrete is not very reliable in shear, and less so if of poor workmanship. Besides the above styles of bar, plain twisted steel bars are largely used. They are, therefore, like a corrugated bar, and though of medium steel, have their strength and elastic limit increased by the process of twisting.

The desirability of a good surface for appearance is evident. This is usually done by careful work in forms and working the stones away from the surface with a suitable tool. This is better than afterwards plastering the surface. Another method is to use a richer outside mortar, white or colored as desired. This is done by putting it outside of a steel plate near the forms, and gradually raised up as the work progresses; another scheme is to rock face or brush hammer it. Another desirable feature is to use a handsome concrete railing, either



21 ft. 6 in. skew through culvert, between Counties of Grey and Wellington. 14 ft. roadway.

separately moulded or moulded in place. The concrete bridge is thus capable of very artistic treatment.

We will now briefly describe the various types of concrete bridges.

(a) Reinforced slabs are largely used for short spans.

(b) Deck girder bridges with slabs over the beam resting on concrete abutments. These are suitable up to about 40 feet span, and are generally cheaper than an arch if the foundations are not good.

(c) Through girder bridges similar to the above but

with floor near the bottom and carried by two girders which also act as hand rail. This type is suitable where the water-way is limited.

(d) Concrete slab and beams where steel I beams are used instead of reinforcing steel. This is not strictly a concrete bridge, as the steel beams carry the load and the concrete is only for the protection of the steel.

(e) The arch. This is the most popular type and may be divided into arches with or without hinges. The hinged arch is rare in this country, most examples occurring in Europe. The arch without hinges is the usual type in this country and the arch ring may consist of a single monolithic ring or a number of ribs. The roadway may be carried on fill held in by the spandrel walls, or it may be carried on a concrete slab, or a series of subsidiary arches on top of the main arch ring or arched rib or on a series of beams and columns.

The spandrel filled arch is the most common and is suitable for shorter spans, and the slab style for long spans. In cases where the foundation is less reliable, the weight of the structure may be considerably reduced by using a slab or beams and columns, as for longer spans, but with solid spandrel walls.

The shape of the arch may be circular, parabolic or elliptical. The circular arch is the usual type, either segmental or three or five centered. Where the rise is small it may be figured as a parabolic ring, which is simpler than the circular ring.

The rise of the arch should be at least one-tenth of the span. The greater the rise, the more economical the design.

Provision should be made for expansion. The spandrel walls of arches should have expansion joints or plains of weakness. It is our custom to have the spandrel walls separate from the arch ring, but fastened thereto with dowels. This allows the arch ring to rise and fall with temperature changes.

The top surface of a concrete bridge should be water-proofed by plastering with a 1 to 1 mortar before the concrete has set or by coating with pitch or asphalt. Any place where water might lodge should be drained.*

Concrete Not Always Adaptable

Concrete bridges are, as a rule, not believed to be adapted to locations where the traffic or channel beneath them must be left unobstructed during construction, says the "Engineering Record." In the case of two large bridges erected recently an open channel has been maintained by the use of steel centering, and in the Harrisburg Viaduct a system of cantilever steel forms was devised which had sufficient strength to support the green concrete. For low concrete bridges the forms are generally supported by posts or towers placed at short intervals across the span, and in consequence the channel is obstructed or the traffic interrupted. When it became imperative some time ago to replace the timber bridges carrying cattle runways across railroad tracks and streets in the Union Stock Yards, Chicago, the authorities wished to use concrete, though conditions, apparently, were unfavorable. The railroad tracks over which these runways are carried have an unusually heavy traffic, both night and day, which could not be interrupted. The tracks, too, are so close together that posts or towers could not be placed between them for the support of the centering. On the other hand, the traffic on the runways themselves could not be delayed, since they are the only entrances from the cattle pens to the slaughtering and packing houses and for about 8 hours every morning

carry an uninterrupted procession of animals. The entire stock yards area, moreover, is so closely built up with large industries that it was manifestly inadvisable to change the locations of the runway bridges. The solution of the problem, by the use of three-hinged arch viaducts, is described elsewhere in this issue. The ribs were cast on the ground in a convenient place, loaded on flat cars, conveyed to the site and erected by a derrick. With the ribs in place the suspender rods and floorbeams were hung, and all form work was carried by the ribs without any support from below. The design was so handled that the new bridges could be built around the existing runways without interfering with the traffic on them. While interesting in itself as the solution of a difficult construction problem, the design also indicates a type of reinforced concrete construction which may be found applicable in many cases where ordinary methods of erection would be objectionable on account of the interference of the supporting posts and towers.

Long Span Concrete to Bridges

"The Builder" (London) says that within recent years concrete has become a serious competitor with masonry in the construction of long-span arches. At least nine concrete arches, with spans ranging from 187 to 280 feet, have been built on the Continent and in America. Two other notable bridges in the same material are about to be commenced—one of these for the city of Spokane, Wash., containing an arch of 281-foot span, and the other for the city of Pittsburgh, having been designed with a 300-foot arch. The Rocky river bridge at Cleveland, Ohio, with the span of 280 feet, is nearing completion at the present time. Several of the structures to which we refer are reinforced to some extent by steel, others being of plain concrete. Although British engineers have not yet attempted any rivalry with their confreres abroad in respect of gigantic concrete arches, it must not be supposed that they have neglected the claims of that material in bridge building. Four or five reinforced concrete arches or nearly 100-foot span have already been constructed; a fine highway bridge was completed last year at Pontypridd with a centre arch of 117-foot span, and the new bridge commenced at Kilkenny will have the clear span of 140 feet, this being the longest arch in reinforced concrete hitherto undertaken in the United Kingdom.

New Quebec Bridge to be of Cantilever Design

According to a despatch from Ottawa, the new Quebec bridge will be of cantilever design and tenders will be called for by public advertisement in the leading engineering journals of Canada, the United States and Great Britain in the course of a few days. The Minister of Railways received a cable from Engineer Fitzmaurice, who is now in England, stating that after consultation with his colleagues, Modjeska and Vautelet, the other members of the board of experts appointed by the Government to supervise plans and construction of the new bridge, they had agreed that the tests which have been recently made, both in England and the United States as to the suitability of the cantilever design submitted last fall by the Board of Engineers, showed that it was the best possible. Tests have also been made of the suspension design, but the engineers have decided in favor of the cantilever. About three months' time will be given for tenders to be submitted, and all tenderers must comply with the condition requiring a sufficient guarantee that the bridge will be constructed strictly according to specifications, and that in case of any failure the contractor will be liable for all loss.

* Paper read before Canadian Cement and Concrete Association. Illustrations courtesy of author and Trussed Concrete Steel Company.

Fine New Office Building at Montreal, Que.

Erected for the Lake of the Woods Milling Company on St. Sacramento Street—Particulars of Design and Construction

Architects: ROSS & MACFARLANE, Montreal

A handsome and substantial addition to the number of down-town office buildings at Montreal, Que., has been made in the erection of a building for the Lake of the Woods Milling Company on St. Sacramento street, immediately opposite the Board of Trade Building. It also has frontages on St. Alexis and St. John streets, giving it a situation and aspect that makes it prominent in a district that is quite closely built. The old Corn Exchange formerly occupied the site, and the walls of the lower storeys have been retained, as they were found substantial and adapted to the new additions above. The interior has been entirely removed and from the foundations up is built in fireproof materials of steel and concrete. The upper portion has been built with the Leeds Fireclay Company's unglazed terra cotta. The design is classic and the maximum of light has been provided, preserving at the same time good proportions and safe construction. Two passenger elevators run from the basement to the several floors above, and iron stairs provide similar communication. All corridors and stair halls are paved with mosaic and marble.

The interior of this building has been laid out in suites of offices for the occupation of several leading business firms in the city, and special interior finish has been designed and set up to suit the requirements of the respective tenants, and especially in the office of the Lake of the Woods Milling Company, where quartered oak pilasters and panelling have been used in their decoration. Private offices have been finished in mahogany and the electric light fixtures are of special design. Cork flooring has been provided in the clerks' space and mosaic and marble have been used in a decorative way.

During the course of construction it was found necessary to support and underpin adjoining part walls, and also to underpin the foundations of that portion of the masonry which has been retained.

It is worthy of mention that operations were begun in October and that the building was turned over to the owners and the tenants for occupation on the first of May. Considering the fact that this building was erected during the winter months, that it is a fireproof struc-

ture and that the material used in the exterior walls has been imported from England, and having in mind also the amount of interior work of a special character, a record has been established in point of time that will compare favorably with those made on similar structures in any other city.

The general contract was awarded to J. H. Hutchison. Among the sub-contracts may be mentioned the



Lake of the Woods Building upon completion

following: Carpentry, Simpson & Peel; roofing, Richardson & Simard; plumbing and steamfitting, Garth Company; tiling, Calkins Tile & Mosaic Company; painting, J. N. Arcand; electric wiring, Philip Lahee & Company; architectural ironwork, John Watson & Son; elevators, Otis-Fensom Elevator Company.

I-beam columns used in the temporary one storey machinery building of the Brussels Exhibition, which is about to be opened, have been built so that no damage is done to the I-beams, thus increasing their value when the buildings are torn down. Two I-beams are used in each column and are held together by clamps around the flanges, cast-iron plates being placed inside at the same level as the outside clamps in order to act as spacers. These columns are seated on cast iron base plates resting on a concrete foundation.



View taken at the commencement of operations.—Showing part of old walls retained.

Cost of a 48-inch Cast Iron Force Main

A 48-inch cast iron force main, 18,181 feet long, was laid during 1908 and 1909 in the low service district of Detroit, Mich. The work, for which the contract price was \$22.95 per ton, occupied slightly less than twelve months, the progress averaged 63.8 lin. feet per day, and the cost per lineal foot to the city, as given by Mr. George H. Finkell, civil engineer, in the last annual report of the Board of Water Commissioners, was \$17.48.

Where the line crossed the old Bloody Run, seven 4 x 5-foot concrete piers, 36 feet on centres and having a maximum height of 10.4 feet, were put in to secure a solid foundation. Between each pair of piers the pipe was supported on a reinforced concrete beam 8 feet 6 inches by 4 feet in section and 35 feet 6 inches long. Each pipe was subjected to a test pressure of 300 pounds per square inch at the foundry and 100 pounds after being laid and caulked.

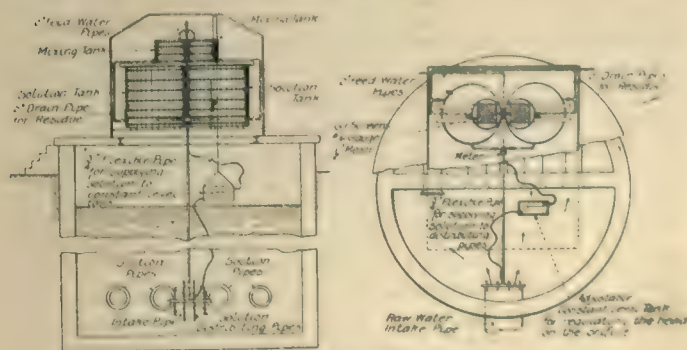
After the line had been completed and filled, a section of 48-inch pipe 14,907 feet long, containing 1,360 48-inch joints, seven 42-inch joints, two 36-inch joints and 38 12-inch joints, was tested for leaks by feeding the entire section through a new 1-inch meter for 20 hours. The amount supplied was 690 cubic feet, or at the ratio of 258 gallons per hour.

The total cost of constructing the 18,181 feet of 48-inch main was \$316,835, distributed as follows: Pipt. \$168,339.90; specials, \$6,367.59; lead, \$8,459.64; gates, \$8,403.22; miscellaneous, \$3,211.60; wells, including labor, \$8,698.52; cartage, \$10,617.63; outside bills, \$2,074.38; superintendence and engineering, \$7,721.94; labor, not including wells, \$92,946.08.

Water Sterilizing Plant at Montreal

A temporary sterilization plant, which treats 16,000,000 Imperial gallons of water daily with a solution of hypochlorite of lime, is in use at Montreal, pending the completion of that city's filtration system, on which work is now in progress. The chemical is applied to the raw water near the bottom of an intake well into which the ends of the suction lines from pumps extend. The equipment, which is placed over the intake well, consists of two wooden mixing tanks mounted above two large solution tanks, from which the chemical flows through a flexible rubber pipe to a constant level feed tank and thence through a second length of flexible pipe to a manifold of pipe, through small holes in which the hypochlorite is discharged.

The charge of bleaching powder is first rubbed through the screens on top of the mixing tanks, and mixed with water into a thick paste; then the whole charge is dissolved by water from the supply pipes shown in the accompanying drawing, and the lower tanks allowed to fill with the solution of the required strength. Each solution tank has sufficient capacity for 24 hours' supply.



The solution is made up in one tank, while the other is emptying into the water supply, and by the arrangement of piping shown, the tanks can be interchanged on the feed without interruption, thereby securing a continuous flow into the constant-level tank.

From the solution tanks the hypochlorite flows through a 2-inch central valve and meter to a small, constant-level tank, suspended in the intake well. The function of this tank, which may be raised or lowered by means of the small crank shown in the drawing, is to regulate the head on the distributing grid, so that a proper quantity of the solution may be added in proportion to the pumpage. The solution tanks and distributing grid are connected by rubber hose. The solution in flowing into the raw water in the manner shown through small holes in the piping of the grid, is more or less uniformly distributed throughout the water entering by the intake pipe.

The quantity of water pumped at present is about 16,000,000 Imperial gallons in 24 hours, and about 120 pounds of bleaching powder per day is used. The strength of the solution in the large tanks is about 0.5 per cent. and 100 gallons per hour is fed to the supply; that is, the raw water is dosed with bleaching powder in the proportion of about 1 part in 1.3 millions of weight. The commercial product has an average of 87 per cent. available chlorine.

The plant was installed under the direction of Mr. J. O. Meadows, sanitary engineer of the Provincial Board of Health, by the Montreal Water & Power Company, of which Mr. F. H. Pitcher is general manager and chief engineer. It has been in successful operation since January 24th.

Labor Matters

About 100 carpenters of Kingston, Ont., went on strike last week for an agreement of \$3 per day of 8 hours.

At Regina, Sask., between 200 and 300 men, belonging to the carpenters', plumbers' and electricians' unions, went out on a demand for increased wages. A large supply of non-union carpenters is reported at Regina and it is stated that nearly all the positions vacated by the union men are being filled. The contractors of that city agreed to the union scale of wages, but refused to recognize the closed shop.

At Halifax, N.S., the plumbers are out owing to the refusal of the master plumbers to grant an increase of from 25 to 30 cents per hour. The carpenters in this city have also asked for an increase.

At Toronto a strike has been declared by the painters, who want a minimum rate of 35 cents per hour instead of the 30-cent one which has hitherto prevailed. The Master Painters' Association hold strongly to the open shop principle. The workmen at a meeting held last week declared for closed shop. About 500 painters are affected.

The new city engineer of Medicine Hat is Mr. A. J. Grimmer, who was at one time city engineer of Fredericton, N.B., and later on the academical staff of the Manitoba University.

The Ottawa Plumbers' Union wants a new agreement with the Master Plumbers, and is asking for shorter hours and an increased scale. The plumbers are now getting from 38 to 40 cents an hour and working 50 hours per week. The following scale is what they suggest: From July 1, 1910 to July 1, 1911, 43 cents per hour; from July 1, 1911 to July 1, 1912, 44 cents per hour; and from July 1, 1912, to July 1, 1913, 45 cents per hour.

Contract Work for Municipal Projects

Some of its Advantages over Day Labor—Suggestions Looking to Improvement in the Present Method of Awarding Contracts*

BY CHAS. R. GOW

From experience in the use of both classes of labor under discussion, I think I can safely say that inefficiency of labor is not peculiar to municipal work. We have it in contract work just as often as we have the same inefficient supervision and faulty system of control. And I suppose that the reason municipal work, as a rule, costs so much by the day labor method is due to the fact that the system has grown up with municipal administration, which has made it peculiarly conducive to inefficiency.

The rate of wages paid for foremen and superintendents in municipal and most government work is, as a rule, I think, less than is paid by the large contracting concerns doing the same work on the same scale, and that would mean, of course, that a much less efficient class of foremen would be carried by the cities than by the contractors. We have found from experience that some foremen are cheap at \$10 a day, while others who might be willing to work at from \$2.50 to \$3 a day, would be very expensive. As an illustration, I once worked as superintendent of a large contracting concern in New York. They had previously done railroad work, and they were engaged at the time on the construction of one of the large subway sections there, and brought on a lot of these foremen to handle that work. And the first criticism I made after looking over the work was that they did not have a sufficient number of competent and experienced foremen. I was told to hire any foremen I knew who were suitable for the work, but when I mentioned the fact that we would probably have to pay \$150 a month for such foremen as I had in mind, the president of the company threw up his hands. After considerable argument he finally agreed to allow me to engage two such men as I wanted at that salary. The first of these men who happened to appear on the work was put in the place of a \$3 man. And his first act was to discharge six men out of the gang, and in his first day's work the result was an increase in output of 25 per cent. And this increase in output, as I remember it, represented a value of something like \$35 to the contractor. That would illustrate in a way what I mean when I say that the high-priced foreman is oftentimes cheap in the end.

The cities, of course, establish a fixed rate for their foremen as a rule. There is no promotion by merit, and there are seldom any questions asked as to the ability of the foreman, provided he comes with the proper credentials from the civil service or other department. Of course, the average laborer will do no more work than he is required to do, whether he is working for the city or for a contractor. And unless he has competent supervision the results cannot be expected from him. The political aspect of city labor was pretty clearly dealt with by Mr. Eddy. Of course, its demoralizing effect is unquestioned. It was in order to correct the evils of political control that the civil service system was inaugurated, and yet to my mind that is even a greater evil as regards labor inefficiency than political control.

An Interesting Case in Point

When, some years ago, I was acting as superintendent for the Boston Transit Commission, in charge of their contract labor, we had some 600 men employed. That was on the original subway, doing some special work where it was adjacent to buildings, or in localities where it was feared the

contractors might lead the commission into difficulties. We were obliged under the law to procure all the labor from the civil service list.

And the most difficult feature of the whole undertaking was to secure a gang of men that we could do anything with at all. The trouble seems to come in this way: The good men, the efficient men, are seldom out of work for any great length of time. The value of their services is well recognized by contractors, and as soon as they finish up one job they secure other work, if there is work being done. Consequently they don't take the trouble to register with the civil service commission and wait their turn before they are certified for employment. The majority of the men who do register with the civil service commission are men who can't find employment in any other way and simply look upon the city as a good asylum from which to obtain an easy living. The result, as we found it, was that if we wanted 25 men to start a piece of work, we would make requisition for 100, and out of that 100 probably 50 would appear with high standing collars and patent leather shoes, and some of them on crutches or otherwise disabled. And we would be expected to select from that crowd a gang of men to go down 20 or 30 feet below the surface of the ground to brace trenches and excavate in wet and difficult ground. I can readily understand where the city departments may be seriously handicapped on that account and where a really conscientious official would have serious difficulty in obtaining a gang of men that would be suitable for his needs.

The next evil that suggests itself to me is the influence of labor unions. The labor vote, of course, is of such consequence that it can't be ignored by political office-holders if they expect to continue in office. And the result is that labor councils have been allowed wide latitude in dictating the details of labor administration. It is one of the avowed principles of the labor unions at the present time to so regulate the output of men as to make positions for the largest number of men possible. And they consider it perfectly legitimate to so cut down the output of one man as to make room for a second one doing the same work. Of course, where this is allowed to prevail, as I believe it is largely in the city employ, it can't be expected that efficient service can be maintained.

Sentiment vs. Economy

Then there is the question of discharging men in the city employ. Now that they are under the protection of the civil service, it has become a matter of considerable difficulty for a foreman to get rid of an inefficient man. And I can readily see where all these things combined can tend to raise the price. The matter of employing citizen labor is very fine in sentiment, but it hardly makes for economy. The contractors found long ago that the available supply of English-speaking labor was practically exhausted, that is, the supply of competent labor. And they were obliged to turn to foreign labor, not so much as a matter of economy, as a matter of necessity. My own experience is that we pay practically the same rates of wages to the competent foreigners that we do to equally competent Irishmen or Americans. And while we would much prefer to have the English-speaking man to the foreigner, we find it impossible to obtain a sufficient number of competent men. And, as a matter of fact, the Italian labor at the present time is becoming scarce. The better class of Italian laborers to-day can command and receive \$2 a day,

*Extracted from an address given in a discussion before the Boston Society of Civil Engineers.

when business is good, for common labor. We pay some of them who are skilled a little beyond the average, as high as \$3 a day. We pay a minimum wage in our company of 17.5 cents an hour, and an average for common labor of probably about \$2.10, which is not a serious handicap to day labor as a matter of competition.

I am inclined to take issue with Mr. Eddy as to the possibility of day work being done better than contract work. My experience and observation led me to a different conclusion.—I have noticed that where day labor is in vogue, as a rule there is no inspection, and where there is any conscientious endeavor to do the work cheaply, it is carried to the same extreme that a contractor is apt to carry his work in doing it cheaply. I have in mind an instance I noticed a few years ago in one of the cities nearby where bids were asked for the construction of a covered waterway, a brook channel. I think it was. And for some reason all the bids were rejected and the work was done by day labor. In that case there was an inspector on the work who appeared to me to be a little more ambitious to hustle the work along and to do it cheaply than even the foreman himself. Most of his energies were given to pushing the work. On that particular piece of work there was a concrete arch, very flat, as I remember it, and not more than 12 inches in thickness. And at the time I noticed the work they were concreting this arch and imbedding in it field stone as thick as they could get them and still have them come within the limits of the sections. Now, so far as I know, no serious trouble has occurred from that type of construction, but I rather imagine that if a contractor suggested that to an inspector or an engineer he would be told a few things. There are several other cases I have in mind where contracts have been called off and bids rejected and the work subsequently done by day labor, and the engineers or inspectors, having the contract price in mind as an upset price which they must not exceed, have stretched their consciences materially to keep within the limits under the disadvantageous conditions they were put to by the labor situation and expense.

Incompetent Tenderers and Low Bids

As a general thing, in letting contracts, the disadvantages could largely be overcome if the engineers would show a little more courage oftentimes in rejecting low bids and the bids of incompetent parties, and insist, as far as they were able to do so, on awarding the work to competent parties at what would be a fair and living price. We all of us make mistakes in our bids. We often overlook important items. You understand, of course, that the working engineer has had months, perhaps, to think over the problem and to think over the obstacles and the difficulties to be encountered, while the contractor is obliged to form his judgment in a few days, and oftentimes the best of contractors make serious mistakes in estimating the work, and consequently bid ridiculously low. Of course, there is a certain spirit among contractors as well as other business men that makes them feel like standing up and taking their medicine under such circumstances. And oftentimes they would appreciate a suggestion from the engineer that he would like to have them retire under the circumstances and allow him to award the contract to a higher bidder. It is not impossible to find out by a proper investigation just what the ability of the contractor is and whether the work in question is beyond the limit of his ability. It seems to me that it would be perfectly proper, and should almost be deemed necessary under the circumstances I have outlined, to advise the awarding of the bid to some other contractor. And if this were done in all cases I think that the difficulties that arise out of contract work in some cases could be largely overcome.

Toronto building permits for April aggregated \$2,522,055. The total for the year to date is \$5,647,748.

Some Data on Water Purification from Poughkeepsie, N.Y.

From the 1909 report of the Board of Public Works of Poughkeepsie, N.Y., the following data have been obtained on the operation of the water purification plant. The highest recorded amounts of chlorine were 19 parts per million on Dec. 12, 1908. The general average has been 12 parts per million. The raw water is subject to considerable variations in turbidity and bacteria; the periods of low turbidity being in general coincident with periods of low bacteria. The maximum turbidity recorded was 400, on Feb. 25, 1909, the maximum bacterial count being 120,000, two days previous. The minimum turbidity was 12, on May 19, 1909, and the minimum bacterial count was 600, on July 6, 1909. The sedimentation basin provides storage for about 24 hours' flow on the average. The results of the study of silt in the basin was as follows:

Total number of gallons of water	914,552,299
Total volume of sludge, cubic yards	551
Total weight of sludge, tons	524
Total weight of dry material, tons	140
Per cent. of total deposit in $\frac{1}{4}$	58.4
Per cent. of total deposit in $\frac{2}{3}$	74.4
Per cent. of total deposit in $\frac{1}{2}$	82.9
Cubic yards sludge per million gallons	0.6
Tons dry material per million gallons	153
Average turbidity raw water	37.2
Average turbidity settled water	18.7
Per cent. removed	49.7

The low per cent. removal probably on account of clear water during a great portion of the year.

Based on experience of 1908, the following coagulant table was prepared:

Turbidity	Grs. per gal.	Turbidity	Grs. per gal.
40.....	1.00	100.....	1.75
50.....	1.15	125.....	1.85
60.....	1.30	150.....	2.00
75.....	1.55	200.....	2.20

The turbidity was determined by the standard turbidity rod. The color by comparison with permanent "platinum cobalt" standards. The alkalinity according to standard methods, using lacmoid as an indicator. The chlorine was also determined by standard methods. Bacterial counts on gelatine at 20 degrees C., and again at 37 degrees, have been made daily throughout the year; the 20 degrees gelatine in duplicate.

The general averages of temperature, turbidity, color and alkalinity of the raw and settled waters for year ending Dec. 1, 1909, were as follows:

	Raw Water.	Settled Water.
Temperature	53.6	53.6
Turbidity P. P. M.	35.4	16.3
Color P. P. M.	49.4	38.6
Alkalinity P. P. M.	51.5	47.3

The general averages of turbidity and bacterial counts from Sept. 1, 1908, to Dec. 1, 1909, were as follows:

	Raw Water	Settled Water.
20 degrees	9853	1569
Per cent. rem.		84.2
37 degrees	551	2.15
Per cent. rem.		60.8
Turbidity	37.9	19.9
Per cent. rem.		47.5
Coag. grs. per gallon	1.224	
Number days coag. used	12.7	
Free P. P. M.		0.46

Experiments with chlorine as a disinfectant were begun Feb. 1, 1908, and continued until the 12th, using the coagulating tanks for the applying of the chlorine. Late, a crude tank was used to permit the use of the coagulant until a

disinfectant house could be built. The removal from the first to the twelfth was an average of 96.4 per cent. in the settled water, and in the same number of days previous the per cent. removal was 53.3. At the present time two large vats are used alternately with a capacity of 990 gallons each, with proper pipe connections and apparatus to carry the solution directly over the flow of water into the basin. The use of chlorine was continued during the summer months while the basin was out of service, by a laying a line of 1-inch pipe across the road into the small intake basin. Not the slightest trace of chlorine can be found after an 8-hour day now.

From Dec. 1, 1907, to May 1, 1909, 32 counts were made, in which the counts before cleaning were less than counts after cleaning, and six counts were greater before than after cleaning, the total number of counts being 38, a per cent. of 84.2, in which an increase was shown after cleaning. During the year filter No. 1 was scraped seven times; No. 2, six times; No. 3, six times, and No. 4, seven times. The following table gives data regarding average length of runs and millions of gallons of water filtered between scrapings:

	Filters.			
	1	2	3	4
Days elapsed	54.7	57.0	60.4	59.2
Days actual operation	51.9	54.1	58.5	56.3
Mill. of gals. per acre filtered....	89.8	91.1	126.3	79.4
General average of days elapsed.....			57.8	
General average days operation			55.2	
General aver. mill. gallons per acre filtered..			96.6	

The general average removal of dirty sand at each scraping has been, approximately:

	Filters.			
	1	2	3	4
Thickness removed (feet)	0.10	0.14	1.08	0.09
Cubic yards removed	54.5	77.0	41.0	42.0

No 1 and No. 2 filters were re-sanded to make a depth of sand of 5.33 feet above the bottom of the pillars, 497.8 cubic yards being placed on No. 1, and 511 cubic yards on No. 2. No. 3 and No. 4 were re-sanded the year before. Four-inch cast iron water pipe was laid on top of filters used as a supply for the new sand-washing apparatus, which consists of an ejector, a distributing box and 200 feet of fire hose, with 8-inch pipe for waste. This apparatus is said to have greatly reduced the cost of re-sanding and is expected, with a few improvements, to effect a total saving of 40 per cent. The heaviest deposits of silt are at the effluent ends of all the filters. The policy has been followed of letting the filters with the lowest "co-efficient of conditions" deliver the most water.

The foregoing data on the operation of a slow sand filter plant are of value, but the cost items are omitted. In the portion of the report devoted to bookkeeping and financial statements the items are not given in sufficient detail to give satisfactory ideas of unit costs.

Experimental Grouted Macadam Road

During the past year a New York State Commission of Highways set aside \$1,800 for an experimental piece of concrete road to be constructed according to ideas of the county engineer of Westchester county. The piece of work was constructed on Road No. 52 last July under the direction of Eberhard J. Wulff, county engineer, and the following matter has been taken from his report to the State Commission of Highways:

Crushed trap rock of a size usually employed in the top course of a macadam containing, by experiment, about 40 per cent. voids was spread on the old macadam surface and rolled by a steam roller to a finished thickness of about 3 inches, the percentage of void being reduced by this rolling to about 25.

Screened sand and Atlas Portland cement were mixed in the proportions of one part cement to three parts sand, in

the dry state, on a mixing platform, spread upon the road surface and worked into the voids by sweeping about with brooms and continuous rolling with a steam roller until the voids were completely filled with the dry sand and cement mixture. Water was then spread freely on the road surface, forming a fluid grout of the sand, cement and water, the sweeping, watering and rolling being continued to assist a perfect penetration and filling of the voids between the adjoining particles of stone. More sand and cement mixture was spread wherever it was found necessary to completely fill all voids and to leave a very thin covering over the entire surface, which, when completed, was smooth and even but slightly gritty. The roadway was then permitted to harden for about seven days before being thrown open to traffic, the roadway being wet down frequently during that period. Expansion joints were placed about 25 feet apart by pouring a thin line of heated asphalt across the roadway after the broken stone was compacted but before any sand and cement mixture was spread. A section of 100 feet in length was placed without expansion joints but reinforcing the concrete slab with woven wire mesh.

The completed roadway, states the report, presents a smooth surface, equal to new macadam, is quite free from irregularities frequently formed in concrete roads, and offers a good foothold to horses. Automobiles have no detrimental effect on the road. After five months of fairly heavy traffic over the road no serious defects have developed and the coming winter will prove the efficiency or the advantage of expansion joints or reinforcement.

The measured quantities of materials used were 88 barrels of cement, about 40 cubic yards of sand, and 200 cubic yards of 1½-inch trap rock (commercial size), the resulting concrete representing a mass of 150 cubic yards in place. Expressed in the proportion of the completed concrete, the mixture would be about 1:3:7½; if expressed in the proportions of the loose materials used in the mixture, would be about 1:3:12½. It would be manifestly impossible to secure a dense mixture if the materials were mixed in the latter proportions in the loose state, and the resulting concrete would unquestionably be porous and full of cavities and lacking in resisting power for road purposes. The result of the dense concrete being obtained by the expediency of reducing the voids contained in the loose stone by rolling.

The cost of the improvement was very nearly \$1 per square yard and was in excess of the preliminary estimate. This was largely due to the cost of labor and the cost of renting tools and machines, and should prove materially less if similar work is done on a larger scale. All sprinkling was done by hand sprinklers, as it was found impossible to use a sprinkling wagon. All sand and cement was mixed by hand, when a mechanical mixture would have been more economical.

The detailed cost of the work was as follows:

	Total.	Per sq. yd.
200 cubic yards trap rock, at \$2.47.....	\$ 493.20	\$0.2774
88 barrels Portland cement	143.20	0.0805
50 cubic yards of sand	75.00	0.0422
1,600 square feet wire reinforcement.....	52.10	0.0292
2 barrels of asphalt	15.00	0.0080
Lumber	16.00	0.0090
Steam roller, 21 days	210.00	0.1182
Teaming	150.00	0.0856
Hire of tools and machinery	100.00	0.056
Labor	517.50	0.291
Total	\$1,772.00	\$0.996

Tar painting is now practised on most of the roads of the Walmer Urban District in England, according to Mr. R. H. Lapage, and has reduced the annual total cost of maintenance and repairs about 4½ cents a square yard on the main highways, as compared with the cost when tar was not used.

Trade News from Montreal

Labor Matters and Condition of Supply Market—Fair Wage Clause for City Contracts—Personal Notes

Montreal Office of the "Contract Record."

May 9th, 1910.

The past fortnight in Montreal has been a very important one to the building trades, in many respects. During this time a strike has been threatened and apparently averted.

The structural steel men were the interested parties and it is stated that outside influences were brought to bear upon the local union of steel workers to induce them to go out on strike. Apparently satisfied with existing conditions, this the Montreal men refused to do, and none of the structural companies have experienced any difficulties with their men. A strike at this season of the year, while it undoubtedly would prove a serious setback to all the larger building operations and cause unlimited hardships to all interested in construction work, yet the strikers would inevitably be the losers and have cause to regret their hasty actions.

Sub-contractors Dissatisfied

During the past week a persistent undercurrent of discontent has been noticeable among the various sub-contractors to the building trade, and to a large extent this is due to an investigation into the affairs of a Montreal general contractor whose balance of assets over liabilities is anything but promising to the interested parties.

The different trades feel that they are entitled in some measure to protection against losses of this kind. It is rumored, in fact, that the plumbers will take immediate action and will enact a regulation that will force contractors following their trade to notify the proprietors within eight days of the signing of their contract that they (the plumbers) must be protected against loss. This they are enabled to do under the Quebec laws.

Contractors would also like to see the names of the different sub-contractors announced when the general contract is signed. They object to these contracts going to contractors other than those who have figured the job and have thus been largely instrumental in obtaining the contract.

Undoubtedly the sub-contractors have had much to complain of in the past, and perhaps a solution of their troubles rests with the architect, who by his personal supervision can make the pathway of the various contractors a much easier one.

Conditions of the Supply Market

Cement continues to be an active feature of the supply market and is moving quite freely. From the office of the Canada Cement Company we learn that cement sales are far in advance of the same period in 1909.

Brick are quoted at prices unchanged from last year's figures, but are not yet in heavy demand. Almost every barge reaching Montreal at present has its quota of river brick. They are coming from Three Rivers, Sherbrooke, St. John and various points in the eastern townships, and there is very little prospect of a scarcity in this line during the coming summer.

Foundation Troubles

It is early yet for a rush in building supplies. Almost every contract of any size that has been commenced this season is struggling with foundation troubles. The Windsor station contractors finished their work some time ago. Now there is the addition to the General Hospital, the two schools for the Protestant school commissioners, the Y.M.C.A. foun-

ation, and many others that could be mentioned, which are either giving or show promise of giving trouble with the foundation work.

"Fair Wage" Clause for City Contracts

The Montreal City Council have decided to insert a "fair wage" clause in all city contracts and are also considering the appointment of a "fair wage" officer whose duties will be similar to those of the Federal Government's officer. The resolution as adopted by the City Council is as follows:

1. The contractor shall not have the right to dispose of his contract to another, and should he do so it will not in any way affect the conditions of the contract.

2. All workmen employed in the execution of the contract must be residents of Montreal unless in exceptional circumstances.

3. Undermentioned are the minimum wage and the maximum hours for the various trades. (These left blank.)

4. Any case not mentioned in this list will be fixed by the Board of Control, the rate of wage to be similar to the current wage in the city of Montreal.

5. The contractor may not alter the terms under which the workmen are engaged without the consent of the Board of Control and then he must give a sworn statement of the payment made and from time to time show that he has paid his men in full for their part in the fulfilling of the contract.

6. A weekly statement must be made to the Board of Control of the names of the workmen, the amount of wages paid and the balance due.

7. In case where the contractor fails to pay his men the city may pay the sum due and deduct it from the amount of the contractor's bill, and similarly in the case where the workmen are employed at a smaller rate than that mentioned in the schedule.

8. No piece work will be allowed.

9. The hours shall be similar to those observed in the city of Montreal.

10. Only in cases of urgency may the hours of employment be increased.

11. The same conditions will apply to the hiring of horses.

12. Should the Board of Control be dissatisfied they may examine the books of the contractor.

13. It is imperative that the list of the hours of work and of wages should be posted in a conspicuous place.

14. The Board of Control may appoint at any time a fair wage officer.

15. Any contract entered into by the contractor and a workman, by which the latter shall receive a smaller wage than that mentioned in the list, shall be null and void.

16. The city of Montreal must in all undertakings observe the terms of the list of proper wages in every detail.

Notice is given to workmen that any breach of the above list of wages and of hours is to be reported to the Board of Control, and any such report will be treated confidentially.

Lachine Canal Open

Spring construction work on the Lachine Canal has been completed and water was again turned into the canal on May 1st. The bulk of the work which Engineer Lordly and his assistants have carried through this season has centred around the St. Gabriel locks at the foot of Seigneurs street. At this point the canal has been widened and the guide pier lengthened considerably. These improvements have been made to offset the difficulties which up-going vessels have had to contend with, due to heavy currents.

General Contractor in Difficulties

A meeting of the creditors of Thos. Wand, general contractor, 320 Laval avenue, was held on May 6th, at the office of the Dominion Mercantile Protective Assn., Ltd. The creditors present were content to give Mr. Wand a release if his estate shows at least 30 cents on the dollar. A balance of assets and liabilities will be struck and it is expected that a settlement will be effected on the above basis.

Montreal's Annexation Policy

The Quebec Legislature has granted Montreal the privilege of annexing the municipality of Rosemount, but that corporation's contract with Le Cie de Travaux Munieaux, for sewer work, street construction and laying of waterworks, amounting to approximately \$865,000, was annulled. Under

its own supervision, however, the city must expend \$861,000 on public works in Rosemount Ward during the ensuing three years. The proposal to annex Maisonneuve was vetoed by the Quebec Legislative Council. By its recent annexations the geographical area of Montreal has been practically doubled, but its population has only been increased by about 20,000.

The Blumenthal Building

The contract for the erection of the new building on the Blumenthal Estate has finally been awarded to Messrs. D. G. Loomis & Sons, general contractors, who have commenced its construction. The structure will front 90 feet on St. Catherine street, and 120 feet on Balmoral street. It is to be built of reinforced concrete, fireproofed throughout, and will be faced with terra cotta. Messrs. David Ogilvy and C. A. Mitchell were the associated architects who drew the plans. The cost will be in the neighborhood of \$200,000.

Paving Contractors and the City

City Surveyor Barlow has stated that no experimental paving materials will be tried out this year. They will not, however, prevent the laying of a sample block at the expense of the interested parties. Quite a large amount of work has been placed under way already by this department and is being done by day labor. Objection was taken to the insertion of the word "scoria" blocks in designating the material to be used, and this has since been changed to read "artificial blocks."

Prominence of School Buildings

A large percentage of the contracts let to date are for school buildings, and this class of structure is forming a very important feature of 1910 construction in Montreal. Almost every architect is drawing plans for a school building, and according to the latest report the largest of all will be built this year in Outremont for the Jesuits.

Personal Notes

Messrs. Ross & Greig, representatives in Montreal and district for the Goldie - McCulloch Company, Limited; Sheldon Company, Limited, Galt; Gurloch Packing Company, Hamilton; Spooners' Copperine, Port Hope, have removed from 325 to 412 St. James street, where they have secured much larger quarters.

Messrs. Finley & Spence, architects, are now occupying offices at 46 Beaver Hall Hill, having removed from 74 Guardian Building. Their new apartments are handsomely designed and finished and do credit to this well known firm of architects. Mr. W. A. Gagnon, for some time employed with Messrs. Finley & Spence, has been made an associate member of the firm.

Mr. Eric Mann, who has been a resident of Montreal for a great many years, has given up his architectural practice and left for Scotland this week, where he will reside in the future.

Theo Daoust, architect, 103 St. Francois Xavier street, has removed to new and modern offices at 90 St. James street.

On or about the 20th of May, Messrs. Eadie-Douglas, Limited, will move to their new building, No. 12 University street, Montreal. This building has been entirely remodelled to suit the firm's requirements. The ground floor front is finished in Burmantofts' Marmo terra cotta. On the ground floor there is a large showroom and quarters for salesmen, and the upper two storeys will be divided up into various offices. The Terrano Flooring Company of Canada, Limited, the Insulyte Company, Limited, and the Dominion Fireproofing Company, Limited, will also have offices in the building.

At Vancouver, B.C., permits were issued last month to the value of \$1,461,208. The total for April, 1909, was \$783,490.

Trade Conditions at Winnipeg

With a prospect of the greatest building season ever experienced, Winnipeg has the misfortune to be suffering from a shortage of building materials that might almost be termed a famine. The present scarcity is greater than at any other time during the past six years. Common brick has advanced \$4 a thousand, timber and dimension lumber are \$2 higher than a week ago, and shingles are selling for almost whatever dealers dare to ask. Cement is still selling at 75 cents a barrel over last year's price, and the supply is very short. Good common brick is practically cleaned out, and all the local brick yards have disposed of their supplies. Contractors are estimating a hold-up of at least three weeks on big jobs.

There is not only a shortage of material but also one of labor. It is stated that contractors in the city last week who were desirous of getting 700 men for construction work in the west were unable to get more than one-fourth the number needed. Municipal work and railroad construction are hampered by a lack of men. The Winnipeg painters, of whom there are several hundred, have gone on strike for 40 cents an hour. They are at present receiving 30 cents. The employers have offered 35 cents, but will probably have to meet the demands of the men, the T. Eaton Company, the Hudson Bay Company and ten others firms having already done so.

Diamond Drilling, Quebec Bridge Site

Diamond drilling at the Quebec bridge site, which was begun in May, 1909, was completed in November, during which interval 19 holes were sunk, some on land, some at the shore line, some in shallow water and others in the bed of the river. All the work was done by the Sullivan Machinery Company, Chicago, and two crews were employed. For the shore borings platforms 20 feet high were built so that the drill was out of water at the highest tide levels. The river work was done from a scow and presented a number of difficult features: the current was rapid, the depth of water ranged from 30 to 48 feet, rough weather was rather frequent, and the tides caused a variation of 12 to 18 feet. In addition, the ground was troublesome, consisting of an irregular deposit of sand, gravel and boulders above the ledge or bed rock. For the deep water holes a 6-inch standpipe was driven through the drift deposit by a drive block sliding on the drill rod. This was followed by a 4½-inch casing below which a 2½-inch casing was driven to bed rock 50 to 130 feet below the river bottom. A large amount of blasting was required through the boulders. A 1½-inch core was removed, using a Sullivan Badger drill, and the ledge was drilled for a depth of 15 feet. The total length of holes was 2,000 feet.

A Progressive Firm

The American Road Machine Company of Canada, Limited, are now comfortably settled in their factory at Goderich, where they are manufacturing the well known "Champion" line of road making and contracting machinery.

The present firm are successors to the Canadian Road Machinery Company, of Hamilton, and were incorporated in December last. The president of the company is Mr. S. Jones Phillips, while the vice-president and treasurer is Mr. R. F. Mancill. The position of secretary and general sales manager is occupied by Mr. F. W. Woods.

Although operations in Goderich were started only in February of this year, a large number of new and up-to-date machines have already been turned out and the company find it necessary to keep their plant running day and night to keep up with their orders. The policy of the company will be to manufacture nothing but road and contracting machinery and to specialize on high class machines.

Empress Hotel, Victoria, B.C.

Among the many important projects of the kind which the C.P.R. is carrying out in western Canada this year is the extension of the Empress Hotel, Victoria, B.C., at an approximate cost of \$135,000. The accompanying illustration, which is reproduced from a photograph kindly furnished the "Contract Record" by Mr. W. S. Painter, Montreal, the C.P.R. architect, will convey an idea of the nature of the proposed work. The



C.P.R. Empress Hotel, Victoria, B.C., which is to be Enlarged at a Cost of \$135,000

addition to the hotel will be placed over the kitchen wing and will be constructed of steel and reinforced concrete. It will contain 67 bedrooms and 53 bathrooms. The floors throughout will be of concrete. Both the exterior and the interior of the proposed addition will be made to conform with the existing building. Contracts for the work have been awarded as follows: General contract, J. L. Skeene, Victoria, B.C.; plumbing fixtures, James Robertson Company, Montreal; hardware, James Walker Hardware Company, Montreal.

Personal News and Notes

Mr. Angus Smith, the new city engineer of Victoria, B.C., will probably have control over all construction work in the waterworks department. Hitherto the Water Commissioner has been in charge of the work and there has been a considerable amount of disagreement.

Mr. L. Yaeck, of Walkerton, Ont., has discovered good clay at Merritt, B.C., where he will shortly establish a brick yard.

The city council of Port Arthur, Ont., have placed Mr. J. A. Antonisen, city engineer, in charge of all public utilities in that city.

The Calgary city hall has been in an uncompleted state for nearly two years. It is estimated that the sum of \$125,000 will be required before it is ready for occupation.

Congratulations to Mr. M. P. Davis, Toronto, the contractor for the sub-structure of the new Quebec bridge. Mr. Davis survived the ordeal of a marriage ceremony last week.

Mr. W. A. Bowden, who for the last five years has been designing engineer for the Department of Railways

and Canals, has been appointed Chief Engineer of the Department. He is a graduate of McGill University.

During the month of April building permits were issued at Montreal to the number of 346, and to the value of \$1,647,295. This is an increase of over \$600,000 on the total for the corresponding month of last year, which was \$1,016,856.

A dinner was held on the 20th ult., at the Prince George Hotel, Toronto, in honor of Mr. T. S. Scott, the assistant city engineer, who left the following day for Vancouver, where he will enter the contracting business. Dean Galbraith presided.

Mr. Allen Hazen, New York City, the consulting engineer who designed the Toronto filtration plant, has been called in by the city of Ottawa, Ont. While making his observations Mr. Hazen will be remunerated at the rate of \$100 a day with travelling expenses and assistants' wages also paid.

Toronto labor men are indignant over a little accident that happened the other day to Mr. Alex Lyons, formerly vice-president of the Amalgamated Carpenters' Union of that city. Mr. Lyons left Toronto during the winter to visit the old country. Upon his return to New York he "did not happen to have the necessary amount of money in his pocket at the time he landed" and in consequence was hauled off to Ellis Island and detained there for a considerable time.

An Energetic "Trouble Man"

Mr. R. E. Holliday, of the Canada Cement Company, who was recently appointed testing engineer or "trouble man" for that concern, is a native of England and was educated at Oxford University. He has been in Canada seven years and consequently is pretty well acclimatised. Mr. Holliday possesses an expert knowledge of materials and has had considerable experience



Mr. R. E. Holliday, Canada Cement Company, Limited

in construction. He was formerly secretary of the Provincial Construction Company, the concern which erected the Andrew Darling reinforced concrete warehouse at Toronto, a structure that is regarded as a particularly good example of this kind of work. Later on Mr. Holliday was associated with the Lehigh Portland Cement Company. For some little time Mr. Holliday had an office in the Temple Building, Toronto, but his headquarters are now at Montreal.

Lighting Problems and their Solution

Of the many problems that require complete solution in the design of a satisfactory home, few are of more vital importance than the question of lighting. The architect who is abreast of the times will be the first to admit the truth of this assertion and to welcome propositions dealing with artificial illumination that have real claim to merit. Within the past few years, electricity, without question the safest,

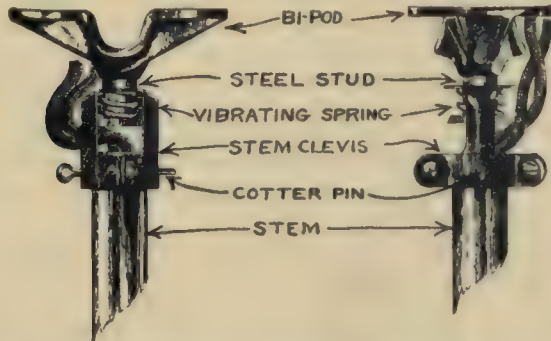


Figure 1. Showing the Anti-Vibratory Device on all stem type Folding Tungstoliers and Method of Fastening them to Ceilings

most efficient and hygienic form of lighting—has been brought within easy reach of the general public by the invention of the tungsten lamp, which not only increases the degree of luminosity, but reduces the cost for current by over one-half of the charges usually made. A great many architects, however, have condemned the tungsten lamp owing to the frailness of the filament, but this, investigation has proved, is not the cause of any dissatisfaction, as where properly in-

stalled, this lamp is giving better satisfaction than any other illuminate upon the market to-day. Where the trouble lies is in the fact that the installation has been made without due consideration being given as regards proper protection for the lamp to offset any vibratory movement. When the Wels-

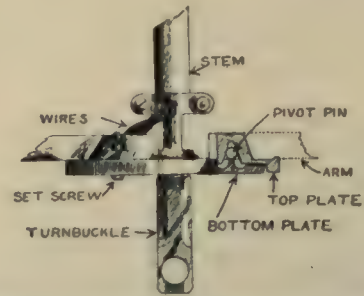


Figure 2. Method of Fastening Arms in both Stem and Close Ceiling Types, by the use of two iron plates

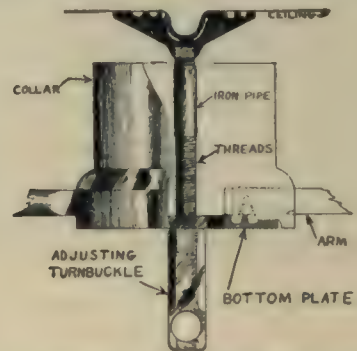


Figure 3. Showing close ceiling type adjustment



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The One Piece Frame and Bearings. No more shaky bearings from Bolts and Nuts working loose, much stronger, more rigid and neater than the old style Bolted Bearings.

The Interchangeable Drum Frictions. All our Wood Frictions now are positively interchangeable, made to template, and fitted and turned to exact standard, so they can be attached to the drum on the spot, without sending the job to a machine shop.

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would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Collingwood, Ont.

Tenders addressed to K. S. Maedonell, town engineer, will be received until May 23rd for sewer extension of Second street, between Birch and Oak streets.

Claresholm, Alta.

A by-law will be voted on to issue \$15,000 20-year 5 per cent. waterworks debentures. Geo. Simpson, secretary-treasurer,

Fort Frances, Ont.

Bids will be received until May 26th by W. H. Elliott, Town Clerk, for furnishing material and constructing an extension to the sewerage system, including vitrified tile pipe and junctions, c. i. manhole covers, etc.

Hull, Que.

Tenders addressed to J. F. Boulton, city clerk, will be received until May 23rd for the construction of artificial stone sidewalks and also of pipe sewer on Champlain street.

Huntsville, Ont.

Tenders will be received until May 30th for road improvement debentures representing \$12,000. See advertisement in this issue.

Kamloops, B.C.

A by-law to borrow \$40,000 for extension of waterworks will probably be submitted shortly.

La Tuque, Que.

It is stated that the council will shortly call for tenders for the construction of a waterworks system. Estimated cost, \$300,000.

Medicine Hat, Alta.

The ratepayers voted \$20,000 for street making machinery, \$30,000 for cement walks, \$55,000 for plank walks and \$35,000 for sewers.

Montreal, Que.

The Board of Control have recommended the expenditure of \$3,500 for permanent works in Mount Royal Park for the construction of a public lavatory and improvements to roadways.

The time for receiving tenders for pavement and sidewalk construction has been extended to May 19th. L. O. David, city clerk.

Nanaimo, B.C.

Tenders will be received for the construction of from four to eight miles of concrete sidewalks. Allan Waters, City Engineer.

Ottawa, Ont.

N. H. H. Lett, secretary, Board of Control, writes that no action will be taken regarding the awarding of tenders for paving Bank and O'Connor streets, the Board having suspended business until after the 20th inst.

Prince Rupert, B.C.

Thos. Dunn, Peter Black and Dr. McIntyre are in charge of the expenditure of

the \$25,000 appropriated by the Provincial Government for sewer work.

Regina, Sask.

Tenders are being called until June 6th for construction of sewage disposal works. A. E. Chivers, city clerk. See advertisement in this issue.

Tenders addressed to A. E. Chivers, city clerk, will be received until May 30th for pavement and sidewalk construction. L. A. Thornton, City Engineer. See advertisement in this issue.

Tenders are being received until May 30th for construction of storm water and sanitary trunk sewers and disposal works. See advertisement in this issue.

The ratepayers sanctioned the following by-laws: Sidewalks, \$10,000; pavements, \$115,000; trunk sewer, \$280,000.

South Vancouver, B.C.

Ratepayers carried road improvement and sidewalk construction by-laws.

St. John, N.B.

This municipality is calling for tenders until May 31st for paving, waterpipe and sewer excavation and sewer and waterpipe. See advertisement in this issue.

City Engineer Murdoch's plans for the renewal of water pipes were accepted. Estimated cost, \$38,000. Tenders will be called.

St. Thomas, Ont.

Hazen & Whipple, who were engaged to report on waterworks extensions here, have recommended improvements to cost \$32,000. They include: Construction of a coagulating basin (at \$7,500), and aerator (at \$1,000), on side hill near the pumping station, at distance of about 500 feet, \$8,500; connections to and from this basin to the pumps, to consist of 80-inch cast iron pipe, \$3,000; installation of two electrically-driven centrifugal pumps to be installed in the present station, taking water from the reservoir and lifting it to the aerator above coagulating basin, \$1,500; the construction of a pure water reservoir of covered concrete, reinforced with steel, with fire equipment and a capacity of 600,000 gallons, near present station below level of filters connecting piping from present filters to this basin, \$8,500; installation new coagulating apparatus and controllers on discharge lines to regulate the flow of the filter, \$2,500; installation of proper loss of head gauges, \$2,500. The cost of engineering in connection with this was estimated at \$4,200, making a total of \$32,200. The consulting engineers agreed with most of the details of a report presented previously by City Engineer Jas. A. Bell.

Toronto, Ont.

Tenders are being received until May 31 for construction of chimney at pumping station of filtration plant at the Island. See advertisement in this issue.

Victoria, B.C.

Pending the preparation of specifications the invitation for pavement tenders has been postponed. Angus Smith, City Engineer.

City Engineer Smith was instructed to

prepare a statement of what work could be done this year on the trunk thoroughfares and the cost and to call for tenders for several works. Contracts will be awarded by council on May 23rd.

Vancouver, B.C.

Board of Works have decided on a general sewerage scheme for Mount Pleasant and Fairview. The work will cost over a hundred thousand dollars, and tenders will shortly be invited.

W. McQueen, city clerk, sends us the following list of tenders received for construction of wood block pavement on Robson street from the east side of Burrard street to the west side of Bute street: T. R. Nickson & Company, \$29,891; M. P. Cotton Company, Limited, \$33,857; Palmer Bros. & Henning, \$39,800. As yet the contract has not been awarded.

Woodstock, Ont.

Until June 1st tenders for \$50,000 30-year debentures (interest at 5 per cent.) to be used in road improvement, will be received.

Westmount, Que.

Tenders are invited until May 25th by this municipality for paving, etc. See advertisement in this issue.

AWARDED.

Chatham, Ont.

The following tenders for supply of pump were received: The lowest tender, Smart-Turner Company, of Hamilton, at \$1,318.40, pump laid down at Chatham (accepted); Parks' tender was the highest received at \$1,402.50. There was \$1,000 difference between the tender of the Smart-Turner Company and the Canada Foundry Company.

Montreal, Que.

The city road department has awarded the contract for the construction of the Rosemount eastern main sewer to M. Deenen, whose tender was the lowest at approximately \$37,000.

Moose Jaw, Sask.

W. F. Heal, City Clerk, is authority for the statement that the contract for 33,000 square yards of paving has been awarded to Kettle River Company, of Minneapolis, Minn., for \$106,064. Wood block will probably be used. Noted previously.

Port Arthur, Ont.

Stewart & Hewitson, local contractors, were given the contract for paving Pearl, Park, Van Norman, Cameron and Cumberland streets with block asphalt, while south Water and court streets will be paved with sheet asphalt by the National Paving & Construction Company.

St. John, N.B.

Contracts have been awarded as follows: 1,000 barrels coal tar at \$3.50, Carrington-Patterson Company; 95 tons Trinidad Lignite asphalt at \$23.50, Robt. Reford Company; 600 loads bank sand at \$1.25 per load of 40 cubic feet, H. E. Creighton; 40 cords of birch and maple wood at \$7.14 a load of 160 cubic feet, Geo. Dick. No bids were received for 6,000 square yards of heart

wood spruce paving blocks, 7 inch by 6 inch by 3 inch, the standard required being considered too high. Other bids on tar, \$3.60; asphalt, \$24.75 and \$25.00; wood, \$8.00.

Saskatoon, Sask.

J. H. Truesdale, City Clerk, sends us the following list of prices in connection with the accepted tender of Western Pavers, Limited, Winnipeg, for concrete sidewalks: Concrete sidewalks, 17 9-10 cents per square foot; concrete curbing straight, 32 cents per lineal foot; concrete curbing, circular, 32 cents per lineal foot; concrete crossings, 17 9-10 cents per lineal foot. The amount to be built this year will amount to about \$65,000.

Toronto, Ont.

Mr. John Wagner, Cleveland, was awarded the contract for the construction of the high level interceptor sewer, in connection with the trunk sewer, at \$31 per lineal foot, and Messrs. Ryan & Reilly, Philadelphia, were given the contract for the construction of the trunk sewer syphon at the Don river at \$46,000.

Winnipeg, Man.

The following tenders were awarded by the board to the engineer of construction: Sewer on Inkster, from Main to Aikins, \$1,283; Selkirk avenue, from Battery to McPhillips, \$1,827.70; Bannerman avenue, from McGregor to a point 600 feet west, \$863.

The following tenders for asphalt pavements were accepted, the lowest figure in each case being that of the engineer of construction: 24 foot pavement, Stella avenue, from King to Salter street, \$15,120.50; 24 foot pavement, Agnes street, from Ellice to Wellington avenue, \$20,002.90; 24 foot pavement, Dorchester avenue, from Wellington crescent to Stafford street, \$14,743.60; 24 foot pavement, Toronto street, from Portage to Ellice avenue, \$17,754.20, full width pavement, Elora avenue, from Main to Schultz street, \$10,056.90; 24 foot pavement, Elora avenue, from Schultz to Salter street, \$13,110.20; Watermain, Inkster avenue, from Main to Aikins street, \$452.35; watermain, Crawford avenue, from Main to Mac street, \$489.32.

Yorkton, Sask.

F. T. McArthur, town engineer, writes that the contract for concrete sidewalks has been awarded to Messrs. Conery & Mattaini, of Guelph, Ont., at 18 cents per square foot.

Railroads, Bridges and Wharves

Berlin, Ont.

Tenders are being called until May 19th for the construction of a 35-foot concrete arch near New Dundee, and a concrete bridge floor near Ayr. Bowman & O'Connor, consulting engineers, Toronto. H. J. Bowman, C.E., county clerk.

Collingwood, Ont.

Tenders are being called until May 23rd for a reinforced concrete bridge, 14 foot span, 66 feet wide. Plans, etc., at office of Town Engineer, K. S. Macdonell.

Fort William, Ont.

Tenders are being called until June 3rd for construction of cement bridge, etc. H. S. Hancock, City Engineer. See advertisement in this issue.

Mount Hamilton, Ont.

Tenders addressed to A. G. E. Bryant, township clerk, will be received until May 21st for the construction of cement bridges in the township of Barton. Specifications at office of the reeve, J. Walter Gage.

Miscou, N.B.

Tenders will be received until June 3rd by N. Tessier, Secretary, Department of Public Works, Ottawa, for extension to wharf here. Plans, etc., at office of E. T. P. Shewen, district engineer, St. John, N.B., G. Stead, Chatham, and on application to local postmaster.

Newmarket, Ont.

Tenders are being called until May 22nd for the construction of a reinforced concrete arch bridge 60-foot span, over the Holland river. Barber & Young, consulting engineers, Toronto.

Owen Sound, Ont.

Cleveland capitalists are interested in the project for railroad between here and Meaford. A street railway service is also in the plan. Mayor Harrison.

Paisley, Ont.

Tenders addressed to Denis Phelan, reeve of Township of Greenlock, will be received until May 26th for the building of a 2-span flat arch bridge, 80 feet long, at Stark's mill. Plans, etc., with above-mentioned. Thos. H. Purdy, clerk of Greenlock, Narva.

Saskatoon, Sask.

Tenders are being received until May 23 for the extension of the C. P. R. freight sheds here. Plans, etc., at office of Frank Lee, Division Engineer, Winnipeg, Man.

Toronto, Ont.

Tenders are being called by the T. & N. R. R. until May 17th for supply and erection of a 50,000 gallon steel tank. A. J. McGee, secretary-treasurer.

AWARDED.

Croton, Ont.

The contract for the bridge over the Sydenham river, has been let to the Western Bridge & Equipment Company, of Chatham, for \$1,100. Bridge to be completed by July 1st.

Orillia, Ont.

The Toronto Construction Company has been awarded the contract for the construction of the C. P. R. from Coldwater to Atherly Junction. The contract will run into about half a million dollars.

Peterborough, Ont.

E. M. Elliott, county clerk, sends us the following tenders for Nogey's Creek bridge superstructure: Jencks Dresser & Company, Sarnia, \$1,865; Dickson Company, Campbellford, \$1,574 (accepted); Hamilton Bridge Works, \$1,515.

Sault Ste. Marie, Ont.

The O'Boyle Construction Company has been awarded the contract for the construction of 31 miles of railroad between Hawk Lake and Hobon.

St. Thomas, Ont.

Tenders for the erection of concrete bridges over the Salty Creek and the Union Pond, were as follows: Salty Creek—J. W. Chivers, \$1,100; Jas. Vincent, \$1,275; Williams & Walker, \$935; Powles & Gunning, \$997; Isa Prew, \$1,225; C. C. Stafford, \$1,329. Union Bridge—J. T. Leverson, \$3,100; James Vincent, \$1,895; C. C. Stafford, \$1,899; Powles & Gunning, \$2,169. The tender of Powles & Gunning for the Salty bridge and of James Vincent for the Union bridge were accepted.

Woodstock, Ont.

The County of Oxford called for tenders for the construction of a 125-foot steel bridge with concrete abutments. The contract was given to the Hunter Bridge and Boiler Works Company, Kincardine, Ont. Contract prices were: Superstructure and floor, \$3,200; abutments \$776. A contract

was awarded to M. M. Hiles, of Attwood, for a 30-foot reinforced arch of \$898.

Winnipeg, Man.

The contract for the supply of steel work and wire carrying device on Redwood bridge has been awarded by the Board of Control to the Western Iron Works.

Public Buildings, Churches, Schools, etc.

Arnprior, Ont.

Tenders are being received until May 30th for the erection of an addition to and alterations in the high school building. See advertisement in this issue.

Beaverton, Ont.

Mr. J. F. Givens, secretary of the Library Board, has received Carnegie grant of \$5,000 towards library, which will be erected at once.

Brandon, Man.

At a meeting of representative fraternal societies the question of the erection of a fraternal temple was favorably considered. Estimated expenditure, \$50,000.

Cranbrook, B.C.

Contractor McCallum has commenced work on the new Y. M. C. A. building.

Comber, Ont.

Tenders for the erection of a brick church, 80 x 46, with stone basement, will be received by the managers of the Presbyterian congregation until May 31. Plans, etc., at the manse, work to be completed by November 25th. J. Fraser Smith is interested.

Edmonton, Alta.

A by-law to raise \$175,000 for a general hospital will be submitted to the people shortly.

Fergus, Ont.

Tenders will be called shortly for electric wiring, hot water heating, slate roofing for the Carnegie library here.

Hull, Que.

At the next council meeting a site will likely be decided on for the civic hospital. D. Aubry and Father Duhant are interested. Noted previously.

Haileybury, Ont.

Tenders addressed to J. H. Shibley, secretary-treasurer, High School Board, will be received until May 25th for the erection of high school. Plans, etc., at office of A. D. Pillar, architect, and at C. Preston's store, this place.

Hamilton, Ont.

Tenders are being called until May 23rd for the various trades required in the erection of police and patrol station. Plans, etc., at office of architects, Messrs. Stewart & Witton, this city. S. H. Kent, city clerk.

On June 6th a by-law will be submitted to the ratepayers of Wentworth County to issue \$40,000 20-year debentures for the purpose of building a house of refuge.

None of the twenty plans for Carnegie library submitted by architects all over the country was satisfactory to all of the members of the board, and it was decided to submit them to a competent American architect.

Kinmount, Ont.

The Roman Catholics intend to erect a new church at once. Rev. Father Galvin is interested.

Montreal, Que.

Plans have been prepared and tenders are invited until May 19th for the construction of an annex to the Westmount

public library. Mr. Robert Findlay, architect.

Messrs. Hutchison, Wood & Miller, architects, are preparing plans for the erection of a church building, corner Mance and Prince Arthur streets for the First Presbyterian Church. Tender for this will be invited at a later date.

A movement is on foot to erect a modern institution for the blind at a cost of \$100,000. The Montreal Association of the Blind, (President, C. W. Lindsay), are interesting themselves. It is stated that Mr. A. F. Dunlop, architect, Lindsay Building, has offered to draw the plans for this building at his own expense.

It is stated that the Grand Trunk Boating Club will have a 125-foot wharf built on the opening inshore for the use of motor boats during the current season. Work of laying the wharf will commence immediately.

It is rumored that the St. James Methodist Church have secured an option on property on Drummond street with the intention of erecting a church building as soon as their property on St. Catherine street can be disposed of to advantage.

New Westminster, B.C.

The Fraser River Motor Boat Club, now being formed, have the erection of a club house under consideration. J. P. Hampton Bole is interested.

North Battleford, Sask.

The ratepayers voted \$7,000 for a city store house and \$10,000 for agricultural society buildings.

New Liskeard, Ont.

The council have decided to accept Andrew Carnegie's offer of \$10,000 for a public library here. Mr. Lester Neil is interested.

Ottawa, Ont.

The Department of Trade and Commerce is sending out specifications of a building which is to be erected by the Australian Government at Melbourne for the "Commissioners of Savings Banks," with the object of having Canadian architects submit competitive plans. Prizes of \$1,000, \$600 and \$250 are offered.

Prince Rupert, B.C.

Monro & Lailey are calling for tenders for the erection of the hospital here and also for the same at Stewart to be erected by Dr. W. T. Kergin.

Peterborough, Ont.

Tenders addressed to G. H. Duncan will be received until May 25th for the construction of the isolation hospital. Plans, etc., at office of the architect, W. Blackwell, C.E. S. R. Armstrong, city clerk.

Port Arthur, Ont.

N. G. Neill, Industrial Commissioner, writes that the following buildings are to be erected: Y. M. C. A., costing about \$40,000; an armory, costing \$100,000, is under consideration, and a Carnegie library, costing \$40,000.

Renfrew, Ont.

Mr. Garvock, school architect, Ottawa, has been asked to prepare plans for the erection of a rear addition to the Model School. Estimated cost, \$30,000. The remodelling of the collegiate was also considered.

Regina, Sask.

Ratepayers sanctioned the following money by-laws: Collegiate, \$26,500; isolation hospital, \$18,000; Children's Shelter, \$10,000; Hospital, \$25,000.

Saskatoon, Sask.

School Board decided to issue \$62,000 debentures and build a new school.

Shoal Lake, Man.

Tenders addressed to E. Hepworth, secretary-treasurer, will be received until June 1st for erection of frame or cement school house. Plans on application.

St. John, N.B.

City Engineer Murdoch has estimated the cost of a new incinerator plant from \$50,000 to \$100,00. The council is considering it.

Strathcona, Alta.

Subscriptions are being taken for the building of St. Luke's Church. W. A. Dixon, people's warden.

Plans have been prepared for the Oblates of Mary Immaculate for their academy, for which a site has been selected. One wing will be erected this summer. Rev. Father Jan, of St. Anthony's Church, is interested.

Toronto, Ont.

Tenders are being called until the 23rd inst. for the furnishing and installing all heating and electrical apparatus, etc., required for the Central Light, Heat & Power Plant in the University of Toronto. Darling & Pearson, 2 Leader Lane, architects. See advertisement in this issue.

A permit for the erection of the extension to the Church of Our Lady of Lourdes, corner of Sherbourne and Earl street, at a cost of \$60,000 has been issued by the City Architect.

Tenders are being received until May 30 for roofing, galvanized iron work, etc., required in connection with new Isolation Hospital. See advertisement in this issue.

Virden, Man.

Tenders addressed to John Pritchard, treasurer, will be received until May 25th inst. for the erection of a parish hall for St. Mary's church. Plans, etc., at office of the above mentioned, and at the office of the architects, Matthews & LeMaistre, 305 Fort street, Winnipeg, Man., or at the residence of Rural Dean Reeves, St. Matthew's rectory, Brandon.

Vernon, B.C.

The Curling Club will erect a rink here to cost about \$4,000. Dr. MacDonald is interested.

Vancouver, B.C.

The Swedish Lutheran Church will erect their new church on corner Pender street east and Carl avenue. Estimated cost, \$23,000. Building committee, Rev. C. R. Swanson, president; A. Johnson, secretary, and A. Nelson, treasurer.

Winnipeg, Man.

Plans for the two new collegiates have been approved by the school board and tenders will be called at once. Estimated cost of each building, \$250,000. Plan for the one at South Winnipeg called for a 3 storey building 220 x 180 feet, lower portion of Tyndall stone, upper red brick, etc.

The erection of a new city hall in the near future is being considered, also a suggestion that competitive plans be called for in the fall. Aldermen Douglas and Midwinter and Controllers Harvey and Waugh are interested.

St. John's Cathedral is to be replaced at once with a new stone building. Plans were accepted for a magnificent cathedral but in the meantime only part is to be built, which will be added to as funds are available. Total cost \$200,000.

The Olivet Baptist Church, St. James,

have decided to take an option on property to be used as a site for their new church, which will be erected eventually.

AWARDED.

Amherstburg, Ont.

C. Williamson, architect, of Watt, Jacques & Williamson, Windsor, sends us the following list of successful tenders for the 8-room school in Amherstburg: Mason work, J. Wilson, of Amherstburg, \$5,850; carpenter work (Georgia pine and maple floors), V. Williamson, of Walkerville, \$5,419.76; lathing and plastering, J. Wilson, of Amherstburg, \$1,044; heating and ventilating (Pease system), Ryan & Company, of Amherstburg, \$2,169.75; painting and graining, Whipple & Bennett, of Walkerville, \$825; metal work, Robt. Paddon, of Windsor, \$266. Plumbing contract to be let later. Total cost, about \$16,500.

Fergus, Ont.

P. Perry, secretary-treasurer, library board, sends us the list of tenderers for the new library here: Plastering: W. Stafford, Elora, \$227 (accepted); P. Martin, Guelph, \$330; J. J. Mahoney, Guelph, \$357; Richardson & Ritchie, Elora, \$375. Painting: W. Bergin, Elora, \$300; W. McCullough, Fergus, \$410. Carpentering: J. Moffatt, Fergus, \$1,853.85; A. Smellie, Fergus, \$2,150. Masonry and excavating: T. Wickie, Fergus, tool faced \$2,065, rock faced \$1,890 (tender), Fergus and imported stone \$1,388; A. Irving, Guelph, tool faced \$2,700, rock faced \$2,550, Fergus and imported stone \$2,065. Metallic ceiling: J. Chapman, Fergus, \$865; Occomore, Guelph, \$142.50; Guelph Stone Company, \$149; Howard, Guelph, \$186. Eaves: T. Kerr, Fergus, \$40.

Medicine Hat, Alta.

Morton Fulton has been awarded the contract for the erection of a \$20,000 addition to the General hospital.

Moose Jaw, Sask.

The local firm, Navin Bros., have been awarded the contract for the erection of the Provincial Government Telephone and Land Titles Building. Amounts of contracts, \$25,713 for the telephone building and \$35,920 for land titles office.

Montreal, Que.

The contract for the electric wiring and installation in the new Alexander School has been awarded to the Sayer Electric Company. A. F. Dunlop, architect.

Messrs. Peden & MacLaren, architects, have awarded contracts as follows for the erection of the Kensington School at Notre Dame de Grace for the Protestant School Commissioners of Coteau St. Pierre. Excavation, brick work and masonry, Robertson Bros., Westmount; carpentry work, Laird, Paton & Son, Limited; painting and glazing, J. A. Alexander; roofing, Metal Shingle & Sliding Company, Limited; lathing and plastering, Gray & Wighton; plumbing, hot water heating and ventilating, Geo. R. Woodburn & Company.

Ottawa, Ont.

C. MacNab, chairman, pro tem., Building Committee, sends us the following list of tenders. Those recommended for acceptance were in last issue:—Hopewell Avenue School—Masonry, brick and concrete work: G. A. Crain, \$29,600; John Robertson & Son, \$29,687.50; Alexander & Campbell, \$30,346; T. C. James, \$33,500. Carpentering: Taylor & Lacey, \$9,600; Alex. Christie, \$10,780; J. W. Featherstone, \$10,793, deduct for flooring, \$335, \$10,458; A. Richards & Company, \$10,842; T. A. Shore, \$11,223, deduct for flooring \$538, \$10,685; A. G. Marshall, \$12,750, deduct for flooring \$508, \$12,242. Plastering: Chas. Hunt, \$1,555; Thos. Brethour & Company,

\$1,672. Painting and Glazing: John Strang & Son, \$1,600; Ritchie & Nunn, \$1,965. Roofing: J. Herbert & Son, \$284; J. D. Sanderson, \$290; McFarlane & Douglas, Limited, \$307. Electrical Work: McCallum & Company, \$1,298; J. A. Ellacott, \$2,174. Heating: J. R. McLennan, 2 C. I. boilers, Johnston system \$4,684; J. M. McLennan, 2 C. I. boilers, gravity system, \$4,098; J. R. McLennan, 2 C. I. boilers, Webster system, \$5,384; J. R. McLennan, 1 steel boiler, Johnson system, \$4,684; J. R. McLennan, 1 steel boiler, gravity system, \$4,096; J. R. McLennan, 1 steel boiler, Webster system, \$5,384; Currie & Livock, 2 C. I. boilers, Johnson system, \$4,500; Currie & Livock, 2 C. I. boilers, gravity system, \$3,820; Currie & Livock, 2 C. I. boilers, Webster system, \$4,250; Currie & Livock, 1 steel boiler, Johnston system, \$4,450; Currie & Livock, 1 steel boiler, gravity system, \$3,745; McKinley & Northwood, 2 C. I. boilers, Johnson system, \$4,229; McKinley & Northwood, 2 C. I. boilers, gravity system, \$3,715; McKinley & Northwood, 2 C. I. boilers, Webster system, \$4,192; McKinley & Northwood, 1 steel boiler, Johnson system, \$4,361; McKinley & Northwood, 1 steel boiler, gravity system, \$3,847; McKinley & Northwood, 1 steel boiler, Webster system, \$4,324. Plumbing: McKinley & Northwood, Mott's closet \$3,466; Clow closet 1, \$3,441; Clow closet 2, \$3,475; standard closet 3, \$3,595. Ventilation: Sheldons, Limited, standard fan with 5 h.p. motor, \$1,050 or \$1,925 for both schools, f.o.b. Ottawa; The Canadian Buffalo Forge Company, Multivane fan with 3 1-2 h.p. motor \$1,157, standard fan with 3 1-2 h.p. motor \$927, standard fan with 5 h.p. motor, \$992; The Green Fuel Economizer Company, standard fan with 5 h.p. motor, erected, \$1,205. Galvanized iron work: McFarlane & Douglas, Limited, \$1,267; McKinley & Northwood, \$1,391. Bulk tender: Taylor & Lackey, including excavating, masonry, brickwork, fireproofing and concrete, plastering, roofing, galvanized iron, painting and glazing, electrical work, \$45,371. Breeze Hill Avenue School: Masonry, brick and concrete: G. A. Crain, \$28,480; Alexander & Campbell, \$29,207; John Robertson & Son, \$32,609; T. C. James, \$37,900. Carpentering: Taylor & Lackey, \$9,279; A. Richards & Company, \$10,442; J. W. Featherstone, \$10,487, deduct for flooring \$295, \$10,192; T. A. Shore, \$10,824, deduct for flooring \$505, \$10,319; A. G. Marshall, \$11,200; Alex. Christie, \$11,340. Plastering: Thos. Brethour & Company, \$1,590; Chas. Hunt, \$1,650. Painting and glazing: John Strang & Son, \$1,950; Ritchie & Nunn, \$1,850. Roofing: J. Herbert & Son, \$260; J. D. Sanderson, \$260; McFarlane & Douglas, Limited, \$297. Heating: J. R. McLennan, 2 C. I. boilers, Johnston system, \$4,571; J. R. McLennan, 2 C. I. boilers, gravity system, \$4,005; J. R. McLennan, 1 steel boiler, Johnston system, \$4,571; J. R. McLennan, 1 steel boiler, gravity system, \$4,005; Currie & Livock, 2 C. I. boilers, Johnston system, \$4,493; Currie & Livock, 2 C. I. boilers, gravity system, \$3,795; Currie & Livock, 2 C. I. boilers, Webster system, \$4,217; Currie & Livock, 1 steel boiler, gravity system, \$3,715; Currie & Livock, 1 steel boiler, Webster system, \$4,147; McKinley & Northwood, 2 C. I. boilers, Johnston system, \$4,296; McKinley & Northwood, 2 C. I. boilers, gravity system, \$3,676; McKinley & Northwood, 1 steel boiler, Johnston system, \$4,428; McKinley & Northwood, 1 steel boiler, gravity system, \$3,771; Electrical work: McCallum & Company, \$1,248.78; J. A. L. Ellacott, \$2,142. Plumbing: McKinley & Northwood, Mott's closet, \$3,455; Clow closet 1, \$3,580; Clow closet 2, \$3,600; standard closet 3,

\$3,585. Ventilation: Sheldons, Limited, multivane fan with 3 1-2 h.p. motor, \$1,100 or \$2,100 for both schools; standard fan with 5 h.p. motor, \$1,050 or \$1,925 for both schools, f.o.b. Ottawa; the Canadian Buffalo Forge Company, multivane fan with 3 1-2 h.p. motor, \$1,157; standard fan with 3 1-2 h.p. motor, \$927; the Green Fuel Economizer Company, standard fan with 5 h.p. motor, erected, \$1,205. Galvanized iron work: McFarlane & Douglas, Limited, \$1,047; McKinley & Northwood, \$1,163. Bulk tender: Taylor & Lackey, including excavating, masonry, brickwork, fireproofing and concrete, plastering, roofing, galvanized iron, painting and glazing, electric wiring, \$43,414.

St. Thomas, Ont.

The contract for frescoing the Central Methodist church has been awarded to the firm of Simpson & Carter, church decorators, Sarnia.

Saskatoon, Sask.

For the new Caswell Hill School a contract has been let to Shannon Bros. & Cassidy at \$37,973. Other tenders were: Saskatoon Building and Construction Company, \$48,973; J. E. Farley, \$41,700; Bigelow Bros., \$36,000, and Walter Bennett, \$36,250.

Toronto, Ont.

Contract for the galvanized iron and roofing work on the Italian Mission, Ter-aulay and Elm streets, has been awarded to the A. B. Ormsby, Limited.

Winnipeg, Man.

The contract for the two fire stations and drill tower has been let to John Saul. Total cost, \$38,975.

Residences

Hamilton, Ont.

Recent building permits include: W. E. Goring, ten frame dwellings, on Shaw street, \$8,000; Giles & Beck, brick dwelling on Locke street, for D. J. Forest, \$2,100.

Montreal, Que.

Plans and specifications are being prepared for the erection of a residence on Cedar avenue for Mr. J. Bryce, and tenders will shortly be invited. Philip J. Turner, F. R. I. B. A., architect.

Tenders will shortly be invited for the erection of twenty-five houses in Brooklyn Park, St. Lambert, Que., Mr. Philip J. Turner, F. R. I. B. A., architect.

Tenders are invited for the erection of a residence on Cedar avenue for Wm. Agnew. Mr. Philip J. Turner, F. R. I. B. A., architect, Board of Trade Building.

Tenders for the erection of a residence corner Cote St. Antoine and Mount Steven avenue for Dr. H. M. Church, were received until May 14th. Hutchison, Wood & Miller, architects.

Tenders for the erection of a residence on McGregor street for H. P. Walker, have been received by MacVicar & Heriot, architects, but no contracts have as yet been awarded. (Note.—In our issue of May 11 this was erroneously credited to J. Resther & Sons, architects.)

Tenders have been received for the erection of a residence on Rosemount avenue for Mr. F. E. Devlin. Geo. T. Hyde, architect.

Outremont, Que.

Tenders close May 20th for the erection of a residence in Outremont for De Gaspe Beaubien. Messrs. E. & W. S. Maxwell, architects.

St. Thomas, Ont.

N. R. Darrah has a permit for residence for Jos. Griffin, \$2,000.

Strathcona, Alta.

Wilson & Herrald received tenders until May 14th for the erection of residences for Dr. Tory and Prof. Edwards. Plans are being completed for the residences of Dr. Lehmann and Dr. Kerr.

Victoria, B.C.

A Shotgun has a permit for a frame one-storey dwelling on Quadra street, \$2,500.

Winnipeg, Man.

P. C. Samuels, architect, has prepared plans for the apartment block to be erected on the southeast corner of Langside street and Preston; cost \$100,000. Work will be done by day labor.

AWARDED.

Montreal, Que.

Contract for the erection of three flats on St. Hubert street, for Mr. Victor Martineau, has been awarded to D. Morel, general contractor. Mr. Dalbe Viau, architect.

Mr. Alphonse Piche, architect, has awarded the contract for the erection of a residence for P. O. Nadeau, to Mr. L. Dalbee, general contractor.

The contract for alterations to residence on Sherbrooke street for Mr. W. Watson has been awarded to John Allan, 300 Atwater avenue. Messrs. Peden & MacLaren, architects.

The contract for masonry work on house for E. J. Ferguson, Ontario avenue, has been awarded to J. H. Hutchison. Other trades not let. Kenneth G. Rea, architect.

The contract for the erection of a tenement house on Languetiere street east for Rev. Heffernan, has been awarded to J. T. Tobin, general contractor. John Jas. Browne & Son, Limited, architects.

Contracts for the different trades in connection with the erection of a residence, corner Boulevard St. Joseph and St. Urbain street, estimated cost \$7,500, for Mr. H. Pelletier, K.C., have been awarded as follows: Excavation, Eug. Hassard; masonry and brick work, Clovis Morin; carpentry and joinery, Carriere & Frere; plastering, J. C. Parent; painting and glazing, F. X. Lavallee; roofing, plumbing and heating, Jos. Sigouin. Mr. Jos. Perault, architect.

Business Buildings and Industrial Plants

Bridgeburg, Ont.

Arrangements have been completed for the establishment of a Canadian branch of a marble working firm of Buffalo, N.Y. About three acres of land constitute the site, and \$100,000 the expenditure.

Chippewa, Ont.

The Lantz Company, 861 Main street, Buffalo, marble and onyx works, has completed plans for the establishment of a Canadian branch plant at Chippewa, Ont.

Cornwall, Ont.

It is stated that the Bell Telephone Company will shortly proceed with the erection of a new telephone exchange to replace their office in the Rossmore hotel which was recently destroyed by fire.

Dunnville, Ont.

The International Tool Company, of Canada, at Welland, will build a plant at Dunnville.

East Selkirk, Man.

The Lake of the Woods Milling Company are laying out the site for their new elevator here.

Edmundston, N.B.

The store and dwelling owned by G.

Mosher were damaged to the extent of about \$3,500 on the 8th inst.

Edmonton, Alta.

Representatives of the Red River plow works are negotiating as to their removal here. Mayor Lee.

Fort William, Ont.

Plans for the erection of a two storey annex to the Dyke block, frontage 40 feet, have been approved by J. Dyke. Cost, \$20,000.

Guelph, Ont.

Ald. Pequegnat, chairman of the Railway and Manufactures Committee of the City Council, is in receipt of the plans for the proposed new C. P. R. station. These have been accepted by the railway authorities.

Grandview, Man.

T. A. Burow's saw mill was destroyed by fire on the 11th inst. Estimated loss, \$50,000.

Hull, Que.

The damage on property due to the recent explosion is estimated at about \$70,000, distributed as follows: Explosives Company, \$10,000; houses and furniture, \$10,000; plate glass in Ottawa, \$10,000.

London, Ont.

It is rumored that the Armour & Company are considering sites for a large abattoir here.

Montreal, Que.

Plans and specifications for a brick extension warehouse 185 by 5 feet for the Dominion Tobacco Company, 80 Papineau avenue, are being prepared; estimated cost \$25,000. E. J. P. Courval, 714 Laval avenue.

North Hatley, Que.

The sash and door factory of T. V. Reed was damaged to the extent of about \$10,000.

Owen Sound, Ont.

The Bell Telephone Company will erect a new building as soon as a suitable site can be secured. H. R. Polson, local manager. W. Bruce Taylor, engineering department, Hamilton.

Prince Rupert, B.C.

Westenhaver Bros. are about to build a large business and apartment block.

The block containing the Hotel Northern, Balkan Hotel, Hayner's furniture store, etc., was destroyed by fire on the 5th inst. Total estimated loss, \$25,000.

Portage la Prairie, Man.

The Urban Mutual Insurance Company has voted to build a new business block to cost \$13,000. Reported in March 16th issue.

Quebec, Que.

The tannery of Messrs. Arthur and Pierre Pouliot on Arago street was destroyed by fire on the 10th inst. Estimated total loss, \$36,000.

Regina, Sask.

A company recently incorporated as the Regina Cold Storage & Packing Company, Limited, it is stated, will erect a large abattoir and cold storage plant. Capitalization, \$100,000. About \$50,000 will be spent on the building. First directors, A. J. Gibson, J. M. Young, F. P. Churchill and J. R. Hicks.

Sarnia, Ont.

The Bank of Toronto has purchased T. Kenny Company's block. The building will be completely overhauled and made into an up-to-date structure.

St. Boniface, Man.

Plans are being prepared for the erection of an 8 storey cereal mill, capacity 300 barrels a day, for the Western Canada Flour Mills Company. Tenders will be called shortly. G. H. Archibald & Company, the general contractors, have the contract for the twenty-seven tubular cement bins. Amount of permit, \$150,000.

Toronto, Ont.

Tenders will be received until May 28th for all trades required in the erection of a steel constructed, fireproof warehouse building for Messrs. Hobberlin Bros. & Company, corner Yonge and Richmond streets, and also for the necessary alterations in connection with the renovation of the adjoining buildings. Plans, etc., at office of the architect, E. J. Lennox, 164 Bay street. See advertisement in this issue.

Victoria, B.C.

It is understood that the Warwick Asphalt Pavement Company will erect a plant here, which will involve an expenditure of about \$40,000. Capt. J. Warwick, representative. Aldermen Sargison and Langley are interested.

Vancouver, B.C.

Messrs. McArthur & Harper, of Kamloops, have acquired 107 feet of property on Westminster avenue, and 120 feet on Hastings, where it is their intention eventually to erect a large office building.

Welland, Ont.

Fire did damage to the extent of about \$2,000 on the 9th inst. to the bakery and residence owned by Mr. R. Schooley and R. Doan respectively.

Winnipeg, Man.

J. H. G. Russell is the architect for the Trust & Loan Company's building.

D. W. Bellhouse has plans under way for the Ashford block on Balmoral street, for which tenders will shortly be called. Tenders are being called for the factory of the Henderson Manufacturing Company, which will cost about \$50,000. Architect, D. W. Bellhouse.

The Canadian Oil Company's plant in Elmwood, valued, with stock, at \$75,000, was destroyed by fire on the 15th inst.

The Winnipeg Electric Railway have a permit for an addition to their retort house \$20,000.

The Factory Equity Grain Bin & Shocker Company, Limited, propose to establish Canadian branches throughout Canada, making Winnipeg their headquarters. It is stated that the factory here will be built shortly. Estimated expenditure, \$50,000. Directors, D. W. McCuing, president of the Grain Growers' Association; Dr. F. Torrence and A. R. McDiarmid, Brandon.

D. D. Mann is the authority for the statement that the C. N. R. will erect a building on the site of the old Manitoba hotel before the World's Fair in 1912. Whether the building will be an hotel or office was not stated.

AWARDED.

Goderich, Ont.

J. S. Johnson is superintendent of construction in the erection of the Western Canada Flour Mills here, for which the art & Company, general contractors, of New York. Estimated expenditure, \$200,000.

Montreal, Que.

Contract for alterations to the premises at 871 St. Catherine street west for F. W. Gross has been awarded to Messrs. Simpson & Peel. John Jas. Browne & Son, Limited, architects.

The contract for the installation of two electric elevators in the Labelle Building has been awarded the Otis Fensom Elevator Company. G. A. Monette, architect.

The contract for erection of stable buildings for Messrs. Tees & Company, St. Catherine street west, has been awarded to Shearer, Brown & Willis. Ross & MacFarlane, architects.

The general contract for the erection of the factory building for the H. P. Labelle & Company has been awarded to Mr. Jos. Bourque, general contractor. G. A. Monette, architect.

The general contract for the erection of the Willis Building has been awarded to Peter Lyall & Sons. Amount of permit, \$100,000.

Port Colborne, Ont.

The Maple Leaf Milling Company have awarded to the Allis-Chalmers-Bullock Company the contract for transformers, motors (sizes varying from 700 h.p. down to 7 1-2), all switching and wiring apparatus.

Toronto, Ont.

The Bishop Construction Company, Limited, Toronto, have been awarded the following contracts: Canadian National Carbon Company, Limited, Cleveland, Ohio, erection of Toronto plant; Canadian Rubber Company, warehouse, Toronto, T. Pringle & Son, Limited, Montreal, engineers; reinforced concrete building for Peabody's Company, Limited, Walkerville, Ont.

A. B. Ormsby, Limited, has the contract for the galvanized iron, fire doors and roofing work on the Toronto Show Case Building, Carlaw avenue; also for the cornice on No. 4 factory for the T. Eaton Company.

Power Plants, Electricity and Telephones

Bowmanville, Ont.

On May 31st the ratepayers will vote on a by-law to purchase the electric light plant for \$12,000.

Brockville, Ont.

Mitchell & Mitchell have been engaged as consulting engineers in connection with the \$50,000 improvements to the municipal electric lighting plant.

Dawson, Yukon District.

The North Fork Power Company will soon commence work on the construction of an extensive development on the north fork of the Klondike. Seven and one-half miles of ditch will be built. Charles Boyle, resident manager of the Canadian Klondike Company, has charge of the work.

Francis, Sask.

Tenders are invited for the construction of fifteen and three-quarter miles of rural telephone system. Colin Wells, secretary-treasurer, Rural Telephone Company.

La Tuque, Que.

It is rumored that the municipality of La Tuque will erect an electric lighting plant at an estimated cost of \$50,000.

London, Ont.

Tenders will be called for at once for the steel tower to carry the wire into the Horton street subway. Engineer Glaubitz has prepared plans; estimated cost, \$850.

Tenders will be called for at once for the building of an underground conduit, 6-inch, 9-inch and 12-inch. Engineer Roberts.

Medicine Hat, Alta.

A by-law to raise \$57,000 for the instal-

(Continued on page 32)

Tenders and For Sale Department

Town of Huntsville

The Town of Huntsville offers for sale 20 Road Improvement Debentures of \$962.91 each, representing \$12,000 for 20 years at 5 per cent., particulars on request. Tenders received up to MAY 30TH.

T. M. CULLON,
Clerk, Huntsville.

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Tenders Wanted

Sealed, bulk and separate tenders, marked "Tender," addressed to the Secretary of the Board of Education, Arnprior, will be received up to 7 o'clock p.m., MONDAY, MAY 30TH, INST., for the erection of an addition to and alterations in the High School Building, Arnprior.

Plans and specifications of the proposed work may be seen at the office of Mr. C. A. R. Dulmage, Chairman of the Contingent Committee, between the hours of 9 a.m. and 5 p.m.

Each tender must be accompanied by a cheque for 5 per cent. of the amount of the tender. The lowest or any tender not necessarily accepted.

M. D. GRAHAM,
Secretary, Board of Education,
Arnprior, Ont.

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City of Regina

Pavement Construction

Sealed tenders addressed to the undersigned City Clerk and endorsed on envelope "Tenders for Pavement Construction," will be received up to 12 o'clock noon, MONDAY, MAY 30TH, 1910, for approximately 32,800 square yards of permanent pavement on concrete foundation.

Plans, profiles, specifications and forms of tender are on file in the City Engineer's office, and specifications and forms of tender may be obtained from the City Engineer, and any further necessary information.

A marked cheque for \$5,000 must accompany tender. The cheques of unsuccessful tenderers will be returned. The lowest or any tender not necessarily accepted.

L. A. THORNTON, A. E. CHIVERS,
20 City Engineer. City Clerk.

City of Fort William, Ontario

Reinforced Concrete Bridge

Tenders will be received by the City Clerk up to 5 o'clock p.m. on FRIDAY, THE 3RD DAY OF JUNE, 1910, addressed to the Chairman of Works Committee, for the construction of a reinforced concrete arched bridge of 50-foot span, with pile foundations, to be used for double-track street railway, vehicular and pedestrian traffic, crossing the Neebing River on Simpson Street.

All tenders must be on the special form of tender, accompanied by an accepted cheque for a sum equal to 10 per cent. of the amount of the tender, with the envelope sealed and endorsed "Bridge Tender."

Plans, specifications and general conditions may be seen and form of tender obtained at the City Engineer's office.

The lowest or any tender not necessarily accepted.

H. S. HANCOCK, Jr.,
City Engineer.

21

City of Regina

Sidewalk Construction

Sealed tenders addressed to the undersigned City Clerk and endorsed on envelopes "Tenders for Sidewalk Construction," will be received up to 12 o'clock noon, MONDAY, MAY 30TH, 1910, for approximately 50,000 square feet of concrete sidewalk.

Particulars may be had upon application to the City Engineer.

A marked cheque for \$500.00 must accompany each tender. The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

L. A. THORNTON, A. E. CHIVERS,
21 City Engineer. City Clerk.

To Contractors

Separate or Lump Tenders will be received until 28TH INST. for all trades required in connection with the erection of a

Steel Constructed Fireproof Warehouse Building

for Messrs. Hobblerlin Bros. & Company, on the corner of Yonge and Richmond Streets, and also for the necessary alterations and additions in connection with the renovation of the adjoining buildings. Plans and specifications can be seen and all necessary information obtained at my offices, 164 Bay St.

E. J. LENNOX,
Architect.

20

City of Regina

Province of Saskatchewan

Sewers

Sealed tenders will be received up to noon, MONDAY, MAY 30TH, 1910, addressed to the undersigned, for each of the following contracts for the construction of Storm Water and Sanitary Trunk Sewers and Disposal Works:—

Contract A. The construction of sewers as follows:

- 10761 feet, 30-inch.
- 3248 feet, 48-inch.
- 2369 feet, 5-foot 6 inches.
- 8392 feet, 6-foot.

Contract B. The supply of 11,500 barrels of Portland Cement for the above sewers.

Contract C. The supply of reinforcement for the sewers.

Contract D. The supply of sewer pipe for branches from the sewers.

Contract E. The supply of manhole covers and other special castings.

Contract F. The supply of 700 cords of Field Boulders for the Percolating Filters.

Contract G. The supply of 3,600 barrels of Portland Cement for the Disposal Works.

Tenders for A. and F. must be accompanied by an accepted bank cheque for \$10,000 and \$2,500 respectively or other satisfactory deposits for the above amounts.

The deposits of unsuccessful tenderers will be returned as soon as the contracts are signed.

The right to reject any or all tenders or to waive irregularities therein is to be at the discretion of the City authorities.

Plans, specifications, forms of tender and all information may be obtained on application to the City Engineer's office, Regina, Saskatchewan.

A. J. McPHERSON, C.E., A. E. CHIVERS,
Consulting Engineer. City Clerk.

Regina, Sask., May 7th, 1910.

21

Tenders

University of Toronto Central Light Heat and Power Plant

Tenders will be received in triplicate by the undersigned up till noon, MONDAY, THE 23RD INST., for the furnishing and installing all heating and electrical apparatus, constructing tunnels, etc., required for the Central Light, Heat and Power Plant.

Plans and specifications for the entire work may be seen at the office of the architects.

The lowest or any tender not necessarily accepted.

DARLING & PEARSON,
2 Leader Lane, Toronto.

20

City of Regina

Province of Saskatchewan

Sewage Disposal Works

Sealed tenders will be received until noon, MONDAY, JUNE 6TH, 1910, for the construction of Sewage Disposal Works for the City of Regina. Tenders must be accompanied by an accepted bank cheque or other satisfactory deposit for the amount of \$5,000.

The deposits of unsuccessful tenderers will be returned as soon as the contract is signed.

The right to reject any or all tenders or to waive any irregularities therein is to be at the discretion of the City authorities.

Plans, specifications, forms of tender and all information may be obtained on application to the City Engineer's office, Regina.

A. J. McPHERSON, C.E., A. E. CHIVERS,
Consulting Engineer. City Clerk.

Regina, Sask., May 12th, 1910,

22



Tenders for

Sea Wall Construction

Tenders, addressed to the undersigned, will be received by registered post only, up to 12 o'clock noon on TUESDAY, MAY 24TH, 1910, for the construction of a permanent Sea Wall along a portion of the cribwork in front of Exhibition Park.

Specifications may be seen and form of tender obtained, together with all information relative thereto, at the office of the Parks Department, City Hall, Toronto.

The usual conditions pertaining to tendering, as prescribed by city by-law, must be strictly complied with, and envelopes containing tenders must be plainly marked on the outside as to contents.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman of the Board of Control.

City Hall, Toronto, May 11th, 1910.

20

Bridge Tenders

Sealed tenders will be received by Wm. Purves, Township Clerk, Columbus, Ont., up to noon, on SATURDAY, MAY 28TH, for the construction of Two Reinforced Concrete Bridge of 32 feet and 22 feet spans, near Oshawa.

Plans and specifications may be seen and information obtained from the Clerk, or from Hiram Gifford, Reeve of East Whitby, Oshawa, or from the engineers.

BOWMAN AND CONNOR,
36 Toronto street, Toronto.

20

COMPETITIVE PLANS

Competitive working sketches will be received by the undersigned up to and including MAY 28TH NEXT, for a four-roomed brick public school building with modern conveniences.

It is desired that the building be so planned that additional accommodation may be conveniently added to it when circumstances demand. Address

THOS. I. TRUEMAN,
Secy.-Treas. Public School Board,
Midland, Ontario.

20

Tenders for Paving

The City of Saint John Invites Tenders for

Paving, etc., in Main, Pond, Smythe, Nelson and St. John streets, according to plans and specifications to be seen and forms of tender obtained at the office of the City Engineer, Room No. 5, City Hall, duplicates of which are on file in the office of the "Contract Record," 504 Confederation Life Building, Toronto.

A cash deposit must accompany each bid, the amount being as stated in each specification.

The city does not bind itself to accept the lowest or any tender.

All tenders must be addressed to the Common Clerk, Room No. 3, City Hall, who will receive bids until noon of TUESDAY, THE 31ST DAY OF MAY, A.D. 1910.

ADAM MACINTYRE, WM. MURDOCH,
Comptroller. City Engineer.
St. John, N.B., May 7th, 1910. 21

Tenders For Crushing Stone

Sealed tenders, addressed to the undersigned and endorsed "Tender for Stone" will be received up to 12 o'clock noon, on MONDAY, MAY 30TH, 1910, for crushing and delivering on the road about 4,000 cubic yards of stone, the contractor to provide all necessary machinery, etc. The stone for crushing may be obtained along the West Branch of the Humber River on lot No. 6 in the 8th concession, and lots Nos. 7 and 8 in the 9th concession of the Township of Toronto Gore. The road to be improved is the 9th Line (Gore Road), in said township, commencing at the county line between Peel and York, and extending northerly. The tenders will be opened at the office of the Clerk of the County of Peel, Brampton, at 2 p.m. on the above date.

For further particulars apply to the undersigned. The lowest or any tender not necessarily accepted.

J. G. JULIAN
Reeve of Toronto Gore Tp.
Castlemore P.O.

21

City of Westmount Street Paving

Tenders are invited for paving of Sherbrooke, St. Catherine and Selby Streets, Metcalfe and Wood Avenues, Cote St. Antoine Road, and other streets and avenues, in asphalt, scoria block, bitulithine or other permanent material, as stated in specifications and details now open to inspection by all interested at the office of the City Surveyor in the City Hall.

Tenders must be enclosed in sealed envelopes plainly marked "TENDER FOR PAVING" and filed with the undersigned not later than WEDNESDAY, THE 25TH MAY, INSTANT, 1910, at noon.

The Council does not bind itself to accept the lowest or any other tender.

Given at Westmount this 13th day May, 1910.

A. D. SHIBLEY,

City Clerk.

20

NOTICE

In conformance with the Patent Act, and particularly Section 38, with reference to Canadian Patents Numbers 99,175 and 105,824, owned by the Diamant Briquet Works, for improvements in the Manufacture of Briquets, the public are hereby notified that the article protected under the said patents is being manufactured and may be obtained from The Silicate Brick Company of Ottawa, Limited, and that inquiries for the supply of the article in quantities, for licenses to manufacture or other negotiations in regard to the Patent Rights may be made to the undersigned.

BLACKMORE, COTE & COMPANY,
Patent Solicitors and Experts,
114½ Yonge St., Toronto, Ont.

20

City of Prince Albert Tenders

Sealed tenders addressed to the undersigned and marked "Tenders for Extensions" will be received until noon on SATURDAY, THE 21ST DAY OF MAY, 1910, for the construction of extensions to the water and sewerage systems of the City of Prince Albert, comprising approximately the following work:—

- 4,585 Lineal Feet 10-inch Water Main.
- 984 Lineal Feet 8-inch Water Main.
- 3,395 Lineal Feet 6-inch Water Main.
- 6½ Tons Special Castings.
- 19 Valves.
- 13 Hydrants.
- 535 Lineal Feet 24-inch Storm Sewer.
- 667 Lineal Feet 18-inch Storm Sewer.
- 580 Lineal Feet 8-inch Storm Sewer.
- 3,056 Lineal Feet 8-inch Sanitary Sewer.
- 13 Man Holes.
- 1 Flush Tank.
- 1 Lamp Hole.
- 16 Catch Basins.

Plans and specifications may be seen and forms of tender obtained at the office of the City Engineer of the City of Prince Albert after May 2nd, 1910.

C. O. DAVIDSON,
City Clerk.

Dated at Prince Albert, April 27th, 1910. 20

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—INSPECTOR for reinforced concrete, only first-class men need apply. Also several mechanical and electrical draftsmen. Apply, stating experience and salary expected, Box 979 Contract Record, Toronto, Ont. 20

WANTED—TRAVELLING SALESMAN to represent firm manufacturing bank, office and store fittings. Must be competent to make sketches, etc. Man having experience in architect's office preferred. Apply, Box 974 "Contract Record," Toronto. TF

TOWN OF PRESCOTT Sewer Construction

Sealed tenders will be received by the undersigned up to noon of SATURDAY, MAY THE 21ST, 1910, for the construction of Sewers, Septic Tank and Outlet in connection with the sewerage system of the Town of Prescott.

Plans and specifications may be seen and forms of tender obtained at the office of the Town Clerk, Prescott, or at the office of Morris and Moore, Pembroke, after Monday, the 9th day of May, 1910.

Tenders must be made on forms supplied, signed and sealed, and marked on outside "Tender for Prescott Sewer," accompanied by an accepted cheque for one thousand dollars on a chartered bank of Canada, made payable to the Town Treasurer of the Town of Prescott.

F. W. ELLIOTT,
Chairman Sewerage Committee,
Prescott, Ont.

20

Positions Wanted

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra.

WANTED POSITION AS SUPERINTENDENT, to take charge of concrete or railway construction work. I am thoroughly experienced in this line of work. Address, Box 978, "Contract Record," Toronto, Ont.

Miscellaneous

Advertisements under this heading two cents a word per insertion.

AGENTS WANTED—United States manufacturers of a well-known waterproofing compound wish to get in touch with reliable firm or individual to represent them in Canada. This would be a desirable opportunity for an energetic young architect or engineer. Box 970 "Contract Record." 20

FOR SALE CHEAP—One hundred thousand feet, well-seasoned white pine timber, part old Gilmour Mill; six thousand feet cedar; eleven thousand feet hemlock; four hundred feet white oak; all in various sizes, six to sixteen inches, and lengths, six to thirty feet. For particulars apply—F. W. ARMSTRONG, Trenton, Ont. 21

New Companies

Belding Lumber Company, Limited, Toronto, Ont., capital \$40,000. Incorporators, John Cowan and Thos. W. Best, both of Toronto, Ont.

The Granville Power Company, Limited, Ottawa, Ont., capital \$1,500,000. Incorporators, Francis H. Chrysler, and Chas. J. Bethune, solicitors, both of Ottawa, Ont.

Dominion Pacific Lumber Company, Limited, Montreal, Que., capital \$3,500,000. Incorporators, Henry A. Lovett, K.C., and Geo. V. Cousins, accountant, both of Montreal, Que.

Shurly, Dietrich Company, Limited, Galt, Ont., capital \$350,000. Incorporated to manufacture, sell and deal in saw, mechanics' tools, machinery, etc. Incorporators, J. C. Dietrich, manufacturer, and John Turnbull, machinist, both of Galt, Ont.

It was erroneously reported in our issue of May 11th that Messrs. Byers & Anglin, general contractors, 18 St. Alexis street, Montreal, had dissolved. As a matter of fact the firm was being reorganized by the admission of Mr. C. H. Harrington, B.Sc., son of the late Professor Harrington, of McGill University. Mr. Harrington was for some time connected with the offices of Messrs. Byers & Anglin, and latterly has been in the employ of the Eastern Concrete Construction Company, of Boston. The new firm will be known as Messrs. Byers & Anglin.

Power Plants, Electricity and Telephones

Continued from page 29)

lation of an electric light plant will shortly be introduced.

Moncton, N.B.

The agreement drafted by the city and the street railway provides that the construction of the street railway will commence on or before March 26th, 1911. This will be submitted to the ratepayers on May 27th.

New Hamburg, Ont.

The ratepayers will shortly vote on a by-law to purchase an electric light plant.

Regina, Sask.

The ratepayers have given a mandate to the city council to immediately proceed with the construction of a street railway to be operated by the municipality.

Renfrew, Ont.

A by-law will be submitted to the ratepayers on the 21st inst. for \$82,000 30-year debentures for the purchase of water powers, which will be developed.

Vernon, B.C.

A company in which Vancouver capital will be largely represented is now being formed for the purpose of establishing a large electric lighting and power plant in the upper Okanagan valley. It is stated that plans have been so far matured that incorporation of the company will be completed at an early date. The principal business of the new company will be the construction and operation of lines of electric railway which, according to present plans, will radiate from the town of Vernon.

Vancouver, B.C.

The Western Canada Power Company will construct an eight-mile railway, which will be operated in conjunction with their new power plant at Stave Falls. A small electrical unit will be ready in a few days to furnish power for this railway.

Waterville, Que.

Plans have been completed for the development of a water power on the Coaticook river about a mile below here. Of this, 250 horse power will be required to operate the factory of Geo. Gale & Sons, and the company will also light Compton as well as this place. F. C. Davis, connected with the Hydro-Electric plant for the town of Coaticook, is the engineer in charge.

Welland, Ont.

The ratepayers will vote on a street railway franchise on June 20th; also on a \$5,000 fire alarm system.

AWARDED.

Victoria, B.C.

The telephone and light committee recommended that the contract for the conduit system to be laid on Douglas street be awarded to the B. C. Electric Construction Company, of Vancouver, and the contract for the necessary electric wiring to Messrs. Hutchison Bros., of this city.

Winnipeg, Man.

M. Peterson, secretary, Board of Control, sends us the following items. Contracts have been awarded as follows: Section A.—Comprising three 50-light regulators and control panels, also one hundred arc lamps, 6.6 ampere magnetite system, Canadian General Electric Company, Winnipeg, at \$9,190. Section B.—Insulated line wire and cable, The Northern Electric and Manufacturing Company, Winnipeg, at \$2,010.75. Section C.—Mast Arm Parts,

The Northern Electric and Manufacturing Company, Winnipeg, at \$258.21. Section D.—Six-panel Switchboard, instruments, etc., The Canadian General Electric Company, Winnipeg, at \$3,450.

Miscellaneous

Castlemore, Ont.

Tenders are being called until May 30th for crushing and delivering on road about 4,000 cubic yards of stone. See advertisement in this issue.

Ottawa, Ont.

Tenders are being called until May 23rd by the Public Works Department, for dredging required at the following places in Ontario: Five Miles Narrows, Spanish River and Welland River.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, will be received until May 26th for the widening of the canal near Welland, Ont. Plans, etc., at office of Chief Engineer of the above department, and at the office of the Superintending Engineer, St. Catharines, Ont.

Recent building permits include: J. J. Anderson, concrete office and warehouse, Wellington street, \$2,500; Frank Barnes, brick veneer dwelling, Sunnyside avenue, \$2,500; Public School Board, two brick schools, Hopewell and Breeze Hill avenues, \$49,000 each; A. McArthur, brick dwelling, Woodlawn avenue, \$3,500; Wm. Fields, brick veneer dwelling, Osgoode street, \$2,500; Wm. P. Davis, alterations and addition to dwelling, Wilbrod street, \$15,000; St. Paul's Presbyterian Church, stone dwelling for manse, \$10,500; J. McFarlane, row of five brick veneer dwellings, Flora street, \$6,000.

Port Arthur, Ont.

Tenders addressed to J. McTeigue, city clerk, will be received until May 21st for street sweeper. Tenderers will please quote upon a hickory broom, rattan and steel sweeper with weight and capacity.

Toronto, Ont.

Tenders are being received until May 24 for construction of sea wall, etc. See advertisement in this issue.

Winnipeg, Man.

Recent building permits include: J. Johnson, two houses on the north side of Merriam, \$4,000; W. Moxam, apartment block, corner of Spadina and Joseph, \$50,000; D. B. Watt, house, Ashburn, \$3,500; Richard H. Cole, house, Nasau and Kylemore, \$3,300; McLean & Grisdale, two houses, Cathedral, \$2,500 each; The Logberg Printing Company, an apartment and stores building, \$35,000; McLean & Grisdale, two houses, Cathedral avenue, \$4,800; G. B. Watt, house, Ashburn, \$3,500; R. H. Cole, house, southeast corner Nasau and Cairnmore, \$3,300; W. Shaw, house on the west side of Home, between Buell and Preston, \$3,000; A. J. Carson, house on the north side of Cathedral, between Mac and Scotia, \$2,500; Arni Eggertson, three houses, McMillan avenue, \$13,500; Arni Eggertson, two houses, Burnell, \$6,000; H. Haldorson, dwelling, Simcoe street, \$5,000; Dunn and Wallace, house, Grosvenor street, \$5,000; Riverview Presbyterian Church, extension, \$2,600; Taylor Webb, house, Nassau street, stone and concrete, \$11,000; Albert Johnson, apartment block, east side of Sherbrooke street, Paul M. Clemens, architect; twenty suites, three storeys and basement, 46 by 90 feet, \$45,000; Smith & Kirkpatrick, two houses, south side of Buell avenue, \$9,200; H. Sandison, house, 412 Assiniboine avenue, \$5,000; J. Ryan, Jr., house, southeast corner Central avenue and Blanchard street, \$10,000; W. L. Ball, house,

Wellington Crescent, \$15,000; Ed. Noe, house, west side of Lilac street, \$10,000; G. A. Beliveau, house, south side of Harvard avenue, \$10,000.

AWARDED.

Minnedosa, Man.

The contract for the building of the dam on the Little Saskatchewan river has been awarded to Snyder Bros., of Portage la Prairie, \$40,528.

Montreal, Que.

Recent building permits include the following: W. Larose, 237 St. Christophe Colombe, two houses containing six dwellings, \$6,000; Tees & Company, 912 St. Catherine west, one stable, \$5,000; H. T. LaPointe, 173 Plessis, four houses containing ten dwellings, \$10,000; N. Ethier, St. Denis street, one house containing two dwellings, \$12,000; J. Menard, 164 Beaudoin, two houses containing four dwellings, \$3,000; D. Rippel, 527 Rachel, two houses containing six dwellings, \$8,000; J. Creviere, 33 Laurier avenue west, two houses containing four dwellings, \$7,000; J. B. Dagenais, 374 Marquette, two houses containing four dwellings, \$4,000; Protestant School Commissioners, Peel street, one house and one school, \$80,000; L. J. P. Desaulniers, 1427 Papineau, one house containing five dwellings, \$4,000; L. J. St. Pierre, 261 St. Germaine, one house containing two dwellings and one store, \$5,500; J. B. Lefleur, 71 Laurier avenue, two houses containing six dwellings, \$6,000; A. Comiere, 19 Laurier avenue, two houses containing six dwellings, \$8,000; W. L. Haldimand, 444 Argyle avenue, one house containing three stores, \$4,000; A. Menard, 241 Stadacona, one house containing three dwellings, \$3,000; W. Fournier, 2677 Esplanade, two houses containing four dwellings, \$3,000; O. Martineau & Fils, Limited, 371 Marie Ann avenue, seven houses containing twenty dwellings and one store, \$21,000; V. Martineau, 725 St. Catherine east, one house containing three dwellings, \$6,000; L. R. Montbriant, 230 St. Andre, one house containing seven dwellings, \$6,000; Dominion Oilcloth Company, 1192 St. Catherine east, one house and one warehouse, \$80,000; A. Lapointe, 812 Demontigny, one house containing three dwellings, \$2,500; L. F. Gingras, Ste. Rose, Que., two houses containing six dwellings, \$2,500; E. Plaudin, 1808 Boyer street, one house containing three dwellings, \$3,800; F. Dendron, 545 Chausse, three houses containing nine dwellings, \$6,000; Z. Berard, 88a Gaspé, five houses containing fifteen dwellings, \$12,500; Z. Berard, 88a Gaspé, four houses containing twelve dwellings and one store, \$10,000; H. Paiemont & Company, 80 St. Gabriel, four houses containing twenty-four dwellings, \$15,000; Z. Aubertin, 80 St. Gabriel, three houses containing eighteen dwellings, \$12,000; F. W. Cross, St. Catherine west, alterations to one house and one store, \$6,000; Mad. L. Huot, Beloeil, Que., alterations to one house, two dwellings and two stores, \$4,000; Mrs. Dr. Ritchie, Bishop street, alterations to one house and three dwellings, \$4,500; R. H. Bryson, 501 St. Catherine west, alterations to one house, \$7,000; J. W. Cooper, Oliver avenue, Westmount, alterations to one house, \$3,200; Successors Emery Lavigne, 176 Mance street, alterations to two houses, six dwellings and two stores, \$2,700.

Toronto, Ont.

Messrs. J. & J. Taylor have received the contract for the installation of treasury and safety deposit vaults for the Toronto General Trusts Corporation. The same firm has been awarded a similar contract for the Bank of Montreal at Winnipeg. These contracts are said to comprise the two largest vault equipments in Canada.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

PUBLISHED EACH WEDNESDAY BY

HUGH C. MACLEAN, LIMITED

HUGH C. MACLEAN, Winnipeg, President

T. S. YOUNG, Business Mgr. JAS. FISHER, Advt. Mgr.

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Telephone Main 2362

F. W. SCHERBARTH, Representative

MONTREAL Telephone Main 2299 B34 Board of Trade
HERBERT B. MUIR, RepresentativeWINNIPEG Telephone 224 404 Travellers' Bldg.
R. F. HILL, J. R. HOOPER, RepresentativesVANCOUVER Tel. 2010 26 Crowe & Wilson Chambers
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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto May 18, 1910

No. 20

Building Materials and the Outlook for Business

The present season is one of the most promising Canada has ever experienced at this time of the year. A feature is the immense amount of work coming out on all sides. In the west, as in the east, there are one or two disagreeable factors, the most noteworthy of these, of course, being the shortage of building materials, and the labor problem. The shortage of brick is the worst trouble. From Winnipeg comes the same tale that is heard at Toronto, namely, that the situation will not be relieved until the brick yards have their first burn on the market.

At Toronto, No. 1 dry pressed brick brings from \$15 to \$18. Red face brick sells at about \$12. Grey stock brick is scarce at \$10. Hard foundation and sewer brick range from \$10 to \$11. These are the prices obtaining upon the available supply. The great difficulty is to fill orders at all. It is a matter for speculation whether there will be any material reduction with the first output of the kilns, particularly in view of the great amount of work in sight. There is a good supply of cement on hand at Toronto, with prices unchanged as quoted by this journal.

Our Winnipeg correspondent states that in the western section there is a stiffening tendency in all materials, notably brick, lumber and cement. The stocks of lumber in Saskatchewan and Alberta are reported to be smaller than they have been for several years, and the British Columbia mills, therefore, are practically assured of a big demand.

A negotiable factor in the general business outlook is the amount of railway construction planned. This will put a great deal of money into circulation. Notwithstanding the activity of trade, there is every probability that money will continue to be comparatively easy and that capital will be available for legitimate enterprises at reasonable rates.

It is a matter of satisfaction that the crop reports

from the West are very encouraging. The early opening of spring and of seeding marked the beginning of a season of particular activity. The agricultural community, generally, is in a sound financial condition, the proceeds of last year's crop having sufficed to liquidate practically all their old liabilities. These circumstances are exceptionally favorable to the building outlook.

Should Creed Enter Into Contract Matters?

The Public School Board at Ottawa is laying itself open to criticism for turning down certain tenderers because they were not public school supporters. Tenderers were called for the new schools on Hopewell and Breeze Hill avenues. The lowest bid received for one of the contracts was submitted by a reputable firm, one member of which was a public and the other a separate school supporter. The contract was awarded to the next lowest tenderer on the ground that the money should be spent with public school supporters.

Whatever particular arguments may be adduced in favor of this particular award, we do not believe in petty discriminations of this kind. Once a man has been permitted to tender and has shown himself financially capable of carrying out the work, his chances should be absolutely on a par with other tenderers—neither better nor worse—color, creed and politics notwithstanding. If the Ottawa School Board or any other public body wants to discriminate, let the discrimination be made in the advertised calls for tenders, so that people will know where they are at.

The spirit in which tenders should be called is shown in a letter just to hand from Mr. F. L. Fellowes, City Surveyor of Westmount. The following is an extract:

"This city is calling for tenders for the construction of about 100,000 yards of asphalt paving, of the usual standard, and we shall be pleased to receive bids. The work will be let to any reputable tenderer with the lowest price. Every opportunity will be afforded for satisfactory figuring. Contractors are invited to communicate with this office."

No objection can be taken to the power of veto furnished by the clause: "The lowest or any tender not necessarily accepted." Obviously, it is only fair for the parties who invite tenders to have some freedom of action. Contractors, however, often express themselves strongly as to the way in which the freedom thus reserved is used. In practically every case the object of taking tenders is, ostensibly at least, to obtain the lowest bid for the work; and it is only reasonable to infer that the lowest tender will be accepted if the work is carried out. Consequently, those who tender exercise their utmost ingenuity in order to submit the lowest price. In this process, nowadays, much time is spent and much experience brought to bear. It is therefore, very annoying for a firm to find that although they have come out lowest in the competition, a tender at a higher rate has been preferred. Generally, the inferences in such a case are that the firm quoting the lowest price is incompetent or financially inadequate to the work; or that it was intended from the first to give the job to a certain firm and the tenders of others were invited merely as a check. But occasionally, as at Ottawa, the firm quoting the lowest price is in some way objectionable.

Financial inadequacy or incompetence are generally sound reasons for rejection. As to the unfairness of inviting tenders from a number of firms merely as a check price on some favored concern to whom the work is to be given if their price is anywhere near the mark, there can be no two opinions. If the fact becomes known and it not infrequently does, that a certain firm is to

be preferred, the competition is nothing less than a farce played at the expense of its promoters. When, however, tenders are taken publicly and the lowest bid is rejected, owing to a *difference in creed*, it is time for comment. Creed, indeed! Is there any morality in inviting tenders with no intention of giving the work to the best man?

The unsavory reputation which the Ottawa Public School Board will enjoy in contracting circles should point a moral to municipalities and others who are handling really important work.

Architects and the Public

Mr. W. Shaw Sparrow, in the "New Age," has a tilt at architects in their relationship to the community.

The knowledge Mr. Sparrow has of the problems before the architect at the present time, points his lance and renders his thrusts the shrewder. Witness his remarks as follows:

"Unhappily, too, architects are unable to protect themselves. Union is the last necessity that artists think about. They look at things from so many points of view that they talk and wrangle far too much, till their energy for action becomes as futile as evaporated steam. Then they say, 'We're artists, individualists.' A moment later, having forgotten that remark, they add, 'We haven't a chance; there are so many forces against us.' Just so. The unorganized go down before the charging big battalions. As authors fear publishers, yet never set on foot a publishing firm of their own, so architects, despite their poor hopes for the future, with practical courage the tactics of competing shop companies bolstered up by advertisements. Odd and pathetic! Why is it that artists cannot produce a strategist, a great organizer, their own Lord Kitchener?"

Architecturally Treating Stone Work

The architectural treatment of stone work is a subject to which architects do not appear to have given as much attention in all cases as its importance would seem to warrant, but in a public address some time ago, an English architect, W. J. Hale, of Sheffield, offered some suggestions which are of interest along this line. Among other things he said:

Two characteristics which make stone useful as a building material are its weight and its power to resist a crushing force. One of the charms of stonework lies in its capacity to receive the impress of the individual man's power and thought. Its surface can be made to reflect his mind by the manual labor he expends upon it, and the monotony of a modelled and cast material is avoided. Although stone is granular, it is generally more or less laminated, and care should be taken to place the blocks in the building so that the edges only may be exposed to the weather, otherwise the stone will more easily decay and the surface peel off. Jointings should be carefully considered, acute angles avoided and right angles used where possible.

The arch utilizes in its shape and design the prominent characteristics of stone, its weight and its power to resist crushing force, and the introduction of this feature causes one of the greatest changes in architecture. A further development of the arch is the groined or vaulted ceiling, which relies for stability upon the same qualities, and has also certain fire-resisting powers. One method of beautifying the stone is by mouldings, i.e., the working of surfaces or edges of the stone with ridges and hollows of various forms, in order to obtain parallel lines of light and shadow, and, as a variety is the object here,

it is well to get variety also in the size of the light and dark stripes.

One of the problems of the day with regard to architecture in stone is the modern street front. Surely the craze for carrying tons of stone on sheets of plate glass has gone far enough. Any building, to be satisfactory, must not only have supports strong enough to carry the superimposed weight, but the supports must look strong enough for their burden. Any treatment of stone should, in the first place, be examined as to whether or not it takes advantage of the inherent qualities of the material, and secondly, as to whether it satisfies man's trained artistic perceptions. If he stands these tests, then, although the particular feature may not be capable of defence on strictly utilitarian grounds, still it has justified its existence.

A Method of Numbering Drawings

In order to number drawings in a convenient manner and make it easy to find any section or detail referred to on an assembled drawing or plan, Mr. I. W. Jones, engineer and designer of water power plants, Milton, N.H., has devised a system which is self referencing.

The various sheets for a given job are designated alphabetically, from A onward. When there are more than 26 sheets on one job, the 27th is called AA, the 28th AB, and so on. The different views, sketches and details on a sheet are designated numerically and the sheet letter attached to the number. For example, the third detail on sheet D would have as its title, No. 3—D. When sections are taken they are given titles which show the letter of the sheet on which they are detailed, and a number corresponding to the position on that sheet. If, for example, a certain cross-section line on one of the plans is marked 2—H, it means that the drawing of this section will be found on sheet H and that it is the second section or detail on that sheet. All section lines are lettered at both ends and have arrows to show in what direction the section is taken. Moreover, if a piece of machinery indicated on a plan is marked "See Detail 9—M," it would mean that the detailed drawing of the object is No. 9 on sheet M. The scheme thus saves considerable time over one that is not self referencing. Mr. Jones states that it has been found very satisfactory.

Each job is given an individual number which consists of a combination of a consecutive job number for the year in which it was taken, and the last two figures of the year. For example, job number 1009, means that the job was the tenth one taken up in 1909, while the 25th started in that year would be numbered 2509. By this method both plans and files indicate at a glance when a given piece of work was taken up.

Illustrating the manner in which contract matters were carried out under the last administration at Montreal, it transpires that no contract was made for the erection of the new city morgue on Craig street. Mr. L. J. Gauthier, advocate, appeared before the Board of Control last week and asked that the contract be signed. Asked why the council had not dealt with the matter, he told the controllers that it cost so much to get the project through the Hygiene Committee that it was not deemed advisable to press things before the city council. It is almost incredible that such a state of affairs could have existed.

Don't cut prices; anybody can do that. Do better work!

An Example of Up-to-date Store Design

The Willis Building Montreal—Character and Purpose of Structure expressed in Architectural Treatment—Features of Construction

Architects: ROSS & MACFARLANE, Montreal

The new building which is to be erected on the south-west corner of St. Catherine and Drummond streets, Montreal, contains meritorious suggestions in the design and construction of modern store buildings that are of interest to both architects and contractors.

The structure is to be erected on the site of the premises now occupied by Mr. J. A. Harte's drug store. It will be occupied exclusively by the owners for their own business, their present premises being both inadequate

and with the janitor's apartments and store rooms on the eighth floor.

The shipping and packing rooms, also storage, will be accommodated in the basement, and the heating apparatus, elevator and vacuum cleaning machinery in the sub-basement. The stairs and freight elevator are in the rear of the building, communicating with each of the several floors mentioned above.

The building was designed by Messrs. Ross & MacFarlane, and will be erected under their supervision. The structure will rest upon concrete foundations carried down to the rock, and will be built of fireproof materials throughout, the framing consisting of fireproofed steel and the floors of reinforced concrete. The exterior will be carried out in gray limestone. On the principal showroom floor the maximum area of glass has been provided for display purposes. The interior finish of this floor will be decorated in harmony with the character of a piano business. Every effort has been made to express the character and purpose of the building in every detail of construction and decoration.



Perspective view of new Willis Building, Montreal, as the structure will appear on completion

quate and unsuitable for their demands. The first, or street floor, will be used as a general reception floor and showroom, toward the rear of which a Mezzanine floor will be provided for the sales department. At the rear of the store, and approached by a separate side entrance on Drummond street, will be situated the passenger elevator, communicating with the general and directors' offices on the second floor; with the concert hall on the third floor; with the parlor and show rooms on the fourth and fifth floors; with a sales room on the sixth floor; with the repair and polishing rooms on the seventh floor,

A Canon of Ethics for Architects

The following canon of ethics has been adopted by the American Institute of Architects as a general guide to members, and will be recognized as enumerating some of the elementary duties of an architect towards fellow professional men:

It is unprofessional for an architect

1. To engage, directly or indirectly, in any of the building trades.
2. To guarantee an estimate or contract by bond or otherwise.
3. To accept any commission or substantial service from a contractor or from any interested party other than the owner.
4. To advertise.
5. To take part in any competition the terms of which are not in harmony with the principles approved by the institute.
6. To attempt in any way, except as a duly authorized competitor, to secure work for which a competition is in progress.
7. To attempt to influence, either directly or indirectly, the award of a competition in which he is a competitor.
8. To accept the commission to do the work for which a competition has been instituted if he has acted in an advisory capacity either in drawing programme or making award.
9. To injure falsely or maliciously the professional reputation, prospects, or business of a fellow architect.
10. To undertake a commission while the just claim of another architect who has previously undertaken it remains unsatisfied, or until such claim has been referred to arbitration or issue has been joined at law.
11. To attempt to supplant a fellow architect after definite steps have been taken toward his employment.
12. To compete knowingly with a fellow architect for employment on the basis of professional charges.

The Standard Ideal Company, Limited, are removing from 128 Craig street west to 155 Notre Dame street west, Montreal.

Construction of a Concrete Water Tower

At Victoria, B.C.—Details of Methods Employed by Contractors
—Itemized Costs—Factors which Contributed to Extra Expense*

By A. KEMPKEY

The tower, as built, consists of a hollow cylinder of plain concrete, 109 feet high, and having an inside diameter of 22 feet. The walls are 10 inches thick for the first 70 feet and 6 inches thick for the remaining 39 feet, and are ornamented with six pilasters (70 feet high, 3 feet wide, and 7 inches thick), a 4-foot belt, then 12 pilasters (12 feet high, 18 inches wide, and 7 inches thick), a cornice, and a parapet wall. A steel tank of the ordinary type is embedded in the upper 40 feet of this cylinder. To form the bottom of this tank, a plain concrete dome is thrown across the cylinder at a point about 70 feet from the base, the thrust of this dome being taken up by two steel rings, $\frac{1}{2}$ -inch by 14 inches and $\frac{3}{8}$ -inch by 18 inches, bedded into the walls of the tower, the latter ring being riveted to the lower course of the tank. The tank is covered with a roof of reinforced concrete, 4 inches thick, conical in shape, and reinforced with $\frac{1}{2}$ -inch twisted steel bars.

The tower is built on out-cropping, solid rock. This

This tapered lagging was used again on the 4-foot belt and cornice forms, the taper being turned alternately up and down.

The interior diameter being uniform up to the bottom of the dome, collapsible forms were used from the beginning. These forms were constructed in six large sections, 6 feet high, with one small key section with wedge piece to facilitate stripping, as shown in fig. 1. There were three tiers of these, bolted end to end horizontally and to each other vertically.

Above the taper base and except in the 4-foot belt and cornice, collapsible forms were used on the outside also. There were six sections extending from column to column and six column sections, all bolted together circumferentially and constructed as shown in fig. 1. Three tiers of these were also bolted together both vertically and horizontally.

Having filled the top tier, the mode of operation was as follows: All horizontal bolts in the lower inside and outside forms were removed, as was also the small key section on the inside; this left each section suspended to the corresponding one immediately above it by the vertical bolts before mentioned. It is thus seen that in each case the centre tier performed the double duty of holding the upper tier, which was full of green concrete, and the sections of the lower tier, until they were hoisted up and again placed in position to be filled.

These lower forms were then hoisted by hand—four-part tackles being used—and placed in position on the top forms, their bottom edges being carefully set flush with the top edge of the form already in position, and then bolted to it. On the outside, the column forms, and on the inside, the wedge and key sections were set last. A 3-pound plumb-bob and a fine line were suspended from the inner scaffold and carefully centered over a point set in the rock at the base. This line was in the exact centre of the tower, and the tops of all the forms, after each shift, were carefully set from it by measurement, thus keeping the structure plumb.

The first 23 inches of the barrel of the tower were moulded with special outside forms, constructed so as to form the bases of the large pilasters. After eleven applications of the 6-foot forms, these 23-inch sections were reversed to form the capitals, thus making these pilasters 69 feet 10 inches over all.

The forms of the 4-foot belt and beading were made in twelve sections of simple segments and vertical lagging, as shown in fig. 1.

Two sets of the outside forms were split longitudinally, as shown in fig. 1, and used to form the small pilasters. The first set was put in place, filled, and the concrete allowed to harden. The bolts were loosened and the forms raised $5\frac{1}{2}$ inches vertically, again bolted up, and the second set was placed in position, bringing the top of the second set up to the bottom of the cornice. The bases and capitals of the small pilasters were moulded on afterward.

The cornice forms are clearly shown in fig. 1. The small boxes separating the dentils are made of light stuff, and tacked into the cornice forms so that, in stripping, they would remain in place and could be taken

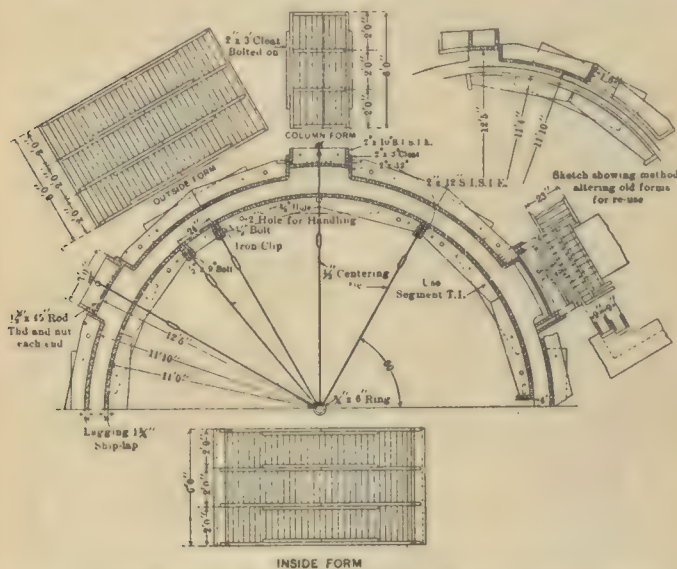


Fig. 1—Movable Form for Shaft of Concrete Water Tower

rock was roughly stepped, and a concrete sub-base built. This sub-base consists of a hollow ring, with an inside diameter of 20 feet, the walls being 5 feet thick. It is about 2 feet high on one side and 7 feet high on the other, and forms a level base on which the tower is built. The forms for this sub-base consisted of vertical lagging and circumferential ribs. The lagging is of double-dressed, 2x3-inch segments, and the ribs are of 2x12-inch segments, 6 feet long, lapping past one another and securely spiked together to form complete or partial circles. These ribs are spaced 2 feet centre to centre.

Similar construction was used to form the taper base of the tower proper, except, of course, that the radii of the segments forming the successive ribs decreased with the height of the rib. Tapered lagging was used, being made by double dressing 2x6-inch pieces to $1\frac{3}{4}$ x5 $\frac{3}{16}$ -inch, and ripping on a diagonal, thus making two staves, 3-inch wide at one end and $2\frac{3}{4}$ -inch wide at the other.

*Abstracted from paper read before the American Society of Civil Engineers.

out separately, in order to prevent the breaking off of the corners of the dentils. A number of outside and inside sections were sawed in half horizontally in order to provide forms for the parapet wall.

The inside diameter of the tank is 8 inches greater than the inside diameter of the base. Two sets of inside forms were split longitudinally and opened out as shown in fig. 1, and another small section was added to complete the circle. The remaining set was left in place to support the dome forms.

The dome forms were made in 12 sections, bolted together to facilitate stripping. All ribs and segments were cut to size on the ground, put together in place, and then covered with lagging and two-ply tar paper. The lagging on the lower sharp curve was formed of a double thickness of $\frac{3}{8}$ -inch spruce, the remainder being 1x4-inch pine, sized to a uniform thickness of $\frac{7}{8}$ -inch.

The roof forms were made in eight sections and bolted together to facilitate stripping. All ribs and segments

of any deck, the concrete was put in through the chute from the deck above. The chute was light and easily shifted by the wheelbarrow men, assisted by the man placing the concrete, during the interval between successive wheelbarrows.

The concrete, except that for the roof and parapet, was composed of sand and broken rock, the run of the crusher being used. That for the roof and parapet was composed of sand and gravel. The only reason for using gravel for the concrete of the roof was the ease with which it could be obtained in small quantities, the supply of broken rock having been used up, and this being the last concrete work to be done.

The concrete used was as follows: 1:3:6 for the sub-base and taper base; 1:3:5 for the barrel of the tower and tank casing; and 1:2:4 for the dome and roof. The dome was put in at one time, there being no joint, the same being true of the roof. Vancouver Portland cement, manufactured on the island about 15

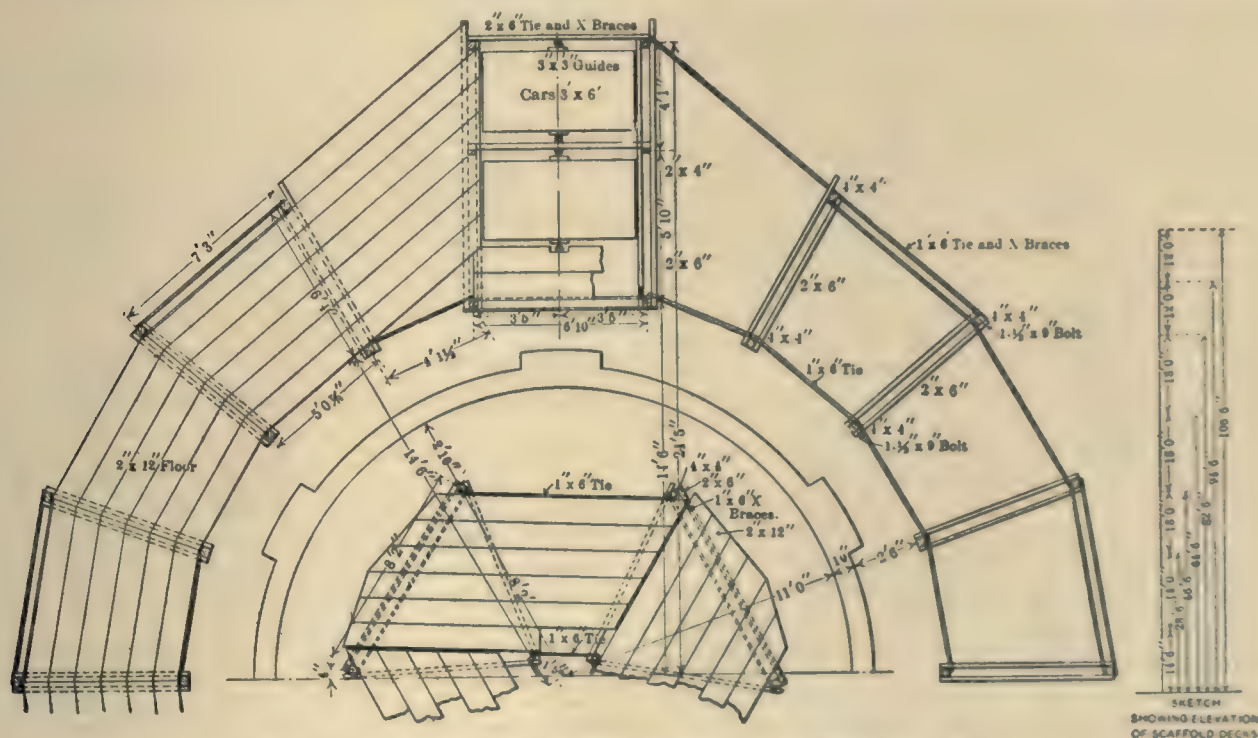


Fig. 2—Details of Scaffold for Constructing Concrete Water Tower

were cut to size on the ground, put together in place, and covered with 1x4-inch lagging, dressed to a uniform thickness of $\frac{7}{8}$ -inch, and two-ply tar paper. The segments being put in horizontally instead of square with the lagging, gave circles instead of parabolas, making them much easier to lay out, and giving a form which was amply stiff.

The question of using an inside scaffold only was carefully considered, but owing to the considerable amount of ornamentation on the outside, necessitating a large number of individual forms, it was not thought that any economy would result. Fig. 2 shows clearly the construction of the scaffolding.

All concrete was mixed wet, in a motor-driven, Smith mixer, and handled off the outside scaffold, being sent up in wheelbarrows on the ordinary contractor's hoist and placed in the forms through an iron chute having a hopper mouth. This chute was built in three sections bolted together, either one, two, or three sections being used, depending on the distance of the forms below the deck. When the top of the forms reached the elevation

miles from the city, was used throughout the work.

Before filling, the inside of the tank was given a plaster coat, consisting of 1 part cement to $1\frac{1}{4}$ parts of fine sand. This proved to be insufficient to prevent leakage, the water seeping through the dome and appearing on the outside of the structure along the line of the bottom of the rings. Three more coats were then applied over the entire tank, and two additional ones over the dome and about 8 feet up on the sides, and except for one or two small spots which show just a sign of moisture, the tank is perfectly tight.

The barrel of the tower was carried up to a height of 66 feet. A special set of inside forms, about 2 feet high, extending to the springing line of the dome, was then put in, and the dome forms were set up on it. The idea was that this 2-foot form could be knocked out piece by piece and the weight of the dome form taken on wedges to the last 6-foot form, these wedges being gradually slackened down in order to allow the dome form to settle clear of the dome. As a matter of fact, this was done, but the dome forms, being very tight, did not settle,

and had to be pried off a section at a time. A similar method was used for slacking down the roof forms, with similar results.

After the dome forms had been put in, the concrete was carried up approximately to the elevation of the bottom of the rings. Small neat cement pads were then put in and accurately levelled, and on these the steel rings were placed, and the steel tank was erected.

In order to ensure a perfectly round tank, each course was erected against wooden templates accurately centered and fastened to the inside scaffold. The tank is the ordinary type of light steel, the lower course being 3/16-inch, the next, No. 8 B.W. gauge, the next, No. 10 B.W. gauge, and the remaining four, No. 12 B.W. gauge.

Work on the foundation was started on August 15, 1908, and the tower was not completed until April 1, 1909. Much time was lost waiting for the delivery of the steel, and also owing to a period of very cold weather which caused entire cessation of work for about one month.

The tower as completed presents a striking appearance. In order to obliterate rings due to the successive application of the forms and to cover the efflorescence so common to concrete structures, the outside was given two coats of neat cement wash applied with ordinary kalsomining brushes, and, up to the present time, this seems to have been very effective in accomplishing the desired result. Irregularities due to forms are unnoticeable at a distance of 200 or 300 feet, and the grouting gave a very uniform color. The application of two coats of cement wash cost, for labor, \$97.68, and for material, \$15.18, or \$1.32 per 100 square feet, labor being at the rate of \$2.25 per 8 hours and cement costing \$2.53 per barrel delivered on the work.

The tower was designed by Arthur L. Adams, M.Am. Soc.C.E., under whose direction the plans for all the work of remodelling the waterworks system were prepared and executed. The forms, scaffolding, etc., were designed by the writer, who was also in immediate charge of the erection.

Tenders received for the construction of the tower covered an extremely wide range, and indicated at once the utter lack of knowledge on the part of the bidders of the cost of a structure of this kind. Inasmuch as none of them had had previous experience in this class of construction, the engineer deemed it the part of wisdom and economy to retain the construction under his immediate supervision, and, therefore, the work was done by day's labor.

The rates of wages paid, all being on a basis of an 8-hour day, were as follows:

Common labor	\$2.25 and \$ 2.50
Carpenter	4.00
Carpenter's helper	2.75
Boilermaker	3.50
Holders on	2.50
Boilermaker foreman	5.00
Plasterers	6.00
Plasterers' helpers	3.00

The cost of material was as follows:

Cement, per barrel	\$ 2.53
Sand, per yard	1.47
Rock, per yard	0.80
Lumber, per 1,000 feet B.M.	\$14.00 and \$16.00

All these prices are for material delivered on the work.

An examination of the cost data, as given, will show that for the most part the unit costs are very high. This is due chiefly to the continued interruption of the work, during its later stages, owing to bad weather, particularly in the case of the erection of the steel tank. The

material cost in this case was also exceedingly high. In the case of the concreting, inability to purchase a hoist and motor and the high cost of renting the same, together with the delays mentioned, added greatly to the unit cost. When it is considered that the cost of plastering covers that of four coats over the entire inside of the tank and three more over about one-third of it, it does not appear so high, especially in view of the high rate of wages paid. The cost per yard for concrete alone was \$25.126, and this is probably about 25 per cent. in excess of the cost of the same class of work executed under more favorable conditions as to location, weather conditions, etc.

The following costs have been rearranged from the tables given by the author:

	Total	Per cu. yard.
Preliminary work—		
Labor, carpenter at 50 cents per hour..	\$ 11.00	
Labor, common, at 34.4 cents per hour.	64.94	
Labor, common, at 28.1 cents per hour.	249.67	
Total labor	\$ 325.61	\$ 0.790
Materials	133.62	0.324
Total labor and materials	\$ 459.23	\$ 1.114
Forms: Building, Shifting, Stripping—		
Labor, carpenter, at 50 cents per hour..	\$1,832.99	
Labor, common, at 34.4 cents per hour.	80.85	
Labor, common, at 28.1 cents per hour.	563.84	
Total labor	\$2,477.68	\$ 6.014
Materials—		
Lumber	\$ 583.49	
Hardware	325.51	
Miscellaneous	13.90	
Total material	\$ 922.90	\$ 2.240
Grand total	\$3,400.58	\$ 8.254
Scaffold: Erecting and tearing down—		
Labor, carpenter, at 50 cents per hour.	\$ 693.00	
Labor, common, at 34.4 cents per hour.	350.59	
Labor, common, at 28.1 cents per hour.	117.27	
Total labor	\$1,160.86	\$ 2.818
Materials—		
Lumber	\$ 487.77	
Hardware	202.79	
Total materials	\$ 690.56	\$ 1.676
Grand total	1,851.42	4.494
Concreting—		
Labor at 50 cents per hour	\$ 142.00	
Labor at 34.4 cents per hour	11.00	
Labor at 28.1 cents per hour	947.81	
Total labor	\$1,100.81	\$ 2.672
Materials—		
Rock	\$ 317.30	
Sand	335.72	
Cement	1,591.97	
Total material	\$2,244.99	\$ 5.449
Hoisting—		
Rental motor and hoist	\$ 406.56	
Power	83.53	
Total power	\$ 490.09	\$ 1.189
Grand total	3,737.89	9.316
Grand total concrete	9,449.12	23 178

These figures do not include apparently any charge for superintendence, which, with perhaps some other

items, may account for the difference between the final total and the cost of \$25,126 for concrete given by the author of the paper.

The cost of plastering 3,000 square feet was as follows:

	Total	Per sq. foot.
Labor—		
Plasterers, at 75 cents per hour	\$ 116.50	
Labor at 46½ cents per hour	15.00	
Labor at 37½ cents per hour	198.52	
Labor at 28.1 cents per hour	105.66	
Total labor	\$ 435.68	\$0.1452
Materials—		
Sand	\$ 8.64	
Cement	66.10	
Alum and potash	16.00	
Total material	\$ 90.74	\$0.0302
Grand total	\$ 526.42	\$0.1754

The cost of washing 8,560 square feet with cement wash was as follows:

	Total	Per sq. foot.
Labor—		
Common, at 43¾ cents per hour	\$ 50.00	
Common, at 28.1 cents per hour	47.68	
Total labor	\$ 97.68	\$0.0114
Material—		
Cement	\$ 15.18	\$0.0018
Grand total	\$ 112.86	\$0.0132

The itemized cost of the steel tank, 20,000 pounds, was as follows:

	Total	Per lb.
Labor—		
Carpenter at 50 cents per hour	\$ 124.24	
Helper at 34.4 cents per hour	2.75	
Boilermakers	382.57	
Holders on	147.33	
Labor	40.61	
Foreman, at 62.5 cents per hour	186.25	
Total labor	\$ 883.75	\$0.0441
Materials—		
Tank, rivets, etc.	\$1,740.69	\$0.0875
Grand total	\$2,624.44	\$0.1316

The various miscellaneous items of cost were as follows:

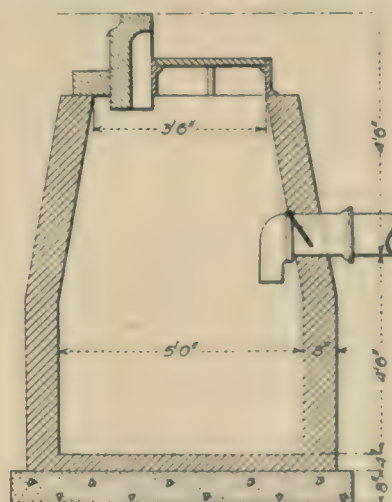
	Total.
Windows, Doors, etc.—	
Labor	\$ 49.00
Material	47.26
Total	\$ 96.26
Equipment, 40 per cent. of \$461.46	184.58
Ironwork (Spiral stairway, inlet and overflow pipes, radiator, reinforcing steel, etc.):	
Labor—	
Machinists, at 50 cents per hour	\$ 89.50
Helper, at 34.4 cents per hour	240.16
Labor, at 28.1 cents per hour	100.79
Total labor	\$ 430.45
Material	\$ 1,814.71
Grand total	\$ 2,245.16
Grand total (tower, and tank complete)	\$16,578.29

Slow Sand and Mechanical Filters

At a meeting of the Canadian Society of Civil Engineers held at Montreal last week, Mr. R. S. Lee, consulting engineer to the Provincial Board of Health, read an interesting paper, entitled, "Recent Developments in the Purification of Public Water Supplies." Concerning the relative merits of slow sand and mechanical filters, Mr. Lee said: "It is a question that has received considerable unprofitable and not entirely disinterested and fair discussion. The two systems do not admit of a rational comparison in the abstract. Both are wonderfully efficient machines in the accomplishment of the work legitimately required of them, and the varying conditions encountered in the field of water purification present a variety of problems in the solution of which both systems are a necessity."

Cost of Brick Catch Basins

In connection with their investigations into the cost of catch-basins in Boston, Messrs. Metcalf & Eddy, in a report to the Finance Commission of that city, give the



Brick Catch Basin

accompanying reasonable costs for the type of structure shown herewith:

2,000 brick at \$10.50	\$21 00
4 barrels American cement at \$1.15....	4.60
20 feet 10-inch pipe at \$0.22.....	4.40
One 12 x 10-inch Y at \$1	1.00
Guttermouth	9.00
D-frame	10.00
Trap	2.00
Total materials (furnished by the city)	\$52 00
Inspection by city	5 00
Teaming by city	3.00
Contract:	
Laying brick	12 00
Excavation	10 00
Backfill	4 00
Sand	3 00
20 per cent. profit on contract	6 00
Making connections	5 00
Laying 20 feet of drain pipe	15.00

Total

\$115 00

It is interesting to compare this estimated reasonable cost with the actual costs. In 1906-07 211 basins were built by contract at \$177 each, and 46 by day labor at \$179 each; in 1907-08, 221 basins were built by contract at \$190 each, and 15 by day labor at \$228 each.

Relative Cost of Sewer Work at Hamilton Ontario

The main sewer on Princess² street, Hamilton, Ont., from Sherman avenue to Wentworth street, is 24 inches diameter, and it was proposed to build this with fire clay pipe. All the other main sewers, being of larger diameter, were built of concrete. Before finally deciding on fire clay pipe in that section, 100 feet of 24-inch sewer was laid, composed of concrete, mixed 1:2:4, four inches thick, two-thirds of the sewer being constructed in the trench, the upper one-third was moulded on the surface and placed in the sewer after being properly set. The cost of this section of sewer was carefully kept in detail, with the result that the concrete sewer was found to be much cheaper than the fire clay pipe. Therefore, it was decided to construct a concrete sewer in this section.

Cost of 24-inch diameter concrete sewer—labor and materials—100 lineal feet:

Labor—

Bottom, 2:3, nine men 9 hours at 20c.....	\$16.20
Bottom, 2:3, setting moulds, 3 men 9 hours at 20c.....	6.21
Top, 1:3, moulding, 2 men 18 hours at 20c.....	7.20
Setting tops	10.00

Material—

70 bags cement	35.00
5 loads gravel (10 cubic yards)	10.80
Coal for mixer	1.00

Total cost for 100 feet \$86.41

Cost per lineal foot of concrete pipe sewer, 24-inch diameter, 86 4/10 cents.

The fire clay pipe cost about \$1.22 per foot, laid in the sewer. The cost of the 24-inch fire clay pipe alone was \$1.13³/₄, to which was to be added the cost of yarn, cement and laying.

Influence of Size of Building upon its Cost

In connection with an investigation of the cost of mill buildings, Charles T. Main, mill engineer and architect, of Boston, has established some interesting relations between the size of a building and its cost. He shows that there is an immediate decrease in cost as the width is increased, due to the fact that the cost of the walls and outside foundation, which is an important item of cost, relative to the total cost, is decreased as the width increases.

For example, supposing a three-storey building is desired with 30,000 square feet on each floor.

If the building were 600 x 50 feet, its cost would be about 99 cents a square foot.

If the building were 400 x 75 feet, its cost would be about 87 cents a square foot.

If the building were 300 x 100 feet, its cost would be about 83 cents a square foot.

If the building were 240 x 125 feet, its cost would be about 80 cents a square foot.

Of course, the exact figures as to cost will vary year by year and with the locality, but the relative values will remain practically constant.

The minimum cost per square foot is reached with a four-storey building. A three-storey building costs a trifle more than a four-storey. A one-storey building is the most expensive. This is due to a combination of several features.

(a) The cost of ordinary foundations does not increase in proportion to the number of storeys, and therefore the cost is less per square foot as the number of storeys is increased.

(b) The roof is the same for a one-storey building as for one of any other number of storeys, and therefore its cost relative to the total cost grows less as the number of storeys increases.

(c) The cost of columns, including the supporting piers and castings, does not vary much per storey as the storeys are added.

(d) As the number of storeys increases, the cost of the walls, owing to increased thickness, increases in a greater ratio than the number of storeys, and this item is the one which in the four-storey building offsets the saving in foundations and roof.

The saving by the use of frame construction for walls instead of brick is not as great as many persons think. The only saving is in somewhat lighter foundations and in the outside surfaces of the building. The floor, columns and roof must be the same strength and construction in any case.

Placing Concrete Aqueduct Lining in Freezing Weather

Owing to delays in building the foundations and piers of some of the aqueduct bridges on the Illinois & Mississippi Canal it was necessary to place some of the concrete lining in cold weather. It was important, therefore, that precautions be taken to keep the concrete from freezing. The methods employed were described by Mr. H. E. Reeves, U. S. junior engineer, in a paper before the last convention of the Illinois Society of Engineers and Surveyors.

The last concrete was deposited Dec. 28th and the temperature during the final weeks dropped as low as 12 degrees or 15 degrees above zero, barely rising to the thawing point in the middle of the day. Owing to the thinness of the lining, 6-inch on the bottom of the trough and 9-inch on the sides, and its exposed position, considerable care was necessary. To heat the concrete materials, the exhaust steam from the mixer engine was turned into the drum of the mixer. This was accomplished by conducting the exhaust pipe to a point in front of the discharging opening of the drum, so that the drum when tilted for discharging would just clear the end of the pipe. The force of the exhaust then carried the steam into the revolving drum, where complete mixture with the dropping particles of concrete utilized practically all of the heat remaining in the steam. Though the expense was absolutely nothing, the results were really surprising. The temperature of the deposited concrete averaged probably 70 degrees, while if a batch were left in the mixer 3 minutes or more its temperature would be 90 degrees to 100 degrees.

To protect the deposited concrete, the inside of each 35-foot span at the close of the day's work was roofed over with inch boards laid loosely on horses, the ends being closed with pieces of canvas; and into the room thus formed live steam from the boiler was conducted through a hastily laid pipe line. The night watchman kept up the steam, the amount needed being very small. Steam was kept on the concrete for two nights or for about 40 hours after being laid. It was considered that the outside was sufficiently protected by the 2-inch forming. On the third day the forms, if needed, were removed and the concrete left exposed. The cost of this protection was about 12 to 15 cents per cubic yard of concrete and the results, Mr. Reeves states, were perfect. As an illustration of the need of protection, it may be noted that the feed pipe for the boiler froze one night about midnight and steam was shut off from the concrete for about 7 hours. The concrete froze to some extent, and about 1/2-inch of the surface afterwards shelled off.

Machinery in the Manufacture of Brick

Criticism of Various Types of Brick Making Machines by an English Authority — Relative Merits of Hand and Machine Made Brick

At a recent meeting of the Royal Society of Arts held in London, Eng., Mr. A. B. Searle dealt with the introduction of machinery in the manufacture of bricks. There are two difficulties in connection with hand manufacture: (1) restricted output on account of the slowness of hand workers; (2) scarcity of skilled workers. The number of really skilled workmen is gradually diminishing, and the impetus to evolve machine methods was given some years ago, when large quantities of bricks were suddenly demanded. There are two main types of brickmaking machines, the so-called soft-mud brick machine, which is very much more used in America than in England, and in which the paste, in a fairly stiff mass, is forced into moulds. The second type of machine, more common here, may be likened to a sausage machine, the paste being forced through dies into moulds capable of making six or more bricks at a time. Another form of this type of machine presses out the paste horizontally in the form of a band, which is afterwards cut by wire or rotary knives, the former being the most common. The origin of this type of machine dates back 40 years, and the modern forms now used here are a development of the original American machines. Several types of machine on this principle were described. A feature of them is the safety doors, which enables the clay to relieve itself when there is excessive pressure in the dies or mouthpieces. Such machines are capable of turning out 6,000 to 8,000 bricks per day without any skilled workmen, and the bricks, if the earth is suitable, are in every way equal to hand-made bricks. Speaking generally, Mr. Searle expressed the opinion that whilst, perhaps, from the artistic point of view, perfectly hand-made bricks are better than machine-made, yet machine-made bricks manufactured under good conditions are superior to bricks made by inferior workmen. The machine most resembling the action of the workman in its operation was the later form of the Henry Clegg machine, although only three bricks could be made at one time. In this machine the safety doors were rather clumsy, these being operated by heavy weights instead of springs. By means of rams, the pug-mill action was continued in two chambers, and even afterwards, when the paste was being driven down to the dies. The result was a brick of a rather different texture to those made in machines of the plunger type. This particular type of machine is largely used in India.

Where Wire-Cutting is Necessary

Coming to machines in connection with which moulds are discarded in favor of wire-cutting, it was pointed out that this method is the more desirable, and even necessary, where the material contains more pure clay and less silica and sand. Machines of the sausage type, discharging the clay horizontally through an aperture, and thence on to the cutting machine, are always used where a sand faced brick is not required. Views of various types of these machines were shown, ranging from the single rollers, through which the paste is passed after leaving the pug-mill, to machines having several sets of "expression" rollers, these having been proved to turn out a paste less liable to cracking in the subsequent treatment. In connection with auger machines, in which a spiral is used on the end of the shaft to propel the paste through the die, Mr. Searle said that brickmakers in England had yet to appreciate the advantages of these. He advocated having upon the horizontal shaft a sufficient length of spiral, as well as the ordinary mixing blades. The propelling power of the mixing blades was in inverse proportion

to their mixing power, hence the desirability, in order to save power, in having the spiral or propeller. This is an important matter, and mistakes of a serious character were made in this connection. The average brickmaker in this country had very confused ideas on this subject. Whilst he had the mixing blades, he did not care about the propeller. He believed brickmakers were sometimes foolish enough to take out the propeller and put in additional mixing blades, with the result that there was loss of power.

Brickmakers, too, would do well to pay more attention to the design of mouthpieces. German manufacturers of brick-making machinery were a long way ahead of us in this country. We certainly made better bricks than the Germans, but the Germans used their power to better advantage. Ordinary straight push mouthpieces were not satisfactory owing to loss of power due to friction, and a number of systems of lubrication by water, water and oil, and by steam, were illustrated.

Another detail of importance was the use of a collar between the pug-mill and the die. This tended to prevent cracking of the brick in the after treatment. He had given much attention to this subject, and his experience was that unless the collar was carefully constructed a large loss of power resulted.

The lecturer then described the actual cutting of the clay into bricks by the wire process. Automatic cutting of the strip before being driven on to the wires had not been altogether satisfactory, owing to the pressure necessary to operate a mechanical automatic apparatus tending to raise the centre of the strip, and so spoil one or two bricks. An improvement had been effected in this direction, however, by an electrical attachment. As a contact only had to be made to set the cutting machine in motion, the difficulty referred to above had almost, if not entirely, disappeared. All cutting machines in England work on the sideways principle, but the Americans prefer not to cut their bricks sideways, the system commonly in use there being rotating cutters, which cut the paste from the top downwards. A number of machines were described for separating stone and the larger particles from the paste where the nature of the earth used renders the presence of these inevitable.

The lecturer expressed a preference for the tunnel method of drying bricks artificially, for the reason that the bricks can be placed on a car and wheeled through the tunnel, thus reducing the handling to a minimum.

That the smaller cities and towns of the Dominion are also in the march of progress is exemplified to some extent by Sydney, N.S., which boasts of permits to the value of \$108,935 for the first four months of 1910, against \$21,000 for the corresponding period of 1909.

Vancouver still hits the high water mark for building in Canada. The increase for the first four months of 1910 over the same period of 1909 was nearly 2½ millions. Bank clearings were a clear million better than the best previously, and the Customs receipts jumped over 50 per cent.

There is a scarcity of labor in the West and consequently workmen are showing a disposition to get all they can. At Saskatoon, Sask., last week, 50 corporation employees working on sewer construction at 22½ cents an hour struck for 25 cents. They are stated to have 30 cents an hour in view.

Original and Artistic Design in Concrete

Thus far in the career of concrete as a building material attention has chiefly been directed to its structural and practical significance, while the possibilities of the pure design side of the question seems to have been very much neglected. It seems unusual that a material offering so many original opportunities to branch away from the trodden path is not studied with more enthusiasm by the architectural profession in general, says Ray Moulthrop in the "Cement Age." The architectural schools and ateliers that are supposed to deal more with theory and possibilities, have ignored it. If a student in one of these schools tries to see what he can do, he would receive no credit in design, for the instructors, who have probably been trained in the Beaux Art school, can only interpret it in the language of the materials they already know.

The most perfect reflection of any period is its architecture, and to-day is no exception to the rule, for the orthodox antagonism to concrete does almost rival the creeds of some of our religious denominations.

The peculiar possibilities of concrete gives it many features that distinguish it from other materials, and those features are enough to bring about for itself a distinct and original style of architecture. It is a situation that demands an original style, and, when this fact is recognized, it may prove to be the solution to the problem of the fugitive "20th century style."

It was the arch that most of all differentiated the architecture of Rome from the styles that preceded it. With concrete, this corresponding feature is the long span that is possible over openings. The windows are not regulated to customary widths, because of the practical limits of the stone lintel. Thus the success of the design will be aided, not by imitating masonry conventions, but by exaggerating the use of a practical divergence. This shows that it frankly intends to represent the material that it is, and not an imitation that has gone before. Also balcony brackets and short cantilevers, and the like, appear more satisfying and stable than in stone.

Balance Before Symmetry

Balance in concrete design is a greater law than symmetry. Symmetry is weak. It is the first thing a child would contrive, to make one side exactly match the other. A little irregularity gives character to a design, just as it gives more strength to a man's countenance to part the hair on one side. Concrete is a heavy appearing, robust material and would be compared to the male form. In the beginning of every great period of architecture this comparison was the rule, but in the Rococco or the decline of the period, the architecture is more likened to the easy curves of the female figure, and all through the sculpture and decoration of this decline, the female form predominated. There are many of these general signs that foretells concrete to be a major factor in the development of the architecture of the future.

Classic details, slender pilasters, coins and similar embellishments are foreign and unnatural to concrete, but to make up for this loss, it admits of many original features in decoration, not possible in stone. No material is so well suited to combine with brick or ornamental tiles. Some of the lessons learned from the artificial style of Art Noveau are as timely as if directed by providence.

Ornament, no matter how intricate, when applied to concrete, should have a large unbroken surface to set it off. If the background is laced with mouldings and shadows, half the value of the ornament is lost. It is by the same principle that a diamond is exhibited on an expansive field of velvet, and not surrounded by a collection of jewelry. What is true of ornament, is also true of window decoration. There are few things prettier than good stained and leaded glass windows and there is no material that furnishes such a harmonious setting for these as concrete. The opening is even

better without the suggestion of an architrave or frame around it. We have a very orthodox view of thinking that stained glass belongs only to a house of worship. Much of the value of the best use of glass in churches is lost, because it is continually striving with the buttresses and details around it to decide which was intended as the feature. In concrete, this should be avoided; and the glass be made the jewel. It is these features that give life, and a little color gives the necessary snap, without endangering the refinement and good taste of a finished design.

As the material is plastic, and can be moulded at will, let the window boxes, concrete pottery and foliage pedestals be an integral part of the design. These features have been much disregarded in the past, but are being more and more recognized as important factors in the architectural treatment; and what material so lends itself in this direction as concrete? The fact that it gives a setting to statuary more harmonious than a cold background of granite or of brick, shows that it will be a stimulus to the cause of the sister arts and many other signs equally apparent, proves that its destiny must be in the foremost building material of the future.

A House with Plate-glass Cornice or Eaves

A pretentious residence recently erected at Waterbury, Conn., has a considerable overhang of cornice or eaves, which, if constructed in the usual materials, would have tended to darken the bedrooms on the first floor. In considering the original plans, the client objected to the cornice for the reason stated, but in order to overcome the difficulty by ordinary methods of design, it would have been necessary to raise the roof or to narrow the cornice, either scheme having the effect of destroying the lines of the house. It was finally decided to use plate glass for the overhang, this material affording all the light that could be desired, and at the same time, owing to the quality and thickness of the glass used, giving the requisite strength. The high polish of the surface keeps this free from dirt. The additional cost is "a few hundred dollars."

R. A. I. C. Convention

Preparations are being made at Winnipeg for the entertainment of the Royal Architectural Institute of Canada, which will hold its third annual meeting in that city this fall. This is the first time that the annual meeting has been held in the west, and there is a marked degree of enthusiasm being shown by the local men in their arrangements for the convention. It is expected that about 150 of the leading architects of the Dominion will attend the convention. Mr. Samuel Hooper has been elected chairman of the arrangement committee.

Mr. A. S. Blizzard, managing director, G. Woolliscroft & Son, Limited, Hanley, Staffs., Eng., manufacturers of all kinds of tiles, terra cotta, faience, mosaic, etc., is now on his way to Montreal with a view to investigating carefully the Canadian field. It is interesting to note that Mr. Blizzard is president of the Northern Staffordshire Chamber of Commerce. "Woolliscroft" products have already been favorably received in the Dominion. A much wider market for them can safely be predicted.

The city engineer of Seattle, Wash., Mr. R. H. Thomas, who it is interesting to note, has held the position for the last 14 years, is anxious to attend the International Good Roads Convention to be held in Brussels this summer, but in view of the fact that improvements involving the expenditure of \$11,000,000 are under consideration, the authorities have notified him that he must either abandon the idea or hand in his resignation.

The Schedule of Output for Checking Cost

Arrangement and Methods of Keeping Same—Importance of Proper Organization—How to Secure Co-Operation of Employees

BY A. O. DAVIDSON

One of the difficult problems confronting the contractor in the prosecution of a piece of work is the continuous daily average production of the required amounts in order to complete his contract within the specified time.

The principal object in a regular scheduled daily production is the advantage gained by the contractor in having his work so scheduled that he knows each day what is required in quantities of output in order to complete the work on time. It also gives him the advantage to be gained by such an arrangement in keeping the labor costs of his work within the estimate.

The specifications covering a piece of work give the approximate quantities as well as the limit of time in which the job is to be completed. With this information it is a simple matter for a contractor to arrange a schedule at the time he makes up his bid from which he can determine the quantities of each classification of work which it is necessary to accomplish daily. If the conditions are such, and the organization is sufficiently strong and well balanced, to accomplish more than the schedule calls for, the contractor is that much "to the good," which gain may, in some cases, be required to offset some extreme conditions which may arise, and for which he has not been able to make any allowance in estimating the actual number of working days he will have.

Best Method of Arrangement

The best method for arranging a schedule is to first determine as nearly as possible from the records of weather during several preceding years the amount of time which it would be safe to figure as working time out of the entire contract period. After this allowance has been made a further deduction should be made for all Sundays, holidays, etc., which will leave a specified number of working days in which it will be necessary to accomplish the work under the contract. After the number of days has thus been determined, it is a very easy matter to figure the quantities which it will be necessary to accomplish daily in order to complete the work within contract time. This is arrived at by dividing the total units of any one classification of work contained in the contract by the number of working days in which it is to be accomplished. It is thus necessary to subdivide the total number of working days into the proper proportion to the various unit classifications in the order in which they are to be taken up to be accomplished. The first thing, however, is the proper allowance of time required for the installation of plant and machinery for the handling of the work. As an example of the sub-division of time for the accomplishment of the work it is, as a rule, first necessary to take up the earth excavations, which are required to be totally or at least partially completed before any of the other classifications can be commenced. As an illustration in this instance, we will assume that the contract calls for the excavation of 10,000 yards of dry earth, all of which it is necessary to handle before any other portion of the work can be taken up. We will further assume that the contract time limit is such that 100 working days can be allowed as a scheduled time in which this excavation must be handled. It will, therefore, be seen that in order to do this it will be necessary to handle 100 yards of excavation every working day as provided for in the schedule.

We will also assume that the contractor, in figuring this particular piece of work, has based his price on the handling

of this excavation by hand, from which it will be seen that practically the only expense in connection with the handling of excavation, assuming that the dirt does not have to be hauled and distributed, will be the labor expense and an allowance covering the small tools required for such work.

We will assume that the contractor has bid 50 cents per yard for this excavation, has made an allowance of 2 cents per yard for shovels, etc., and has figured that this price of 50 cents will allow him a profit of 15 cents per yard over and above his labor cost, allowance for tools and overhead expense. As shown above, he has made an allowance of 2 cents per yard for the cost of tools, and we will assume that he has figured his overhead expense to be 5 cents per yard. Therefore, after figuring his profit of 15 cents, allowance for tools of 2 cents and overhead expense of 5 cents, in order that he may complete this part of the work and earn the profit which he has figured, it will be necessary for him to get the excavation done for 28 cents per yard, which amount must cover the cost of his laborers and foreman for doing the work.

We will further assume that the excavation is of such a character that the output of the average man will be 5 yards per day of 10 hours, and as the schedule requires that 100 yards shall be excavated each day in order to complete this part of the work on scheduled time, it will be seen that it will require a gang of 20 laborers, each of which will be required to produce 5 yards per day in order to accomplish the scheduled amount.

Assuming that the scale of wages for laborers is \$1.25 per day, it will be seen that if each man accomplishes his required 5 yards per day, figuring at the rate of 28 cents per yard which the contractor has left to cover this labor expense, each laborer will have earned \$1.40 per day, which is 15 cents in excess of the rate of wages paid him—i.e., \$1.25. This 15 cents earned by each laborer would amount to \$3 per day on the entire gang of 20 men, which amount we will assume is the wages paid the foreman of the gang. Therefore, the foreman of this gang should be furnished with a schedule in the shape of information that he has 10,000 yards of excavation to complete within 100 working days, which will necessitate the removal of 100 yards per day, in order to complete his work within the given time. He should further be informed that his gang shall consist of 20 men and that it is estimated that each man can handle 5 yards per day, which it will be necessary for each of them to do in order that his work may be kept up to scheduled time.

Foremen Should Make Daily Reports

So far as an individual record is concerned, after the foreman has been instructed and given to understand that this amount of work must be accomplished by his gang, it will not be necessary for the office or the contractor to bother further than to keep a check on the output of the gang. The foreman, if he is discharging his obligations to the contractor as he should, will look after the individual output of this gang, and if he finds he has a man employed who does not accomplish sufficient work to enable him to keep up to the requirements, he will replace him. In order to allow the office to keep the proper record of this operation, the foreman should be required to turn in a daily report of the time of these men, in connection with which he is to report each day the quantity of excavation handled. When the time sheet has

been figured up in the office it will show the total labor expenditure for this foreman and his gang, which expense, divided by the number of yards excavated, will show the cost per yard, and, as stated above, there is 28 cents per yard figured in the estimate for this purpose; and unless the daily output is 100 yards, the costs are in excess of the estimate and more work will have to be accomplished during the succeeding days in order to keep the cost down to or below the 28 cents per yard.

In this connection it is also a good plan to adopt a bonus scheme and instruct the foreman that he and his men will participate proportionately with the contractor in any saving that they may effect in the reduction of cost in this particular operation. An arrangement of this kind is an incentive to both the foremen and the men to exert their best efforts in behalf of the contractor.

Where an operation of this kind is worked with a double crew and a bonus offered for an increased output, there is not only the incentive of the extra remuneration, but there is also a rivalry created between the foremen and their men, which not only operates for the benefit of the men individually, but for the contractor as well.

In explanation of the bonus system in connection with the excavation work as explained above, we will assume that the efficiency of the gangs engaged in this work was such that the entire quantities were accomplished in 90 days, instead of 100 days, the limit of time set in which this work was to be done in order to finish on scheduled time. This, then, is a saving of ten days of 100 yards per day, and figured at the estimated cost of doing the work (28 cents per yard) would mean a saving over the estimated figures for labor of \$28 per day, which, for 10 days, would mean an additional earning for the contractor of \$280.

As the contractor has already realized his estimated profit of 15 cents per yard on this work it is but reasonable to suppose that he will be satisfied with the same additional amount of profit per yard on the additional earnings resulting from the extra efforts of this gang. This would, therefore, leave a margin of 13 cents per yard on 100 yards per day for 10 days, amounting to 1,000 yards, which, figured in dollars and cents, would be \$130, the percentage of this additional profit to be divided between the foreman of the excavation gang and his men on the bonus plan.

As the principal factor which results in an increased efficiency of this kind is the ability of the foreman to handle his men in such a manner as to produce this result, he is entitled to the larger amount of this extra part of the saving resulting from his energy. In this case we would suggest that the foreman's share of the amount should be \$30, which, when distributed over the period of time in which he has been engaged on this part of the work (90 days), would mean an increase in his regular monthly salary of \$10 per month.

The contractor has, therefore, benefited in extra profit to the extent of \$150 on the operation and the foreman has earned an extra \$10 per month, an amount sufficient to encourage him to redouble his efforts on future work. This then leaves \$100 of the extra earnings to be divided equally between the 20 men of his gang, which will allow each individual \$5, which, when reduced to the basis of the hourly rate paid them (12½ cents per hour), would mean that each man has received pay for 40 hours extra time, or four days, which he has not been required to work. It is well, in the case of the men, when making an allowance of this kind for increased efficiency, to explain it to them on the basis of extra time allowed for good service, at the same time giving them to understand that any additional increase in efficiency on their part will be proportionately rewarded by additional allowance of time which they do not actually put in.

Importance of Systematic Planning

After one classification of the various operations has been reduced to a daily quantity output, as explained above, each

of the other classifications should be taken individually or collectively as they may work in together in the progress of the work, and their individual allowance of working days for their performance should be figured as in the case of the excavation, and this reduced to a gang output, and the foremen furnished with a schedule advising them of the quantities they are required to accomplish, the allowance in dollars and cents that has been made for the payment of their output, and they should be required to report daily their labor expense, together with the amount of their production, the same as in the case of the excavation. The contractor should make up his schedules at the time he makes his estimate in bidding on the work, and, in supplying the required number of men in a gang for the performance of the specified amount of work to be done in a day, should base his calculations on the individual output of the average man in such classification of work in which he intends to make use of his services. A foreman when he is instructed that his gang is required to accomplish a certain amount of work during the day can readily understand that it is necessary for each man in his gang to perform a certain amount, in order that the output of his gang collectively will equal that required by the schedule. He will, therefore, quite naturally watch the individual outputs and dispense with the services of any man who does not perform his portion of the work required.

The contractor should arrange, at the time actual operations on the job are commenced, for a meeting of all his foremen and fully explain to them that in order to complete the work within a given time it will be necessary for them to accomplish a certain amount of work each day, and each one of the foremen should be individually advised as to just what this requirement is, and he should also be required to report at the end of each day on a report blank furnished for this purpose, the actual quantities accomplished that day. If the report is not up to the requirement the foreman should give his reasons for any shortage that has occurred, and if the reason is one over which he and his gang have no control, he should be instructed that such shortage must be made up on succeeding days, and he should be kept advised as to when they have again gained the required amount to have their schedule up to date.

How to Secure Co-operation

These meetings of the foremen should be held at least once a week, and, where possible, twice a week, at which meetings all past performances should be gone into, proper comment made and credit given to the foremen who have accomplished quantities in excess of their schedule, and explanations asked for of those who are not up to the schedule time in their output. In cases where the gangs are behind, suggestions should be asked for of the foremen to remedy the trouble, and such suggestions which seem applicable to the case should be put into use. Where such a course is pursued the foremen soon learn to feel that their suggestions are of benefit, and it creates a desire among them to become proficient in their part of the work; and not only that, but stimulates a desire to gain a better knowledge of the other departments of the work and the best methods of accomplishing the most desirable results, all of which results in great benefit to the work.

It will be noted that the arrangement of schedule as explained in detail in the case of the excavation contemplates the performance of this part of the work by hand, no amount being figured in the estimate for a plant allowance. Where it is necessary to perform the work with machinery a proper allowance should be figured in the estimate for the cost of the necessary machinery which it is intended to use and which is chargeable direct to that part of the work on which such machinery is to be used. This means the charging of a fixed amount per unit of classification, which amount should be sufficient to cover the total cost of such machinery completely installed for the performance of that part of the

work on which it is to be used. As this is in reality a fixed charge, there is no means of effecting a saving on this item, with the possible exception of an increased daily machine production in excess of the capacity of such machinery as figured in the estimate.

In the case of production in which material enters, the contractor has an opportunity to effect a saving by reason of any changes in market prices which may occur between the time at which his estimate was made and the time at which he actually places his order for such material. This, however, does not always work to the benefit of the contractor, as the prices of materials may advance instead of decline, and it may be necessary for him to pay more for such materials than he figured in his estimate, unless he enters into contract

for such materials at the prices he used in making up his estimate.

It will, therefore, be seen that the principal avenue open to the contractor whereby he can keep his costs down to the minimum is through his payrolls. Therefore, too much attention cannot be given by the management to the systematic arrangement of a daily schedule of output and the proper organization of his men to accomplish the necessary results, as it is the expenditure of money in pay-rolls without the proper returns for such expenditures that results too frequently in the diminishing of profits, and in many cases absolute loss, not only of money to the contractor, but valuable time as well.

Construction Data on Street Railway Track

Method and Cost of Work with Grouted Crushed Stone Foundation—Economy of System as Shown by Itemized Table

The following data are given by Mr. H. L. Weber, chief engineer, Columbus, Marion & Bucyrus Railway, Marion, O., in a paper presented to the Central Electric Railway Association, March 24, 1910:

A section of reconstructed track with a grouted, crushed stone foundation was laid on Taylor street, Fort Wayne, Ind., in 1908, and I am informed by Frank M. Randall, city civil engineer, that the work is holding up well. The track was a single line, laid with 73-pound, 6-inch rail. During reconstruction it was necessary to excavate the street from 1-foot to 3-foot, remove the old ties and rails and install the new material. During this work 50-ton interurban cars used the track under a 1½-hour schedule. There were also extra limited and express cars and a small city car service under a 15-minute headway. The city car service was at times delayed a few minutes, but the interurban cars had simply to operate under a slow order. A sufficient number of the old ties were removed so the excavation could be expeditiously done, and enough new ties were added to hold the rails to gauge and make it safe under slow running. The tracks were then let down to the sub-grade.

A trunk sewer had previously been constructed through a portion of the street. This portion was sub-drained with a 3-in. tile. All trenches were examined and if soft places were found or developed after a rain, they were filled with suitable material and rammed with the ordinary 45-pound paver's rammer, manipulated by two laborers.

The outside of the rail, against the web, was filled in advance of the paving with a stiff concrete in the proportions of 1 part cement and 4 of sand. The 8 inches of stone were put under the track in two 4-inch lifts. When the stone was in place, all the old ties were removed and the new ones were put in position. New rails were then laid. The track was then thoroughly tamped to grade four times. The men commenced at one end and continued through the entire length of the line, and a close watch was kept on all portions for apparently soft places. When the tamping was completed the crushed-stone foundation was thoroughly grouted for a distance of 15 inches on each side of each rail with a Portland cement grout of 1 part cement and 4 parts good sharp sand.

Over the sewer trench 6 x 8-inch x 8-foot ties were used, for the rest of the track 6 x 8-inch x 7-foot ties. At the suspended joints the ties were placed 20-inch centres. There were 30 ties to each 60-foot rail, making the spacing practically 24 inches. It will be noticed that one-third more ties, but less concrete, are required by this method of construction. The space between the ties, from the base of the rail to the bottom of the ties, was filled with a very soft con-

crete, consisting of 1 part Portland cement, 2½ parts sand, 2½ parts gravel, the gravel containing the sand, and 5 parts crushed stone. The concrete was thoroughly puddled so as to fill under the base of the rails and around the ties, thus giving a bearing surface equal to twice that of the ties. The space between the rails and for a distance of 1 foot outside the rails was paved with brick, with a special block on the inside of the rail to form the flangeway. The itemized cost of the work is given in Table 1.

TABLE 1—COST OF STREET RAILWAY TRACK

	Per lin. ft. of track
Track work and material	
Labor laying track and one-half excavation.....	\$0.413
Ties	0.274
6-inch, 73-pound steel rails	0.700
Rail and cross bonds (compressed)	0.012
Bolts	0.004
Spikes	0.004
Splice bars	0.055
Total cost of track work per linear foot	\$1.462
Track foundation, 8-inch crushed stone, grouted—	
Labor	\$0.129
Stone delivered	0.231
Drain tile	0.011
Cement and sand for grouting	0.035
Total cost of foundation per linear foot	\$0.406
Concrete foundation for paving—	
Labor, including one-half of the excavation	\$0.336
Stone delivered	0.114
Cement	0.114
Sand	0.028
For use of tools	0.013
Total cost of paving foundation, per linear foot	\$0.605
Brick pavement—	
Labor	\$0.114
Metropolitan paving block	0.505
Metropolitan special shapes	0.180
Cement	0.028
Sand	0.021
Track drains	0.005
Mixing boxes, etc.	0.004
Total cost of pavement per linear foot	\$0.857
Grand total cost per linear foot	\$3.328
Cost per square yard of brick paving, including foundation complete, \$1.946.	
Length of track constructed, 2,332 linear feet	
Brick pavement, 1,794 square yards.	

Trade News from Montreal

**Labor Troubles fading away in this Section—
Supply Market in Healthy Condition—General News**

Montreal Office of the "Contract Record."
May 14th, 1910.

No further evidence of labor troubles has been manifested during the past week and building operations are consequently progressing undisturbed, favored with excellent weather conditions.

Conditions of Supply Market

Shipments of Scotch water pipe are commencing to arrive by the water routes and the spring demand for this material is said to be quite brisk.

Along the harbor front there are evidences that brick will not be scarce this year. Every barge continues to dump its quota on the docks.

Cement, according to the different dealers, is in active demand at present, with prices unchanged from former quotations. With the letting of the extensive paving contracts as planned by the City Surveyor's Department, a still larger demand of this product is expected.

New William Dawson School

The progress of construction on the new William Dawson School, Christopher Columbia avenue, for the Board of Protestant School Commissioners, is being somewhat retarded owing to the poor foundation conditions which the contractors, Messrs. Gray & Wighton, are experiencing, and the building will not be partly completed by September, as was anticipated. It has been decided advisable to place the foundations on bed rock, a distance of 24 feet, and, accordingly, piles are being driven to receive the concrete footings.

This building, which was designed by Mr. A. F. Dunlop, is to be four storeys in height and fireproofed throughout. It will contain 31 classrooms, and accommodate 1,500 pupils.

The exterior facades will be in Jacobean style, treated in a simple but dignified manner. The base will be built of dressed limestone and the superstructure will be finished with pressed brick and Roman stone trimmings. The latter are being supplied by Messrs. T. A. Morrison & Company.

Blaugas Company in Operation

The factory and plant of the Blaugas Company of Canada, at Cote St. Paul, has been placed in operation. This company was recently organized with a capital of \$3,500,000 to manufacture a petroleum gas invented by Prof. Blau, of Augsburg, Germany, and is made from the refuse of crude petroleum, heated and compressed until liquified. It is supplied in steel cylinders under pressure and vaporizes on release to a dry gas.

There is no carbon dioxide present in the composition of the gas and therefore danger of asphyxiation in case of leaks is minimized. It is claimed for this gas that it is non-freezable, no matter how severe the weather, and also that it is three times less explosive than ordinary city gas and that it is therefore practically a non-explosive.

Its adaptability to the needs of contractors was demonstrated at the Jacobs Building, where it was successfully used. The directors of the Canadian company are Messrs. M. B. Davis, J. A. Jacobs, H. Markland Molson, Andrew A. Allan, R. C. Smith, F. C. Fairbanks and C. H. Balfour, of Montreal, and their office is located in the Jacobs Building.

Labelle Company's Building

Mr. Joseph Bourque has been awarded the general contract for the erection of the new building for the H. P. Labelle & Company, Limited, St. Catherine street and City Hall avenue, designed by architect Mr. G. A. Monette.

The new structure will front on City Hall avenue, will be 42 feet wide by 85 feet deep, eight storeys in height. The

total floor area will be approximately 52,160 feet. The building will be of skeleton steel construction, fireproofed throughout, and the facade on St. Catherine street will be finished with glazed terra cotta. Automatic sprinklers are also to be installed and also modern elevator systems.

The Phoenix Bridge Company have the contract for the steel fabrication and erection, and Dolton & Company's "Cararra" terra cotta is specified.

A Novel Apartment House

Plans have been drawn by Mr. Wm. E. Doran, architect, for an annex to the Prince Apartments on Guy street, and also for a new apartment house to be erected at the corner of Guy and Luke streets. This latter building is to be known as the "Magic" and will embody several new constructional features. Instead of being subdivided into suites containing several rooms, an apartment will consist of one large room with kitchenette and toilet room attached. This room will be fitted with transposable furniture, which will make it serve as bedroom, living room, dining room, etc., as the occupant desires.

The furniture, when not in use, will be turned into thoroughly ventilated closets and is to be built after the Merrill patents. The structure will be thoroughly fireproofed and will be equipped with every modern improvement. A novel arrangement is that the janitor service will include the washing of dishes, a feature not usually supplied. The building is for Mr. J. A. Prince, who is superintending the construction work, but it is expected that tenders for several trades will be asked later.

Canadian Railway Club Election

Mr. A. A. Maver, master mechanic, Grand Trunk Railway Company, was elected president of the Canadian Railway Club in succession to Mr. H. H. Vaughan at the recent annual meeting held at the Windsor Hotel, Montreal. The other officers elected were: Vice-president, A. A. Goodchild, auditor of stores accounts, C.P.R.; 2nd Vice-president, James Coleman, superintendent of the car department, Grand Trunk; Secretary, James Powell; Treasurer, S. S. Underwood, chief draftsman of the Grand Trunk; Executive Committee, Messrs. A. L. Grayburn, R. W. Burnett, H. C. Butler, C. Kyle, William McNab and F. Ditchfield; Auditors, Messrs. H. A. White, J. S. Johnstone and G. I. Evans. Mr. J. Powell, the secretary, reported that the club was in a flourishing condition and papers were read showing the progressive value and improvement of the association. The members in good standing number 650, although 154 have been struck off during the year for non-payment of dues. The balance in hand is \$2,905, as compared with \$2,287 last year. A committee was appointed to report on the advisability of utilizing the money in hand for the purpose of establishing a reference railway library in connection with the club.

Place Viger Station Extensions

Messrs. John Stewart & Company, who have the contract for the foundation work in connection with the extensions to the Place Viger station for the C.P.R., commenced operations last week.

The new superstructure which the railway company will erect at this point will be quite extensive and a large appropriation has been made for this purpose. The present station and hotel building will also be considerably remodelled and improved.

Canada Cement Company

During the past week the Canada Cement Company have settled in their new office quarters in the National Bank Building, corner St. James street and Place d'Armes Hill. The company are completely occupying the two top floors of this recently remodelled building and are quite comfortably situated.

It is interesting to note that, according to Mr. W. H. Ford, general sales manager, the different cement factories

operating under this company's direction, are in receipt of much larger orders than was the case at this time last season. The average prices obtaining for cement now are also well below last year's figures.

The Canada Cement Company are now organizing an extensive advertising campaign for the purpose of booming the use of cement among Canadian farmers, and with this in view they are preparing a special catalogue.

The company also intend to issue a series of bulletins outlining the different uses of cement. One of these will be published in the interests of the different municipalities and will deal with methods in the construction of concrete roadways and bridges. Another one will be published for the benefit of architects and engineers, and the whole series will doubtless contain some very interesting material.

West Crescent Heights

West Crescent Heights is to be the new name of the Holt & Gordon property, situated in the western section of the Westmount upper level. It is stated that plans have been prepared by Messrs. Brett & Hart, landscape architects, Boston, Mass., and that this extensive property will be improved. The streets are to be laid out in broad curving boulevards, lined with trees, running at a slight gradient over the Westmount mountain. Builders will be allowed to erect only the finest type of residences

Notes

An investigation of Mr. Thos. Wand's affairs show liabilities of approximately \$85,000 and nominal assets of \$54,000. The following committee has been appointed by the creditors to look after their interests: Messrs. K. Stinson, N. Sarrison and J. K. McNutt.

Mr. G. Kahn, general sales manager of the Trussed Concrete Steel Company of Canada, Limited, was in Montreal this week.

Mr. W. E. Ramsay, manager of the Montreal office of the Pedlar people, has just received an extensive order from the city of Montreal Waterworks Department for Pedlar culverts to be installed during the present season.

The Sellers Anchor Bottom Tie Plate Company, of Canada, Limited, has been organized and are applying for a Dominion charter. The company intend to manufacture tie plates, railway supplies and iron and steel specialties. The concern is to be capitalized at \$100,000, and Montreal men are said to be interested.

The first of the three big steel dredging barges which the Structural Steel Company are building at Longue Point for the Canadian General Development Company, was successfully launched last week.

Mr. N. C. Nichols, of the New York Dual Continental Filtration Company, which has filtration systems installed in Ste. Hyacinthe, Buckingham, Longueuil and Verdun, is in Montreal investigating local water conditions.

The Latest in Sterilizing Apparatus

After a series of experiments, a French scientist has succeeded in constructing a simple apparatus for the industrial sterilization of water. It consists of a three-jointed metal ditch or channel, through which runs the water to be sterilized. At each joint is a mercury lamp suspended just above the surface of the water. The channel allows of the passage of a volume of water sufficient to supply a town of 20,000 inhabitants. The experiments were made on Seine water, and as it did not contain enough microbes, the scientist and his collaborators emptied cultures of several kinds of microbes into the water.

Four lamps were placed at equal distances. The effective zone of each being 32 inches. The flow of the water was regulated in such a manner that it was exposed to the action of each lamp during eight seconds. Consequently the total

action lasted 32 seconds. This is, according to the experiments, double the time required to destroy the bacilli of typhoid, dysentery and cholera. Industrial experiments amply confirmed those of the laboratory. Water which contained per cubic centimetre 5,250 microbes, before reaching the first lamp contained only 3,650 between the first and second. After passing the second lamp the microbes had totally disappeared.

Royalties on Septic Tanks

According to the advice City Engineer Ker, of Ottawa, has received from Mr. W. J. Lynch, chief clerk of the patent office, and Dr. Charles Hodgetts, provincial health officer, the patent of the Cameron Septic Tank Company for sewage purification plans has expired in Canada, and consequently any municipality in the Dominion is now free to install septic tanks without paying royalties to the company. The Cameron Company, which is a United States concern, recently wrote to the authorities at Ottawa warning them not to install septic tanks, as it would be an infringement of its patent rights. In consequence, the work of installing a plant for the purification of the sewage from the western drainage system was delayed until advice was secured.

Concerning Extras

As regards extras, it is usual for the contractor to require an order in writing from the architect, or even from the owner, as a condition to the latter being chargeable with them. When this is required the thing that is obtained must be an order, and not merely a plan or a drawing signed by the architect and not described as an extra. But, if at the end of the contract—or, I presume, earlier—the architect gives a certificate allowing the work as an extra, it is, in the absence of fraud, conclusive, and the owner cannot resist payment on the ground that there was no order. The usual clause of the contract does not contract the parties out of this state of the law, for it provides that the builders are not to execute any work "unless on the authority of the architect shown by order in writing, or by plan or drawing expressly given or signed, or initialled by him as an extra or variation, or by any subsequent written approval so signed and initialled by him?" So that there is either to be a certificate, or a written order, or the drawing or plan, etc., has to appear on its face to be an extra, and to be "expressly given" as such. Indeed, if the builder were to execute extra work without such an order, or its equivalent, from the architect, the owner might not only refuse to pay, but might take the benefit of the work and bring his action against the builder for putting it there!

Most of the disputes between builder and owner, and between builder and architect, arise upon the final certificate, and sometimes the quarrel is between the owner and the architect. It is the business of the architect in making his final certificate, not only to see that the work is completed to his satisfaction, but to calculate the extras, omissions and defects by debit and credit, and to certify in accordance with the balance shown. He is not bound to communicate to the builder the precise mode of reckoning; but, if the calculation is fairly made, he has little to fear from doing so. To do so is a mark of good faith and tends to simplify any questions which the builder may wish to refer under the arbitration clause, even if the exhibition of the reckoning does not stop a reference altogether.

A careless haphazard way of treating a contract, is bound to end in trouble and perhaps litigation.—H. Goddard.

The carpenters at Kingston do not look like getting their \$3 a day. Last week 23 contracting concerns came to the conclusion that the present wage of \$2.50 a day of eight hours is a liberal one.

Canadian City Engineers

Mr. J. T. Child, Calgary, Alta.

The optimistic man is a boon to any community. Particularly is this true if he happens to be a city engineer, for in that case he can do a great deal of good among people interested in the upbuilding and development of the country. We may be thankful that Canada is full of optimists. The city engineer of Calgary, Alta., Mr. J. T. Child, is an example. Here is an extract from a letter to the "Contract Record" which he penned a month or so ago: "We have now at least 35,000 people here and they are all wearing a pleasant smile, knowing full well that their city is designed to become great. When it does, I hope to be on the band wagon, for I have always had implicit faith in Calgary and have seen it develop from an ordinary cow town to quite a metropolis."

Mr. Child hails from England. He served articles with Messrs. Hopkins, Gilkes & Company, general iron manufacturers and constructional engineers, of Middles-



Mr. J. T. Child, City Engineer of Calgary

borough, and, afterwards, was for two years with the Ordinance Survey ascertaining parish boundaries in the south of England and Wales. The irresistible call of the West came to Mr. Child in 1883, when he went to Winnipeg and became engaged on draining and reclamation work for the Government. Two years later there was inaugurated the firm of Child & Timewell, which started in an unostentatious manner by opening a small machine shop in Brandon. The rebellion of 1885, however, had an adverse influence upon trade and Mr. Child severed his connection with Brandon and went to Calgary. There, in 1887, he established the firm of Child & Wilson, architects and engineers, with which he remained for ten years. In 1893 Mr. Child designed and laid the first sewers in Calgary. Later, he superintended the construction of some 50 irrigation ditches throughout Alberta. In 1897 he was appointed Assistant Chief Engineer for the Northwest Government, and was stationed at Regina. A change of government in 1902 made a change of scene desirable for Mr. Child, and he made connection with the Northwest Irrigation project which had just started at Lethbridge. A year later he received

the appointment of Divisional Engineer on the large C.P.R. irrigation works, with which he was associated for four years. In 1907 he was commissioned by the C.P.R. to lay out irrigation works in British Columbia. In the same year he laid out for a private firm the irrigation ditch now carried on by the Southern Alberta Land Company. Mr. Child was consulted during the following year upon the question of bringing water to Calgary by gravitation and relieving the ever-increasing cost of pumping from the Bow river.

In that year, 1908, he designed and partly constructed the Calgary gravity water supply system, which embraces an intake with head works on the Elbow river, about 12 miles out, and a continuous wooden stave pipe, 30 inches in diameter, banded with steel rods, laid in the ground for a distance of 10 $\frac{1}{2}$ miles; with an auxiliary reservoir, containing 16,000,000 gallons, situated just outside the city limits, at an elevation of 220 feet. From the reservoir, for a distance of two miles into Calgary, cast iron pipes were laid to connect with the general system of the city. The intake, which is equipped with filtering appliances, is set at an elevation of 310 feet above the general city level. The hydraulic grade of the wooden pipe line was set at 1 per 1,000. Working at its full capacity this system can supply daily about 8,000,000 gallons of water to the city. Since last June the consumption of this water has been at the rate of about 5,000,000 gallons a day. In every way the installation of this system was creditable to Mr. Child, and the cost was actually \$40,000 below the original estimate of \$856,000.

The post of city engineer of Calgary came to Mr. Child at the beginning of 1909. His first work was designing and constructing, under the Bow river, a tunnel, 686 feet long, for conveying water to the district on the north side. This tunnel was 5 feet wide, 6 feet high, 40 feet below ground level and 26 feet below the deepest part of the river. In its construction the material encountered throughout, after getting below gravel and two feet of sandstone rock, was hard shale. No difficulty arose from water seepage and the cost of the undertaking, with 16-inch cast iron pipe, was \$16,000.

The city engineer's job at Calgary is no sinecure, and every year sees Mr. Child's activities extended over a wider sphere. 1909 was in every respect a banner year for Calgary, but in none more so than in municipal work. In addition to the ordinary routine work of grading and bridging executed by the city engineer's department, there was inaugurated a street car system for which 16 miles of track were laid. Last year, 6 $\frac{3}{4}$ miles of paving were laid where only 1 $\frac{1}{4}$ miles were in existence previously. The paving is treated wooden block, sheet asphalt, bitulithic and granitoid, all of which, so far, promise well. Still more extensive schemes of development are now being carried out in Calgary, and the 13 miles of granolithic sidewalks, 12 miles of sewers and 11 miles of water mains constructed last season constitute only a portion of what is now under way and contemplated.

If we are to place any stock in what our most successful men tell us, we must regard Calgary as one of the most promising cities of western Canada. Some people are so enthusiastic about Calgary that they put it in a class by itself. In any event, the city has a future, and a great one, and we can only hope that in its success City Engineer Child will realize his best ambitions.

During 1910, permits have been issued at Winnipeg for the erection of \$6,000,000 worth of new structures. At this period of the year this is another record for the western metropolis.

Personal News and Notes

Mr. J. A. Antonisen, city engineer of Port Arthur, has resigned.

Mr. John Feeney is regarded as the most likely candidate for the position of city engineer at St. John, N.B.

Montreal's permits for the first four months of the year are valued at \$3,000,000—just half the Toronto total for the same period.

The city of Montreal has received the necessary authority to borrow \$5,000,000 to enable it to supply filtered water to the new wards.

We regret to report the death of Mr. W. D. Hutson, roofing contractor, Toronto, which occurred last week at 350 Palmerston Boulevard, Toronto.

At the annual meeting of the Canadian Railway Club at Montreal, Mr. A. A. Maver was elected president and Mr. A. A. Goodchild, vice-president.

The town council of Welland, Ont., is contemplating the appointment of a town engineer. The post will probably be worth from \$1,500 to \$2,000.

At Strathcona, Alta., the value of building permits issued last month was more than double that for April, 1909, the figures being \$92,275 and \$43,750 respectively.

Mr. A. C. Potter, the New York expert, who is now looking over the sewerage system at Edmonton, Alta., has been asked to perform a similar service for Strathcona.

Mr. W. Anderson, of Anderson & Warden, consulting engineers, Vancouver, B.C., left last week for Peru, to report upon a hydro-electric power scheme for the Cerro de Pasco Mining Company.

The Montreal Board of Control have placed themselves on record as being opposed to the day labor system of city work. The members consider that it is both costly and extravagant in the majority of cases.

A visitor to Ottawa last week was Mr. J. S. Helyer, of Vancouver, who designed the Dominion Trust Building, Vancouver, the largest office building west of Toronto and, incidentally, the second highest building in the British Empire.

The Library Board at Hamilton, Ont., had to send a deputation to Buffalo to secure an architect to judge the plans submitted in the competition for the proposed Carnegie Library. There is another great city a little nearer Hamilton than Buffalo.

Mr. Allen Hazen, the New York filtration expert, arrived last week at Ottawa to make his report for that city. Assistant City Engineer Parsons told Mr. Hazen of how a young snake came out of a tap at Mutchmore street, Ottawa, a few days ago and of other wriggling reptiles that float through the water mains. Toronto people are not alone in their troubles.

Mr. J. J. Scully, who for several years has been district superintendent for the C.P.R. between Winnipeg and Fort William, has been appointed superintendent at Moose Jaw. Mr. Scully was largely responsible for the construction of the double track between the two first-named points. This change is believed to be preparatory to Mr. Scully's promotion to general superintendent with supervision over an immense western territory.

A nervy citizen of Calgary refused to heed the warning of the building inspector that his foundation work

was not what the ordinance required, and proceeded making the wall, after being ordered to stop. The inspector was somewhat of the militant order himself, and proceeded to tear out the wall, without resorting to court orders. And then the aggrieved owner appealed to the city commissioners to restrain the aggressive inspector from completing the work of destruction, until a magistrate could rule upon the merits of the case.

Mr. Edwin Forse, C.E., whose death occurred at Toronto last week, was at one time one of the best known railroad engineers in Canada. He was a member of the first engineering staff engaged in New Brunswick upon the construction of the Intercolonial Railway. Later he was engaged on the C.P.R. and saw its line carried through the prairies and over the Rockies. Another great engineering work with which he was connected was the Crow's Nest Pass Railway, to which he went with Mr. M. J. Haney, and stayed till the line was taken over by the C.P.R. Mr. Forse's activities were brought to a close eight years ago, when he suffered a paralytic stroke.

At Ottawa, Ont., the proposal to have an "eight-storey" by-law is resulting in a great deal of opposition. Diametrically opposite views are expressed by two prominent architects, Messrs. W. E. Noffke and C. P. Meredith. The former thinks that the by-law would be detrimental to the value of central property and that it is easier to ventilate a high building. The latter favors the by-law and contends that it would keep Ottawa from becoming congested. "Ottawa," says Mr. Meredith, "is not like New York—on an island. It can spread as far as it likes. Eight storeys is high enough. The high building can certainly be well ventilated, but how about the low structure alongside it?"

A Growing Firm

Forty years in the same town with a steadily increasing business year by year, is the record of A. Hill & Company, steel bridge contractors, of Mitchell, Ont. The business was first started by Mr. A. Hill, sr., and was reorganized in 1894, his two sons, James and A. Hill, jr., becoming members of the firm. Since that date they have specialized in steel bridge construction work, and there is hardly a county in the province in which specimens of their work cannot be found. Within the past year or so, they constructed two large bridges, one 420 feet span over the Maitland river, in the county of Huron, which is the biggest bridge spanning that river, and another of 320 feet span over the Nottawa-Saga in Simcoe county. Mr. Hill reports business good at the present time.

Toronto Society of Architects

The annual meeting of the Toronto Society of Architects, which was held on May 8rd, brought forth many gratifying evidences of good work accomplished during the last twelve months and indications of the society's extended usefulness to the architectural profession at Toronto. From the various reports submitted at the meeting one may gather that the greatest interest shown by the members was manifested in the question of obtaining improved facilities for architectural education. While progress in this department has been comparatively slow in recent years, the society finds ample cause for encouragement. The election of officers resulted as follows: President, Mr. C. H. Acton Bond; Vice-president, Mr. J. C. B. Horwood; Secretary, Mr. P. B. McGiffin; Treasurer, Mr. A. H. Cassels; Committee, Mr. J. P. Hynes and Mr. S. G. Beckett.

Advanced Finishes for Modern Building Construction

The evolution of materials, during recent years, for protecting and decorating concrete and steel structures and the advanced finishes that are now available in this line are matters well worthy the careful study of every progressive architect, builder and engineer, in that without such study one is liable to specify the imitation for the reality and to employ a preparation that is as detrimental to the material as the genuine article is beneficial. By many of those who are most competent to judge, the "Glidden" quality in such materials is considered the standard of excellence. The word "Glidden" is derived from the Glidden Varnish Company, Cleveland, Ohio, a concern the merits of whose products are already widely known in Canada and almost universally recognized in the United States.

Among the various lines manufactured by this company may be mentioned their alkali proof wall size, a material that is intended, especially, to prevent discoloration and staining of decorative materials used upon plaster and cement surfaces. Upon application it penetrates the porous surface and protects the wall coating. It can also be used for backing up granite, limestone and other high class building materials, with a view to the prevention of staining and discoloration of exposed surfaces. The space covered is 300 to 400 square feet to the gallon, according to the surface.

Another product that has a strong claim to merit is the Glidden concrete floor dressing, one of the best materials on the market for the protection and maintenance of concrete floors. This material covers 200 to 300 square feet to the gallon for the first coat and 300 to 400 square feet to the gallon on the second coat, according to the surface.

There is a great demand in Canada just now for satisfactory waterproof concrete finishes. In this department the Glidden firm can provide a solution for every kind of problem. Their liquid cement is a very high quality of cement incorporated with a waterproofing medium of unusual durability and water-resisting qualities. It is made in imitation of Bedford sandstone in a variety of practical shades and is intended especially for waterproofing cement, stucco, plaster, and concrete surfaces, with a view to producing decorative effects. Its covering capacity varies from 150 square feet to the gallon and upwards, according to the condition of the surface.

For use upon plaster, brick, cement, tile, iron and wood surfaces there is the Glidden waterproof white finish, a material whose special function is to intensify the radiation of light in hallways, elevator shafts, and so on. The white finish covers 300 square feet and upwards to the gallon.

Architects perhaps will be most interested in the French Caen stone finish, manufactured exclusively by the Glidden Varnish Company, and widely used with the most satisfactory results. This finish was specified for the Hotel Ritz, the most exclusive hostelry is Paris, the Hotel Carleton in London, and the beautiful Hotel Belvedere, the National Marine Bank and the Metropolitan Savings Bank, all in Baltimore.

The company also manufacture French Caen stone tints, which are of delicate colors and produce the most harmonious effects when employed in conjunction with the French Caen stone finish.

Among the many other products of this concern may be mentioned their waterproof flat finishes, transparent waterproofing, acid and graphite acid proof coating, liquid concrete and liquid rubber.

Further information in connection with all of the above materials, and specifications therefor, may be obtained in handy booklet form upon application to the Glidden Varnish Company, Cleveland, Ohio.

Rendering Interior Walls Damp-Proof

In regard to an effective method for impregnating walls in the interior of buildings, such as basements, ground floors, subterranean passages, etc., against dampness and fungus growth, the "Painters' Magazine" contains the following in reply to a question:

A washable coating for this purpose that may be applied to any surface previously cleaned by scrub brushing to remove dirt, loose mortar, etc., is prepared by dissolving 100 pounds of a special soap produced by the saponification of stearic acid with soda in 6 pounds of 66 per cent. alcohol. Where first coat is no object this coating will produce the most durable results, as it will give a very hard surface that may be cleansed from dust, etc., by brooming or brushing and may be washed with hot or cold water frequently without disintegrating the constituents of the soap, as would be the case with an aqueous solution. The use of the alcohol permits a greater penetration of the soap, and it is not necessary to confine the use to 66 per cent. alcohol, for the stronger the spirit the better the result.

This foregoing formula is to be highly recommended for falls of living rooms where dampness is liable to exist. For cellars, sub-cellars, basements, stables, etc., the ordinary soaps, made from any kind of fat or oil, with or without resin, may be employed and the cost very much reduced thereby, but the stronger the spirit used the better. The proportion of soap and spirit is best determined by trial on a small scale. Unless soft soap is used the soap should be sliced very thin and placed in warm spirit, which is best heated on a sand bath or on a radiator. The kettle in which the solution is made should be well covered and the contents stirred occasionally. High heat is not necessary.

Either solution may be colored by spirituous solutions of aniline colors or by directly mixing with mineral colors such as are unaffected by alkalies, such as yellow ochre, Venetian red, ultramarine blue or green, oxide of chromium green, etc., whereby at little extra cost some attempt at decoration may be had. A very important feature is that fact that to these spirituous solutions may be added liquid disinfecting chemicals for hygienic purposes, as in stables for sick animals, etc. These coatings may be applied to raw woodwork, brick or stonework, cement or concrete plastered walls or whitewashed surfaces. On calcimined coatings it will not answer, unless the latter is fixed with a 5 per cent. aqueous solution of chrome alum, but on oil paint the spirituous soap solutions will not hold. In order to make operation more simple it is best, when the surfaces to be impregnated consist of lime or of stone containing lime or of rough cast, to coat them first with baryta water or waterglass, and, after permitting these to become dry, to wash off the excess with hot water.

Mayor Hopewell, of Ottawa, has laid before the C.P.R. officials a scheme for providing communication between the union depot and the centre of the city by means of a series of bridges extending over the Ottawa river from the foot of the canal to Victoria Island. The proposition which the C.P.R. has on hand, and for which plans have already been prepared, is the construction of an underground tunnel from the Rideau canal to the central stations at a cost of \$1,000,000 or more. The project is an extensive one and if carried into effect will greatly improve the railroad transportation system of the federal capital.

Vancouver builders are easy marks. The latest thing to which they have submitted is the introduction of a card system by the Building Trades Council. It is stated that cards signifying that only union men are employed have gone up on every large building now under construction at Vancouver.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Cornwall, Ont.

Tenders will be received until May 31st for the construction of the Johnston drain; also for four reinforced concrete culverts. Jas. R. Simpson, Township Clerk, Finch, Ont.

Dauphin, Man.

Messrs. Chipman & Power, of Toronto, have been engaged as designing and superintending engineers in connection with the proposed waterworks and sewerage systems.

Fort William, Ont.

This municipality is calling for tenders until June 3rd for constructing sewers on several of the city streets. (See advertisement in "Tenders and For Sale Department" of this issue.)

The council have authority to borrow \$474,466.39 to be expended on public works. Of the local improvement fund, \$140,000 will be spent in the construction of sewers outlined as follows: Francis street, \$53,350; Amelia street, \$13,000; Edward street, \$6,380; May street, \$9,350; Brodie street, \$9,680; May street, \$10,670; Dease street, \$2,000; Brodie street, \$7,370; McKenzie street, \$1,900; Rowand street, \$3,500. Other sewer construction, \$22,600. Paving to cost \$80,000 is authorized as follows: Victoria avenue, \$27,000; Syndicate avenue, \$34,500; Syndicate avenue, \$18,500. For concrete sidewalks in Victoria avenue and elsewhere \$7,500 will be expended. For plank sidewalks, \$15,000 is the estimate. Grading is estimated at \$2,000, macadam at \$7,500, boulevards at \$7,500, and sewer construction at \$9,500.

Galt, Ont.

The by-law to provide \$5,000 for waterworks extensions was carried.

Kamloops, B.C.

The new reservoir by-law received a six months' hoist.

Kaslo, B.C.

The council proposes to introduce a by-law for the purpose of borrowing \$25,000 for sidewalks and other improvements.

London, Ont.

Tenders are invited for a steel tower estimated to cost \$850. Chairman McMahan, Water Commission.

Lachine, Que.

The Lachine Council is preparing a by-law for the purpose of raising a further loan of \$28,000 for the construction of public works, especially roads and sidewalks.

Moncton, N.B.

Tenders addressed to J. Edington, city engineer, will be received until May 28th for construction of sewer and catch basins on Lewisville road. Plans, etc., at office of city engineer.

Melville, Sask.

Plans for a waterworks and sewerage system are under way.

Montreal, Que.

The city of Montreal will construct four public lavatories at various points throughout the city. The Board of Control will order plans and specifications to be made shortly.

New Westminster, B.C.

An extensive system of street improvements, to cost about \$800,000, will shortly be started. The city engineer is engaged on specifications for about five miles of paved streets. Tenders are now being called for two miles of cement sidewalks.

Ottawa, Ont.

Tenders addressed to the chairman, Board of Control, will be received until June 2nd for asphalt and block pavement on Bank street, from Pretoria avenue to Wilton crescent; St. Patrick street, from Dalhousie street to Rideau river. Specifications at office of the City Engineer, N. J. Kerr.

Prince Albert, Sask.

Tenders will be received until June 11th for two return tubular boilers. C. O. Davidson is city clerk. (For further particulars see "Tenders and For Sale Department" of this issue.)

Regina, Sask.

Tenders will be received until June 6th for the following debentures: \$10,000 30 years waterworks; \$10,000, 30 years sewers, each at 4 1-2 per cent.

Toronto, Ont.

Tenders are being called by the Board of Control until May 31st for pavements, kerbs, concrete walks, sewers. Specifications at office of City Engineer. G. R. Geary, chairman.

Vancouver, B.C.

A project of great importance to Southern British Columbia is announced by the Hon. Thos. Taylor, Minister of Public Works, who is now in the interior looking into the question of a trunk wagon road through the southern part of the province. When this is completed it will extend from Vancouver to the Crow's Nest, a distance of 750 miles. The Alberta Government is already co-operating with this province by a trunk road in the south to connect with the B. C. road at the boundary in the pass.

Welland, Ont.

It is stated that the ratepayers will vote on a \$13,000 sewer by-law on the 20th June.

The Water Commissioners have recommended to council the submitting of a by-law to raise for waterworks improvements \$60,000, the amount estimated by Engineer Kennedy, of Montreal.

Tenders addressed to the chairman, Board of Works, will be received until June 1st for construction of granolithic walks, sewers and water mains. K. Paterson, secretary, Board of Control.

AWARDED.

Berlin, Ont.

H. J. Bowman, county clerk, sends us the following list of tenders: 35 foot concrete arch, to Pipe and Campbell, for \$1,945;

others tender, M. M. Hiles, \$1,092; J. B. Lickty, \$1,200; Walter Davies, \$1,213; Fraser & Clemens, \$1,283. Concrete floor on bridge, near Ayr, to Hamilton Bridge Works Company, for \$387; others tenders, Pipe & Campbell, \$395; J. B. Lickty, \$410; Walter Davies, \$480; M. M. Hiles, \$480.

Bridgeburg, Ont.

Geo. Ross, consulting engineers, Welland, sends us the following item re sewers, etc.: The tenders for the construction of the Bridgeburg Sewerage Works, consisting of about 10,000 lineal feet of vitrified sewer pipe running from 8 to 24 inches in diameter, with manholes and all sewer appendages, three septic tanks 70 feet long, 12 feet wide and 6 feet deep, a 24 inch cast iron outlet 180 feet in length, have been opened and contract was awarded to Mr. John F. Connolly, of Toronto, at the price of \$23,700. The lowest bid received was \$18,990.05; others bidders were Peter Lorenzo, Niagara Falls, \$28,240, and A. C. Stewart & Company, Winnipeg, \$35,500. Valves for septic tanks and the cast iron pipe for outlet in river to be furnished to the contractor and \$3 per cubic yard extra to be allowed for rock requiring to be blasted.

Campbellton, N.B.

The following tenders were received for putting in the pipe on wharf: W. H. Wallace, \$356.40; S. D. Harriman, \$310.34 (accepted).

Fernie, B.C.

For supplying the city with 5 miles of sewer pipe and 2 1-2 miles of water pipe, William Dicken, of Fernie, secured the contract at the following prices for concrete pipe: 6 inch, 25 cents; 15 inch, 70 cents; 20 inch, \$1.25; 24 inch, \$1.70; 30 inch, \$2.95; bulk tender, \$21,643.60. Other bulk tenders were: Blackmer Post, St. Louis, Mo., \$23,670.72; H. H. Depew, Fernie, \$25,230.45. Mr. Dicken is the manager of the Western Canada Pressed Stone & Concrete Pipe Company.

Montreal, Que.

The Board of Control have awarded contracts for the construction of sewers as follows: Trunk sewer in Laurier Ward, from head of St. Lawrence street to Mack River, to L. Giguere & Company at \$115,855, the highest tender for this work being \$176,000; No. 3 section Sherbrooke street sewer, St. Lawrence to Bleury street, to M. Dineen, at \$43,730, the highest tender being \$49,000 approximately; only one tender was received for the construction of the sixth section of Sherbrooke street sewer, from Drummond to Guy street, from M. Dineen, at \$90,660—this was not accepted.

Vernon, B.C.

The contract for sidewalk construction has been awarded to Worswick Paving Company, Limited, which is planning to locate a plant in Victoria.

Walkerville, Ont.

C. H. Robinson, town clerk, sends us the following list of tenders: (1) Pavements, The Caldwell Stone Company, Windsor, \$4,194.71; D. M. Mitchell, Niagara

Falls, \$4,433; Thos. Chick, Windsor, \$4,856.35; David Todd & Company, Windsor, \$5,329; contract awarded to The Cadwell Silix Stone Company. (2) Sewers, Thos. Chick, Windsor, \$7,107; John Conn, Windsor, \$7,287.60; G. W. Sewell, Windsor, \$7,466; Sennaire Bros., Detroit, \$9,356. Contract awarded to Thos Chick.

Yorkton, Sask.

The amount of contract for sidewalk construction here given to C. Mattaini, general manager Guelph Concrete Manufacturing Company, Fergus, we are informed, is \$18,000. Noted in last issue.

Railroads, Bridges and Wharves

Angers, Que.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, will be received until June 17th for construction of wharf at this place. Plans, etc., at this Department and on application to local postmaster.

Ellice, Man.

Tenders are being called by this municipality until June 21st for \$5,000 10-year bridge debentures, at 5 per cent. H. Tillman, secretary-treasurer.

Halifax, N.S.

F. A. Ronnan & Company have been awarded a contract for the construction of a railway siding, one mile long, from the Intercolonial Railway main line near Rocky Lake, to the Acadia Powder Company's works.

Joggins, N.S.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ottawa, will be received until June 10th for construction of an extension to the breakwater here. Plans, etc., at above Department and at the offices of C. E. W. Dodwell, Halifax, E. G. Millidge, Antigonish, and on application to local postmaster.

Kenora, Ont.

The proposition of cost for subway has been arrived at between the town, the C. P. R. and the Government, and it is stated that construction will commence at an early date. Estimated cost, \$17,000.

Kingsport, N.S.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ont., will be received until June 13th for construction of extension to pier here. Plans, etc., at above department, at the office of C. E. W. Dodwell, Halifax, and on application to local postmaster.

Montreal, Que.

It is stated that the C. P. R. will this season put up immense steel structures as snow guards in the Rocky Mountains. Plans of the new structures have been prepared.

New Westminster, B.C.

It is stated that large car building shops will be established on this coast by the C. N. R. and that the site will likely be opposite the mills of the Fraser River Lumber Company.

North Vancouver, B.C.

It is reported that the G. T. P. has purchased block 266 with the intention of ultimately using the property for terminal yards. E. J. Chamberlain, general manager, is in the west.

Ottawa, Ont.

Plans are being prepared at the Railway Department for the big bridge over the Saskatchewan river in connection with the Hudson Bay Railway, and as soon as com-

pleted, tenders for the structure will be called.

Ottawa, Ont.

The Montreal, Kapatchawan & Rupert Bay Railway Company have secured a charter from the Dominion Government with a substantial subsidy of \$6,200 per mile and assistance to the bridge along the route amounts to \$2,500,000. Work will be started immediately for the construction of the line, which will run from Bark river to Lake Kapatchawan, on the Grand Trunk Pacific, a distance of 194 miles. Assistance has been promised by the Provincial Government. The capital of the company is \$3,000,000, and a bond issue at the rate of \$30,000 per mile is authorized by the federal charter.

Regina, Sask.

Tenders are being called for \$41,000, 30-year debentures, Albert street subway, at 4 1-2 per cent. A. E. Chivers, City Clerk.

Sackville, N.B.

Tenders for new public wharf will be called shortly. Geoffrey Stead, C.E., Chatham, district engineer.

Sault Ste. Marie, Ont.

Tenders addressed to N. Tessier, Secretary, Department of Public Works, Ottawa, will be received until June 20th for extension to Government wharf here. Plans, etc., at office of J. G. Sing, district engineer, Toronto, and on application to local postmaster.

St. Leonard's, N.B.

A new bridge, to cost \$75,000, is to be built at once across the St. John river, between Van Buren, Me., and here, the cost of which has been provided, one-half by the Maine Legislature and the other by the Dominion and Provincial Governments. If the bridge is intended to support railway traffic it will very naturally connect the Bangor & Aroostook system not only with the Canadian Pacific road but with the new branch of the Intercolonial, now being built across New Brunswick from Campbellton on the Intercolonial road to St. Leonards.

St. Thomas, Ont.

Jas. A. Bell, county engineer, will receive tenders till June 8th for the construction of a reinforced concrete arch bridge over Kettle Creek. (For further particulars see "Tenders and For Sale Department," this issue.)

Toronto, Ont.

Tenders are being called by the T. & N. O. Railway Commission until June 8th for work in connection with the work necessary for construction of Nipissing Junction spur. See advertisement in this issue.

Vancouver, B.C.

It is stated that plans have been drawn up by Engineer Moss, in charge of the engineering business of Waddell & Harrington, for a \$500,000 steel viaduct, about 2,500 feet long, which it is proposed to press upon the city council to erect from the foot of Georgia street.

Vancouver, B.C.

The deal for the acquisition by the G. N. R. of all the property west of Gore avenue on Prior street and for all the Park Lane lots, it is stated, has been closed. W. Holden, acting broker. E. A. Howard, G. N. R. representative.

AWARDED.

Stewart, B.C.

A contract for supplying the piles for the Portland Canal Short Line Railway has been awarded to Messrs. C. Hickson & Company, delivery being fixed for May 20. Mr. James McDonald, of Victoria, has se-

cured the contract for building the dock and approach.

St. Charles de Caplan, Que.

Messrs. Burns & Charleson, of Ottawa, have been awarded the contract for a new wharf at St. Charles, Quebec. Cost, \$15,000.

Public Buildings, Churches, Schools, etc.

Arnprior, Ont.

A by-law has been passed to issue \$14,000 school debentures. Thevor H. Trout, clerk.

Beaverton, Ont.

Tenders will be received until June 10th for \$7,000 4 1-2 per cent. 20 years, town hall debentures. C. A. Patterson, clerk.

Charlottetown, P.E.I.

Tenders will be received by A. Beaton, until June 6th, for repairing Brookfield Hall. Plans, etc., with above mentioned.

Coquitlam, B.C.

Tenders are being called by the Public Works Department, Victoria, for the erection of a brick house for engineer and pump station.

Calgary, Alta.

On May 25th a by-law will be voted on to issue \$126,000 4 1-2 per cent. 30-year City Hall debentures. H. E. Gillis, City Clerk.

Carleton Place, Ont.

The following represent some of the losses in connection with the fire on the 18th inst.: Zion Presbyterian Church, \$35,000; manse, \$2,000; St. Andrew's Presbyterian Church manse, \$2,000; Masonic Hall, \$3,500; drill shed and armories, \$30,000; curling rink, \$2,500.

Dundalk, Ont.

A by-law has been passed providing for the issue of \$5,000 5 per cent. school debentures. M. W. Ridley, clerk.

Barrie, Ont.

F. S. Baker, architect, Traders Bank Building, Toronto, will receive bids up to June 1st for plumbing and heating for Royal Victoria Hospital. (For further particulars see "Tenders and For Sale Department" in this issue.)

Edmonton, Alta.

A second offer of a site for the proposed Ladies' College to be established in connection with the Presbytery of Alberta, has been received by Dr. D. G. McQueen.

By-law for public library site passed and commissioners were requested to secure options on College avenue site.

Fernie, B.C.

The erection of the new Christ Church will be commenced at once. Noted in May 11th issue.

Fort William, Ont.

The council have authority to borrow \$12,015.43 to be applied to high school; \$38,997.77 to public school; and \$8,736.08 to separate schools.

Gretna, Man.

A by-law will be voted on to issue \$12,000 5 per cent. 20-year school debentures. Harry F. Stirk, secretary-treasurer, Gretna, S. D. No. 336.

Guelph, Ont.

Wellington county council have decided to erect a new courthouse to cost \$50,000 or \$60,000.

Hicksvale, Sask.

Tenders were taken for the erection of

Fairview School. R. J. Brown, secretary, Hicksville.

Hamilton, Ont.

At the annual Y. M. C. A. meeting a committee composed of J. F. Walker, H. Banwell, C. P. McGregor and others was appointed to report on the proposed addition to east end and possible building campaign.

At a citizens' meeting it was decided to erect a Sick Children's Hospital in memory of the late King Edward. Rev. Canon Abbott, Thomas W. Watkins and Sheriff Middleton are interested. Amount on hand, \$5,000.

Kenora, Ont.

The plans for a new citadel building for the Salvation Army have been completed and call for an up-to-date structure of red brick.

Lindsay, Ont.

Tenders for the construction of a porch and granolithic steps at the county jail will be received until Monday, May 30th. J. R. McNeillie, county clerk.

Lytton, B.C.

Tenders are being called by the Public Works Department, Victoria, for the erection of a lock-up and court-room here. Plans, etc., at offices of the constable at Yale, Lytton and Ashcroft, and at the above Department. F. C. Gamble, Public Works Engineer.

London, Ont.

There is a possibility that the Y. M. C. A. here may have a new building in the near future.

Midland, Ont.

Competitive plans will be received until May 28 by Thos. I. Trueman, secretary-treasurer Public School Board, for erecting a 4 room brick school.

Moose Jaw, Sask.

Plans have been secured for an isolation hospital. W. F. Heal, city clerk.

Medicine Hat, Alta.

Tenders closed for erection of a concrete block wing to the Woman's Hospital. E. J. Fewings, secretary. W. T. Williams, architect.

Montreal, Que.

A movement is on foot to raise sufficient money to erect a new hospital for infants to supplant the present overcrowded building at 43 Argyle avenue.

It is stated that the Sparrow Amusement Company contemplate the erection of a new theatre building at an early date.

Plans are now ready for the new central Y. M. C. A. building to be erected on Drummond street at a cost of \$300,000; also for the Westmount branch, corner Arlington avenue and Sherbrooke street; the Fairmount branch, corner Park avenue and St. Viateur street. Tenders will be called shortly. Ross & Macfarlane, architects.

The Montreal Art Association has engaged Mr. Edmond Wheelwright as consulting architect of the proposed building to be erected on Sherbrooke street. Three firms have been selected to compete for the new building, viz., Brown & Vallance, Percy E. Nobbs and E. & W. S. Maxwell.

It has been suggested that as a fitting memorial to his late Majesty King Edward VII. that a musical hall with a seating capacity of at least 5,000 should be erected in Montreal. It is also suggested that the Redpath Estate on Sherbrooke street be purchased and devoted to a central approach and entrance way with boulevards, etc., to Mount Royal Park.

The Grey Nuns have purchased the property at northwest corner Sherbrooke and St. Lawrence, Main street, known as Belmont Hall, and, it is stated, will hold this for building purposes.

Tenders have been received for the painting and glazing of an extension to the Public Library of Westmount. Mr. Robt. Findlay, architect.

Tenders will be received until May 26th for the erection of church building at South Bridge, Mass. Mr. Jos. Venne, architect.

Mr. Alphonse Venne and J. A. Godin were the successful architects in the competition for plans of decorations to be erected in connection with the Eucharist Congress to be held in Montreal during the coming autumn. Tenders are being received until May 25th for the carpentering work, plastering, painting and decorating of the above by Mr. Jos. Venne, supervising architect.

Neepawa, Man.

M. H. Fieldhouse, Neepawa, has plans for new church at Salisbury.

New Westminster, B.C.

Over \$97,500 for the erection of three new schools will be raised by debentures shortly.

North Vancouver, B.C.

Competitive plans for a school on Lonsdale avenue were called on the 27th inst. For further information address Alex. Law, Box 178 North Vancouver.

Peterborough, Ont.

Tenders are being received by W. J. McColl, rector, St. Peter's Cathedral, until May 30th for construction of additions and alterations to Mount Joseph Convent. Plans, etc., at office of J. E. Belcher, C.E., Diocesan architect.

Orillia, Ont.

It is probable that the Department of Education will establish a Model School here. Dr. Merchant, Toronto, Chief Public School Inspector.

Ottawa, Ont.

La Salle Academy, Sussex street, was damaged to the extent of about \$5,000 on the 18th inst.

Tenders addressed to N. Tessier, secretary, Department of Public Works, will be received until June 14th for the construction of an addition to the eastern Departmental Building, Ottawa. Plans, etc., at above Department.

Parry Sound, Ont.

Geo. Rawlinson will receive tenders till June 10th for the construction of a brick veneered Sunday School room. (See advertisement in "Tenders and For Sale Department" of this issue.)

Regina, Sask.

Tenders will be received until June 6th for the following debentures: \$16,000 20-year market building, \$25,000 20-year agricultural industrial building grant, each at 4 1-2 per cent.

Sydney, N.S.

The civic authorities intend to agitate for the erection of an additional Provincial Normal School here.

Saskatoon, Sask.

The new Methodist Church at Nutana will be built by Marr, Son & Hoge, of Saskatoon, after school is finished. Estimated cost, \$50,000. Storey & Van Egmond, architects.

J. H. Noel is architect for the new opera house, 75 x 145 feet.

Tenders have been taken for erection of school building. David Webster, archi-

tect. Wm. P. Bate, secretary. Noted previously.

Strathroy, Ont.

A joint committee representing the town and the county conferred as to the advisability of erecting a hospital here. \$12,000 is on hand, and \$15,000 is being asked from the county. No decision was reached. A. K. Hodgins, chairman.

Smith's Falls, Ont.

G. T. Martin, architect, has been in Ottawa consulting the superintendent of the General Hospital regarding plans for a new public hospital to be built here.

Toronto, Ont.

Competitive designs for a residence for the Lieutenant-Governor will be received by J. O. Beaume, Minister of Public Works, until July 15th. Information, etc., on application to the Secretary of the above Department. (See advertisement in Tenders and For Sale Department, this issue.)

The property, northeast corner of Ossington avenue and Davenport road, has been purchased by the I. O. O. F. and will be utilized as the Ontario Oddfellows' Home. Plans are being prepared for the erection of a handsome new home to cost in the neighborhood of \$60,000.

Tenders for carpentry, painting, plastering and tinsmithing in connection with the midsummer repairs to the separate schools, addressed to J. Cadaret, chairman building committee, will be received until May 25th. Specifications at office of architect, Chas. J. Read.

The Board of Management of Knox College are asking for plans for their proposed new college buildings to be erected on St. George street. See advertisement in "Tenders and For Sale Department" of this issue.

Tenders are being called until May 30th by W. C. Wilkinson, secretary-treasurer, for enlargement of Huron Street School; alterations to Malvern Avenue High School, Duke Street and Crawford Street Schools, etc., and for erection of Elizabeth Street School and enlargements of Roden and York Street Schools. Plans, etc., at City Hall.

Virden, Man.

A by-law will be submitted asking \$25,000 for a new public school.

Wainwright, Alta.

Tenders addressed to H. V. Fieldhouse, secretary-treasurer, will be received until May 31st for the erection of a solid brick 4 roomed school, according to plans, etc., prepared by Mr. E. D. Stimpson.

Winnipeg, Man.

Tenders addressed to E. D. Tuttle, architect, will be received until May 27th for the erection of a fresh air home at Gimli, Man., for the board of management of Methodist Church here.

Tenders addressed to J. H. G. Russell, architect, Sylvester-Willson Building, will be received until May 27th for the erection and completion of a brick and reinforced concrete building for the Convalescent Home.

Commissioner J. B. Mitchell prepared the plans for the two new collegiates mentioned in our last issue. Tenders will be called shortly.

The Salvation Army will have an Industrial Home built for the use of mechanics. The Rupert street citadel is to be enlarged and renovated. Work will be done by day labor.

The Winnipeg Hunt Club will have a

club house and kennels erected at Tuxedo Park. S. W. Abbott is secretary.

J. B. Morrison has the lowest tender in for the Riverview Church, and will probably be awarded the contract.

AWARDED.

Lethbridge, Alta.

The contract for erecting Y. M. C. A. building has been awarded to Smith Bros. & Nelson, of Lethbridge, for \$47,980, not including heating and plumbing.

Port Dalhousie, Ont.

Mr. Peacock, Welland, has the contract for 2-room school here, \$9,000, also one at Vineland, \$4,000.

Quebec, Que.

For the construction of a Normal School the Provincial Government has awarded the contracts as follows: Emile Cote, 360 Richelieu street, Quebec, masonry; Jinchereau & Lamonde, carpentry, joiner work, roofing, painting and glazing.

Regina, Sask.

J. P. Merrick and J. H. McDonald secured the contracts for the new buildings to be erected at the fair grounds. Sharron & Trip, architects.

Southampton, Ont.

J. C. Eckford, town clerk, sends us the following: The contract for Town Hall was awarded on 19th inst. to the Chippawa Lumber Company of this town, the contract figures being \$10,947. The other tenders received being only for various trades and parts of the work, were returned to the persons entitled thereto. The estimate of the architect was about \$11,000.

Saskatoon, Sask.

G. N. Hughes got the contract for new civic coal and oil warehouse. The Saskatoon Construction & Engineering Company got contract for standpipe at \$2,977.

St. Catharines, Ont.

The contracts for the various lines of work in connection with the Nurses' Home were awarded as follows:—Masonry, brickwork and plastering, Frank Hoare, \$2,000; carpentering and moving building, J. W. Carle, \$2,000; painting and decorating, Leach & Jones, \$238.

Toronto, Ont.

Tenders were awarded for the erection of the new Oakwood High School. The following are the successful tenderers:—Masonry, H. Lucas & Son, \$75,416; carpentering, M. Hutchinson, \$24,935; reinforced concreting, A. Gardner & Company, \$11,040; flooring, Sanitary Flooring Company, \$1,240; roofing, A. B. Ormsby Company, \$2,227; plastering, T. Blackburne & Son, \$7,250; painting, James Taylor, \$3,000; plumbing, Keith & Fitzsimons, \$3,050; steel work, W. H. Salter, \$4,800; heating and ventilating, Keith & Fitzsimons, \$9,940; heat reguator, Johnson Temperature Regulating Company, \$1,585; electric wiring, Fred. Armstrong, \$97; total, \$142,762.

The Provincial Government have awarded the contract for the building of the addition to the rear of Osgoode Hall to Mr. S. F. Whitham, Toronto and Brantford, the lowest tenderer. The contract comprises the whole work of construction and finishing with the exception of heating and plumbing. The contract price is \$86,000. In all fourteen bids for the building were received.

Union, Ont.

The following tenders for erection of school in Section 8, Yarmouth, were received: Masonry: Jno. Leverton, Sparta, Ont., \$1,331 (accepted); C. Smale, Sparta, Ont., \$1,393; Frank Little, St. Thomas, \$1,840. Carpenter work: Cameron & Buffy, St. Thomas, \$1,125 (accepted); Shaffer &

Elliott, St. Thomas, \$1,366; John Walker, Sparta, Ont., \$1,290. Painting and glazing: W. F. Midforth, St. Thomas, \$120 (accepted); E. Dallyn, St. Thomas, \$125; W. Morse, St. Thomas, \$140. Heating and tin-smithing: Ingram & Davy, St. Thomas, \$135 and \$22; H. M. Ellison, Port Stanley, \$160 and \$22.85; G. T. Stewart, St. Thomas, \$162 and \$16. Slating: C. Riddals, St. Thomas, \$265.35.

Residences

Carleton Place, Ont.

The following residences were destroyed by fire on the 18th inst: W. W. Wilkie, brick residence, \$2,500; Finley McEwen, two houses, \$8,000; John McDonald, loss \$4,000; Peter McDonald, stables and sheds, loss \$2,000; E. P. Wilkie, residence, loss \$4,000; Wm. Comrie, residence, loss \$3,500, some insurance.

Montreal, Que.

Mr. Z. Trudel, architect, has prepared plans and specifications for the erection of an apartment house on Park avenue.

Dalbe Vian, architect, is preparing plans for a residence at Lachine for Mr. Bournet.

Tenders will be received until May 27th for the erection of an apartment house at Mile End for Mr. J. A. Jarry. Dalbe Vian, architect.

Mr. L. R. MontBriant, architect, is erecting seven flats on St. Andre street by day work.

An apartment house is being erected by the contractors and proprietors, Messrs. O. Martineau & Fils, Limited, at the corner of Berri and Marie Anne streets, approximate cost \$21,000.

Plans have been prepared for alterations to residence on Belleville avenue, Westmount, for Mr. G. F. Johnston. Ross & McFarlane, architects.

Ottawa, Ont.

Recent building permits are: Mrs. K. Arnoldi, Wilbrod street, solid brick, \$8,000; J. A. Ewart, architect; Robert Taylor, brick veneer, Powell avenue, \$4,500; V. V. Rogers, brick veneer dwelling, Regent street, \$4,000; Aaron Drazin, solid brick shop and dwelling, Murray street, \$6,500; Pierre Marchand, brick veneer iron clad double house, Stewart street, \$5,000; J. McFarlane, brick veneer iron clad dwelling, Flora street, \$6,000; Ralph Smith, dwelling, MacLaren street, \$5,000; Nap Seguin, brick veneer dwellings, Osgoode street, four in row, \$4,500; W. Shenkman, brick veneer dwellings, Clarence street, \$4,500; Henry Villeneuve, double brick veneer dwelling, Arthur street, \$3,000; James E. Wilson, solid brick dwelling, Wilbrod street, \$3,500; K. Cohen, brick veneer row of three, Queen street west, \$4,500; A. Larocque, solid brick dwelling, McLeod street, \$3,000; James O'Connor, sr., brick veneer double dwelling, Laurier avenue east, \$3,000.

Quebec, Que.

Permit was granted to J. Villeneuve & Fils, contractors (E. Jobin, proprietor), repairs to house on St. Joseph street, \$4,000.

Toronto, Ont.

J. Henry and A. Hendrie intend erecting at 581 Jarvis street a 4 storey brick apartment house costing \$38,000.

Victoria, B.C.

Tenders have closed for residence for Mr. Justice Galligher. Cost, \$20,000.

Winnipeg, Man.

A permit was issued to G. F. Galt, apartment block, Wellington crescent, two and a half storeys, 78 x 92 feet. Contractor,

W. Horner, architect; J. D. Atcheson. Cost, \$50,000.

Winnipeg, Man.

J. Senecal, contractor, has commenced work on A. Petvin's house, \$5,600.

Winnipeg, Man.

D. Boyce Sprague will have a \$14,000 residence built on McMillan avenue, near Aynesley street.

K. B. Skagford will construct thirty houses in Norwood this summer, to cost over \$65,000.

AWARDED.

Almonte, Ont.

The contract for the erection of a new Methodist stone manse has been awarded to Mr. A. C. Gilmour, of Perth, at about \$3,000.

Montreal, Que.

Tenders have been awarded as follows for the erection of J. M. Wilson's house, Ontario avenue: Masonry and brick work, Mr. Hurdeau; carpentering, H. Demers. Estimated cost, \$50,000. Messrs. Saxe & Archibald, architects.

Contracts for the erection of eight residences at Outremont, Que., for Mr. R. Ironside have been awarded as follows by Ross & Macfarlane: Masonry and brick work, James Young; carpentering, T. C. M. Bulmer; roofing, Geo. W. Reed & Company; plumbing and heating, T. Lessard & Sons; electric wiring, W. J. O'Leary & Company.

The contract for the masonry work, residence on Mountain avenue, Westmount, for C. G. Ballantyne, Esq., has been awarded to Sparrow & McNeil. E. & W. S. Maxwell, architects.

The general contract for the erection of the St. Matthew Apartments, St. Matthew street, for a syndicate of builders has been awarded to Mr. J. H. Hand, general contractor. Wright & Son, architect.

Business Buildings and Industrial Plants

Brantford, Ont.

Mr. John Peachey has made application for a permit for a block of stores, \$8,700.

Brandon, Man.

Chas. Hall has commenced erection of new warehouse and office building for Beattie & Sons. Solid brick. Architect Shillinglaw.

Plans are ready for stores and apartment block for Ingram, Matheson & Inglis, 3 storeys. Pressed brick and stone will be used. W. A. Elliott, architect.

A permit has been issued for 3 storey brick block, 45 x 60 feet, \$20,000, for Mr. F. Nation. Architect Shillinglaw.

Calgary, Alta.

John Mosley has purchased a site for a new Dominion Hotel.

Cardston, Alta.

The Cardston Implement Company is to erect a 2 storey brick building. J. C. Cahoon and A. M. Heppler will also build.

Carleton Place, Ont.

The hardware store of H. Singleton was destroyed by fire on the 18th inst. Estimated loss, \$10,000.

Elmira, Ont.

Besides the large new felt factory which will cost in the neighborhood of \$40,000, an extension of one other factory is likely to be made.

Elbow, Sask.

Tenders were called until May 31st for erection of hotel here for E. Bowers. J. J. P. Bowler, architect, Brandon, Man.

Georgetown, Ont.

The Sykes Woollen Mills were destroyed by fire on the 18th inst. Loss, about \$30,000.

Hamilton, Ont.

The Oliver Chilled Plow Works, South Bend, Ind., will locate its Canadian branch here. Estimated expenditure, \$1,500,000. Following are some of the buildings to be erected at once: Six storey warehouse, 100 x 300 feet long; paint shop, three storeys high, 70 x 250 feet; assembly buildings, three storeys, 100 x 400 feet long. All buildings will be designed to be constructed of a combination of structural steel frame, and will have reinforced concrete floors and roofs, with red pressed brick exterior walls, with terra cotta trimmings. B. H. Prack, consulting engineer; W. A. McInerney, secretary.

Iroquois, Ont.

C. E. Keeler's shop, etc., were destroyed by fire on the 19th inst. Total estimated loss, \$3,500.

Kingston, Ont.

Board of Trade representatives had an interview with Manager McNulty, of the Wilbur Iron Mines, regarding the establishment of a smelter here. Proposed expenditure, \$250,000.

Kenilworth, Ont.

O'Neil's planing mill, shingle mill, etc., were destroyed by an explosion on the 16th inst. Total estimated loss, \$20,000.

London, Ont.

The London Concrete Machinery Company have acquired property in East London and work will be commenced at once on several buildings. J. C. Doidge is one of the firm.

Lethbridge, Alta.

Wm. Cousins will build a business block and hall here.

Melfort, Sask.

Wm. Fingland, architect, Winnipeg, has plans ready for a Bank of Hamilton building.

Medicine Hat, Alta.

It is stated that owing to the ratepayers at Portage la Prairie, Man., not giving the desired privileges, the Stephens Brick Company will build here.

Macleod, Alta.

The Macleod Quarry & Contracting Company are building a soap factory and three other residences and stores.

Montreal, Que.

The Kingsbury Footwear Company, Maisonneuve, have secured a site on William David street, taking in the block extending from Ernest to Girard streets, on which the company will erect a factory double the proportion of their present plant.

The property at the northeast corner St. Denis and Ontario streets, containing 69,000 square feet, has been acquired by Mr. J. B. Baillargeon, who will erect a three storey garage and storehouse 150 feet by 150 feet.

Mr. A. F. Dunlop is preparing plans for an addition to the Dougall Varnish Company's plant.

It is reported that the United Shoe Machinery Company will erect their additional factories at Maisonneuve rather than at Back River.

It is stated that a syndicate of English capitalists have offered one million dollars for the extensive sight of Christ Church Cathedral, facing St. Catherine street, between Union avenue and University street.

Plans for the Yorkshire Building have

been curtailed and no awards will be made in this connection until next week.

Tenders are being asked for building the St. Lawrence Flour Mills Company's new mill on the Lacine canal. Mr. George Kent will take charge of the new construction. Noted in issue of May 11th.

Plans have been prepared for a new store building to be erected on St. Catharine street for Mr. John Allan. Messrs. Ross & Macfarlane, architects.

New Liskeard, Ont.

The council has accepted Mr. Matthew's proposition to erect a grist mill here. A by-law will be submitted to the ratepayers shortly.

Ottawa, Ont.

C. P. Meredith has plans for the new building to replace Crown Hotel, corner Sparks and Bank streets. Tenders will be called very soon.

A construction permit has been issued for the James Hope Building, to be erected on Sparks street, showing the proposed cost to be \$90,000. W. E. Noffke is the architect.

Those who suffered loss by fire on the 17th inst. were as follows: G. McAllister, frame hotel; E. H. Hellard, store, etc. Total loss, \$10,000.

Prince Rupert, B.C.

The Prince Rupert Brewing & Malting Company, with capitalization of \$100,000, will at once erect a modern brewing plant.

Port Arthur, Ont.

Work is expected to be re-commenced on the new building for the Daily News. The present plan shows it to be two storeys in height, of colonial design, with massive columns from the street line to the roof cornice. There has been some talk of the building being carried up three storeys.

Quebec, Que.

It is stated that Champlain Market will be the site of the terminals for the National Transcontinental, and that the workshops may be located here. The waterfront will be considerably improved, providing wharves, elevators, etc. The customs house will likely be rebuilt on the same site.

Regina, Sask.

J. A. Goth, of the Regina Celastone Company, says his company will erect a \$20,000 building this year.

F. M. Crapper has plans for a store building. White brick is to be used.

Jas. Balfour is to build later on a large store building. Dr. A. Gregor Smith intends to build at once a brick block, 3 storeys.

Plans are being made for a big block to be erected here for the Dominion Trust Company of Vancouver.

St. Johns, Nfld.

Labrador timber lands (about 13,580 square miles) have been transferred to a syndicate of American capitalists. It is stated that pulp mills will be erected at various points to operate the timber lands extending from Byron's Bay, on the north side of Hamilton Inlet to Port Manners. Capitalization of company, \$25,000,000.

Sarnia, Ont.

Mr. J. McFee's livery barn and Mr. J. Ellison's hotel stables were destroyed by fire on the 21st inst. Total estimated loss, \$10,000.

Saskatoon, Sask.

A new hotel, to cost \$150,000, is to be erected here at once by Charles Underhill, late manager of the Flanagan House.

The plans for renovation and alterations

to the Western Hotel are being made by N. Thompson, architect.

Drs. H. & P. Stewart will have a 3 storey block erected to cost \$20,000.

J. H. Ashdown, of Winnipeg, has bought a building site (104 x 140) on which he will erect a wholesale hardware store shortly.

Norman Thompson, architect, is preparing plans for an extensive addition to Currie Bros.' block.

St. Boniface, Man.

It is learned that the Stock Yards Commission has recommended the granting of a charter to the St. Boniface Union Stock Yards Company, in which the C. P. R., the C. N. R. and G. T. P. are interested. If agreement is ratified, work will commence at once.

Vancouver, B.C.

The plans for east side of Beatty street include the erection of a \$20,000 block by Mr. J. B. Campbell.

The Western Club have a permit for club house, \$53,500.

Victoria, B.C.

A permit has been issued for addition to Empress Hotel, 68 rooms, \$125,000.

A deal involving the expenditure of over \$1,500,000 and the transfer of some 54,000 acres of timber land, the construction of 23 miles of railway and the erection of a large export saw mill on the east coast of Vancouver Island, it is stated, has been concluded. The parties interested are the E. & N. Railway Company and the American Finance Company, of New York.

Red Cliffe, Alta.

The J. M. Danelz Mercantile Company, Swift Falls, Minn., are to build a flour mill here. Cost, \$30,000.

Weyburn, Sask.

Tenders were taken by Storey & Van Egmond, architects, Regina, for erection of warehouse for Cameron & Heap, Limited.

Welland, Ont.

H. S. Peters Company, of Dover, N.J., will establish a Canadian branch here for the manufacture of clothing. The factory will be 38 x 98, brick, three storeys.

The New-Way Motor Company, of Lansing, Mich., will establish a Canadian branch factory here in the near future. Directors, W. H. Newbrough, C. D. Woodbury, and L. M. Gleason, all of Lansing.

Wakefield, Que.

The following buildings were destroyed by fire on the 17th inst.: McLaren woollen mills, McLaren grist mills, and four residences, all owned by the McLarens, of Buckingham.

Wingham, Ont.

A by-law granting C. Lloyd & Son certain privileges was carried. The firm will at once commence the erection of the new building. Cost, about \$15,000.

Winnipeg, Man.

Stevens' cooperage works in Elmwood were destroyed by fire yesterday afternoon. Loss, about \$10,000. Owner of property, E. L. Drewry.

The Sterling Bank will commence erection of their bank at the corner of Portage and Smith streets, as soon as plans are ready.

Architect Northwood has prepared plans for the Dominion Bank branch.

The warehouse of McFarlane, Son & Hodgson, Limited, was damaged by fire on the 20th inst. to the extent of about \$35,000.

(Continued on page 32)

Tenders and For Sale Department

Town of Huntsville

The Town of Huntsville offers for sale 20 Road Improvement Debentures of \$962.91 each, representing \$12,000 for 20 years at 5 per cent., particulars on request. Tenders received up to MAY 30TH.

T. M. CULLON,
Clerk, Huntsville.

21

Tenders Wanted

Sealed, bulk and separate tenders, marked "Tender," addressed to the Secretary of the Board of Education, Arnprior, will be received up to 7 o'clock p.m., MONDAY, MAY 30TH, INST., for the erection of an addition to and alterations in the High School Building, Arnprior.

Plans and specifications of the proposed work may be seen at the office of Mr. C. A. R. Dulmage, Chairman of the Contingent Committee, between the hours of 9 a.m. and 5 p.m.

Each tender must be accompanied by a cheque for 5 per cent. of the amount of the tender.

The lowest or any tender not necessarily accepted.

M. D. GRAHAM,
Secretary, Board of Education,
Arnprior, Ont.

21

City of Regina

Sidewalk Construction

Sealed tenders addressed to the undersigned City Clerk and endorsed on envelopes "Tenders for Sidewalk Construction," will be received up to 12 o'clock noon, MONDAY, MAY 30TH, 1910, for approximately 50,000 square feet of concrete sidewalk.

Particulars may be had upon application to the City Engineer.

A marked cheque for \$500.00 must accompany each tender. The cheques of unsuccessful tenders will be returned.

The lowest or any tender not necessarily accepted.

L. A. THORNTON, A. E. CHIVERS,
21 City Engineer. City Clerk.

City of Fort William, Ontario

Reinforced Concrete Bridge

Tenders will be received by the City Clerk up to 5 o'clock p.m. on FRIDAY, THE 3RD DAY OF JUNE, 1910, addressed to the Chairman of Works Committee, for the construction of a reinforced concrete arched bridge of 50-foot span, with pile foundations, to be used for double-track street railway, vehicular and pedestrian traffic, crossing the Neebing River on Simpson Street.

All tenders must be on the special form of tender, accompanied by an accepted cheque for a sum equal to 10 per cent. of the amount of the tender, with the envelope sealed and endorsed "Bridge Tender."

Plans, specifications and general conditions may be seen and form of tender obtained at the City Engineer's office.

The lowest or any tender not necessarily accepted.

H. S. HANCOCK, Jr.,
City Engineer.

21

To Architects Competition Plans

The Board of Management of Knox College, Toronto are desirous of obtaining plans for their proposed new College Buildings to be erected on St. George Street to the westward of the Lawn of the University of Toronto.

Conditions of Competition, with all information, can be had on application to the Rev. John Sommerville, Confederation Life Building, Toronto.

Plans must be sent by the FIRST OF NOVEMBER NEXT.

28

Tenders For Crushing Stone

Sealed tenders, addressed to the undersigned and endorsed "Tender for Stone" will be received up to 12 o'clock noon, on MONDAY, MAY 30TH, 1910, for crushing and delivering on the road about 4,000 cubic yards of stone, the contractor to provide all necessary machinery, etc. The stone for crushing may be obtained along the West Branch of the Humber River on lot No. 6 in the 8th concession, and lots Nos. 7 and 8 in the 9th concession of the Township of Toronto Gore. The road to be improved is the 9th Line (Gore Road), in said township, commencing at the county line between Peel and York, and extending northerly. The tenders will be opened at the office of the Clerk of the County of Peel, Brampton, at 2 p.m. on the above date.

For further particulars apply to the undersigned.

The lowest or any tender not necessarily accepted.

J. G. JULIAN
Reeve of Toronto Gore Tp,
Castlemore P.O.

21

Tenders for Paving

The City of Saint John Invites Tenders for

Paving, etc., in Main, Pond, Smythe, Nelson and St. John streets, according to plans and specifications to be seen and forms of tender obtained at the office of the City Engineer, Room No. 5, City Hall, duplicates of which are on file in the office of the "Contract Record," 504 Confederation Life Building, Toronto.

A cash deposit must accompany each bid, the amount being as stated in each specification.

The city does not bind itself to accept the lowest or any tender.

All tenders must be addressed to the Common Clerk, Room No. 3, City Hall, who will receive bids until noon of TUESDAY, THE 31ST DAY OF MAY, A.D. 1910.

ADAM MACINTYRE, WM. MURDOCH,
Comptroller. City Engineer.

St. John, N.B., May 7th, 1910.

21

Tenders for Boilers

Sealed tenders addressed to the undersigned and marked "Tender for Boilers," will be received until noon on SATURDAY, JUNE 11TH, 1910, for two Return Tubular Boilers, 72 inch by 18 feet, to maintain a working pressure of 150 pounds per square inch.

Specification may be obtained from the City Engineer on application.

C. O. DAVIDSON,
City Clerk.

1910.

22

Dated at Prince Albert, Sask., May 17th,

City of Regina

Province of Saskatchewan

Sewage Disposal Works

Sealed tenders will be received until noon, MONDAY, JUNE 6TH, 1910, for the construction of Sewage Disposal Works for the City of Regina. Tenders must be accompanied by an accepted bank cheque or other satisfactory deposit for the amount of \$5,000.

The deposits of unsuccessful tenderers will be returned as soon as the contract is signed.

The right to reject any or all tenders or to waive any irregularities therein is to be at the discretion of the City authorities.

Plans, specifications, forms of tender and all information may be obtained on application to the City Engineer's office, Regina.

A. J. McPHERSON, C.E., A. E. CHIVERS,
Consulting Engineer. City Clerk.

Regina, Sask., May 12th, 1910,

22



Temiskaming and North- ern Ontario Railway Commission

Sealed tenders addressed to the undersigned, and endorsed on envelope "Tender for Nipissing Junction Spur," will be received up to 12 o'clock, noon, JUNE 8TH, for Clearing, Grading, Embankment Protection, Driving of Piles, Building of Culverts and Laying of Tie, that may be required in connection with the construction of a branch line for the T. & N. O. Railway, between North Bay and Nipissing Junction.

Plans and specifications may be seen at the office of the Chief Engineer, North Bay, and the Secretary-Treasurer, 25 Toronto Street, Toronto.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-Treasurer of the Commission, for 10 per cent. of the amount of the tender, must accompany each tender.

Lowest or any tender not necessarily accepted.

A. J. McGEHEE, Secretary-Treasurer,
25 Toronto Street, Toronto, Ont.

Dated at Toronto, May 18th, 1910.

Papers inserting this advertisement without authority will not be paid for same.

22

To Builders and Contractors

Sealed, separate or whole, tenders will be received by the undersigned up to six o'clock p.m. of SATURDAY, JUNE 4TH, 1910, for all the work and material (with hot-water heating) required in the erection of a Public Library Building at Orillia, Ont.

Plans, specifications and particulars may be had at the office of architect, on and after Monday, 23rd of May.

The lowest or any tender not necessarily accepted.

W. H. OROKER,
Architect. 22

Orillia, May 18th, 1910.

Tenders

Sealed tenders for brick veneered Sunday School room, consisting of two storeys and basement, for Methodist Church, Parry Sound, will be received by the undersigned until noon on JUNE 10TH, 1910.

Plans and specifications may be seen at my store, James Street, or at the office of J. S. Russell, Stratford.

The lowest or any tender not necessarily accepted.

GEO. ROWLISON,
Recording Steward. 22

Parry Sound, May 18th, 1910.

Bridge Tenders

Tenders will be received up to JUNE 3RD for the following work in the northern part of the County of Wellington:

1. Fifty-foot steel bridge and abutments.
2. Concrete abutments for two bridges.
3. Concrete box culvert, 10-foot opening.

Plans, etc., may be seen with Henry Barkwell, Esq., Goldstone, and full information from the engineers.

BOWMAN & CONNOR,
36 Toronto Street, Toronto, 21

City of Fort William**Sewers**

Tenders will be received by the City Clerk up to 5 o'clock, p.m., on FRIDAY, THE 3RD DAY OF JUNE, 1910, addressed to the Chairman of the Works Committee, for the construction of the following sewers:

Contract 10-11.—A reinforced concrete sewer, 5 feet 9 inches internal diameter, on Francis Street (Ford to Edward), 1,380 feet, more or less; a 4-foot 6-inch reinforced concrete sewer on Edward Street (Francis to Amelia), 400 feet, more or less.

Contract 10-12.—A tile sewer on Amelia Street (Ford to Brown).

Contract 10-13.—A concrete sewer on May Street (Dease to Myles); a concrete sewer on Dease Street (Brodie to May); a concrete sewer on Brodie Street (Dease to Leith).

Contract 10-14.—A concrete sewer on McKenzie Street, (Simpson to Rowland); a concrete sewer on Rowand (Simpson to Pacific).

All tenders must be on the special form of tender accompanied by an accepted cheque for a sum equal to ten per cent. of the amount of the tender, with the envelope sealed and endorsed "Sewer Tender—Contract No...."

Tenders of each contract must be in separate envelopes and accompanied by a separate cheque.

Plans, specifications and general conditions may be seen and forms of tender obtained at the City Engineer's office.

The lowest or any tender not necessarily accepted.

H. S. HANCOCK, Jr.,
City Engineer. 21

Dated at Fort William, May 18th, 1910.

To Plumbing and Heating Contractors

Sealed bids addressed to the undersigned will be received up to noon of WEDNESDAY, JUNE 1ST, 1910, for the plumbing and steam heating, exclusive of tile drains and gas fitting, required in the alterations and addition to the Royal Victoria Hospital, Barrie, Ont.

The lowest or any bid not necessarily accepted.

Plans and specifications may be seen at the office of the architect.

F. S. Baker, architect,
Traders Bank Bldg., Toronto. 21

Tenders

Sealed tenders, addressed to either of the undersigned, will be received until noon on WEDNESDAY, JUNE 8TH, 1910, for the construction of a 50-foot reinforced concrete arch bridge over Kettle Creek, in the Village of Belmont, for the Counties of Elgin and Middlesex. Plans and specifications may be seen at the offices of the undersigned. A marked cheque for the sum of \$200,000 payable to either the Treasurer of Elgin or Middlesex, must accompany each tender as a guarantee of good faith. The committee reserves the right to reject any or all tenders.

JAS. A. BELL, County Engineer,
St. Thomas, Ont.

CHAS. TALBOT, County Commissioner,
London, Ont.

St. Thomas, May 21st, 1910. 22

City of Regina

Province of Saskatchewan

Sewers

Sealed tenders will be received up to noon, MONDAY, MAY 30TH, 1910, addressed to the undersigned, for each of the following contracts for the construction of Storm Water and Sanitary Trunk Sewers and Disposal Works:—

Contract A. The construction of sewers as follows:

- 10761 feet, 30-inch.
- 3248 feet, 48-inch.
- 2869 feet, 5-foot 6 inches.
- 8392 feet, 6-foot.

Contract B. The supply of 11,500 barrels of Portland Cement for the above sewers.

Contract C. The supply of reinforcement for the sewers.

Contract D. The supply of sewer pipe for branches from the sewers.

Contract E. The supply of manhole covers and other special castings.

Contract F. The supply of 700 cords of Field Boulders for the Percolating Filters.

Contract G. The supply of 3,500 barrels of Portland Cement for the Disposal Works.

Tenders for A. and F. must be accompanied by an accepted bank cheque for \$10,000 and \$2,500 respectively or other satisfactory deposits for the above amounts.

The deposits of unsuccessful tenderers will be returned as soon as the contracts are signed.

The right to reject any or all tenders or to waive irregularities therein is to be at the discretion of the City authorities.

Plans, specifications, forms of tender and all information may be obtained on application to the City Engineer's office, Regina, Saskatchewan.

A. J. McPHERSON, C.E., A. E. CHIVERS,
Consulting Engineer. City Clerk.

Regina, Sask., May 7th, 1910. 21

Board of Education

TORONTO

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received for

- Enlargement of Huron Street School.
- Alterations to Malvern Avenue High School.
- Duke Street and Crawford Street Schools.
- Hardware.
- Garden Hose.
- Lawn Mowers.
- Floor Oil and Turpentine.

until FRIDAY NOON, MAY 27TH, 1910, and for

- Erection of New School Building, Elizabeth Street;
- Enlargement of Roden School and York Street School,

until MONDAY NOON, MAY 30TH, 1910.

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in said specifications and forms of tender. The lowest or any tender not necessarily accepted.

W. H. SMITH, W. C. WILKINSON,
Chairman of Committee. Secretary-treasurer. 21

**Notice to Architects**

Competitive designs for a Residence for the Lieutenant-Governor of the Province of Ontario, proposed to be erected on Blair Street, in the City of Toronto, will be received by the undersigned at the Department of Public Works, Parliament Buildings, Queen's Park, Toronto, up to noon on the 15TH DAY OF JULY NEXT.

Information and particulars as to the extent and character of the said designs can be obtained upon application to the office of the Secretary of Public Works.

Subject to such terms, conditions, etc., the following premiums are offered: For the design most approved \$1,000.00 For that approved as second in merit 500.00

The designs for which said premiums will be awarded are to be selected and approved of by the undersigned, and the same are thereupon to become the property of the Province.

J. O. REAUME,
Minister of Public Works.

Department of Public Works, Ontario
Toronto, May 12th, 1910. 23

Positions Wanted

Advertisements under this heading are not a word per insertion. Six No. ten cents extra.

WANTED POSITION AS SUPERINTENDENT, to take charge of concrete or railway construction work. I am thoroughly experienced in this line of work. Address, Box 978, "Contract Record," Toronto, Ont.

CIVIL ENGINEER, Good Organizer, full control of all grades, and labor. Just completed large Water Power Development six months ahead of time, is open for engagement—Box 981, CONTRACT RECORD, TORONTO. 23

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE CHEAP—One hundred thousand feet, well-seasoned white pine timber, part old Gilmour Mill; six thousand feet cedar; eleven thousand feet hemlock; four hundred feet white oak; all in various sizes, six to sixteen inches, and lengths, six to thirty feet. For particulars apply—**F. W. ARMSTRONG**, Trenton, Ont. 21

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—TRAVELLING SALESMAN to represent firm manufacturing bank, office and store fittings. Must be competent to make sketches, etc. Man having experience in architect's office preferred. Apply, Box 974 "Contract Record," Toronto. TF

Business Buildings and Industrial Plants

(Continued from page 29)

James McClement has been awarded the contract for the brick work of the block being built by J. B. Curran on Rosser avenue.

AWARDED.

Montreal, Que.

Contractors for erection of a canned meat factory for Mr. J. D. Villeneuve, to be erected on Papineau avenue, have been awarded as follows: Masonry and brick work, J. Major; carpentering, B. Brouillette. L. R. MontBrient, architect.

General contract for the alterations and additions to the factory on Havre street, for the Montreal Light, Heat & Power Company has been awarded to Mr. C. E. Deakin, general contractor.

The contract for the masonry and brick work in a five storey factory on Partenais street for the Dominion Oilcloth Company, Limited, has been awarded to Eusebe Meloche, 304 Eighth avenue, Rosemount. This building will be of fireproof construction and will cost approximately \$80,000. Messrs. Hutchison, Wood & Miller, architects.

Norwood, Man.

Messrs. Saul & Irish have the contract for the erection of the Bank of Hamilton branch here at \$30,000. W. Fingland, architect, Winnipeg.

Roland, Man.

W. H. Rosewarne, Winnipeg, has the contract for the erection of Bank of Hamilton branch here. Architect, W. Fingland.

Power Plants, Electricity and Telephones

Barrie, Ont.

The Monarch Railway is seeking a 25 year franchise to run its lines along certain streets here, connecting with Toronto; construction to commence within 2 years.

Calgary, Alta.

The \$70,000 electric light plan extension by-law was carried by the ratepayers.

Fort William, Ont.

Tenders are being called by street railway construction department until June 2nd for the supply of the materials needed in the construction of railroad. Specifications at City Engineer's office. A. L. Farquharson, construction superintendent.

Garvin, Sask.

Tenders will be received until July 15th for the construction of a telephone line.

W. Geier Switzer, secretary-treasurer, Arm River Rural Telephone Company.

Hull, Que.

Fire destroyed residences here to the value of about \$10,000.

Kinston, Ont.

The Northumberland Durham Power Company has made a proposition of cheap power to the Board of Trade here.

New Westminster, B.C.

Plans of the new B. C. E. R. depot have been prepared and tenders will be called shortly. Cost, \$80,000.

Ottawa, Ont.

The Railway Commission is sending out an order requiring all street railways under its jurisdiction to equip their larger cars with air brakes.

Portage la Prairie, Man.

The proposition of C. Chamberlain, of the Great Fall Power Company to furnish power to the city for a term of 30 years, etc., was accepted.

Quebec, Que.

Tenders will shortly be invited for the construction of a concrete dam and power house at St. Alban. J. F. Guay, consulting engineer, Morin Building, Quebec.

Saskatoon, Sas.

This city has signed a contract with the Saskatoon Power Company for the harnessing of the South Saskatchewan river, 14 miles below the city.

Toronto, Ont.

Messrs. Jacobs, Davies & Forgie, engineers, of New York, will probably be chosen as consulting engineers in connection with the tube railway question.

Victoria, B.C.

Tenders addressed to the Minister of Public Works will be received until June 6th for the construction of a transmission line for the carrying of electricity to the Hospital for the Insane at Coquitlam. Plans, etc., at government offices. F. C. Gamble, Public Works Engineer.

Yorkton, Sask.

City Secretary-Treasurer is authority for the statement that the question of constructing municipal electric light plant has been discussed, but nothing further has been done.

AWARDED.

Fort William, Ont.

The Carter-Jones Electric Company, of this city, will commence work shortly on a telephone system in Oliver township. There will be 100 miles of wire strung and 800 poles placed in position.

Montreal, Que.

The contract for the erection of a country house at Pincourt, Que., for Mr. J. W. Fontaine has been awarded to Mr. J. St. Maurice. Messrs. MacDuff & Lemieux, architects.

The contract for the bungalow to be erected at Quinchien, Que., for Mr. L. A. Jacques has been awarded to Mr. J. St. Maurice. Messrs. MacDuff & Lemieux, architects.

The contract for the country house at St. Jeanne, Ile Perrot, Que., for Mr. L. Lemieux, has been awarded to Mr. J. St. Maurice. Messrs. MacDuff & Lemieux, architects.

Prince Rupert, B.C.

James Milne, consulting engineer, of Vancouver, has let contracts for steam and electrical apparatus required by this city. The awards were as follows: Boilers, pumps and piping, Goldie & McCulloch

Company, Galt, Ont.; surface condenser, circulating and air pumps, John Inglis Company, Toronto; exciter and switchboard, Canadian Westinghouse Company, Hamilton, Ont.; cross compound engines, Robb Engineering Company, Amherst, N. S.; alternators and arc apparatus, Canadian General Electric Company, Toronto. The total cost of the plant will reach about \$60,000.

Vancouver, B.C.

M. P. Cotton received the contract from the B. C. E. R. for clearing and grading the new line from Burnaby to Vancouver, a distance of 7 1-2 miles. Expenditure, over \$150,000.

Vancouver, B.C.

The tenders for lighting system on streets here were recently as follows: For the electric work, concrete work and erection of standards complete, ready for service: Electrical Construction Company, Limited, \$53,317; Frank Darling & Company, Limited, \$55,350; the Hinton Electric Company, Limited, \$46,908. For the concrete work and erection of the standards alone: M. P. Cotton & Company, Limited, laying of ducts in concrete sidewalks, 40c per lineal foot; on boulevards, 30c per lineal foot; \$5 per junction box and \$10 per foundation and setting of standards. For the lamp standards: The Canada Foundry Company, Limited, \$74 per standard; Frank Darling & Company, \$56.50; Letson & Burpee, \$54.75; Earle & Company, \$48.50; B. C. Supply Company, \$56; Ross & Howard, \$60; Walter McFarlane & Company, Glasgow, \$61.75; Flour City Ornamental Iron Works, Minneapolis, \$78. As the Hinton Electric Company's tender covered the entire electrical and concrete work, including erection of the standards, and the lowest by \$6,409, the contract for all the work was awarded to that firm. Messrs. Earle & Company's price for the lamp standards was \$6.25 per standard lower than the second lowest bid, and it was decided to have them supply the standards.

Welland, Ont.

Contractors Patton and Peacock have secured the contracts for the masonry and carpenter work respectively on a \$20,000 brick mansion near Jordan.

Miscellaneous

Port Colborne, Ont.

Tenders are being called until June 3rd by the Department of Railways and Canals, Ottawa, for Port Colborne entrance improvement. Plans, etc., at Department of Railways and Canals, Ottawa, and at the office of the superintending engineer, St. Catharines. L. K. Jones, secretary.

AWARDED.

Calgary, Alta.

The contract for an extension of the C. P. R. irrigation system into the eastern section of the irrigation block has been awarded to James McDonnell & Company, of Vancouver, with whom are associated Winter, Boomer & Hughes and Grant, Smith & Company, all of Spokane, Wash. The contract is for \$5,230,000, and includes canals calling for excavation of twenty-eight million cubic yards of earth. The contract price is about a quarter of a million under the estimate of the C. P. R., and carries a time limit of five years.

Medicine Hat, Alta.

A. K. Grimmer, M.Sc., City Engineer, writes that the contract for steam road roller was awarded to J. I. Case Company, for \$3,050; that for concrete mixers to the Canada Foundry Company at \$1,325. Mussen's tender on distributing wagons was accepted at \$257 each.

Contract Record

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Brick and Other Constructive Material

Perhaps no problem ever provided the building community with more food for reflection than that of a judicious and satisfactory selection of constructive material. In view of the successes of concrete in every department during recent years, the subject is of particular interest at the present time. We do not hold a brief for brick, but we wonder whether the various charges that are laid against it could really be sustained if a reliable investigation were to be made.

History indicates that considerations of economy and availability first led to the making of brick in any considerable quantity, and that the early Romans, who were both economical and practical, developed their manufacture and that of terra cotta and utilized the material in the remarkable structures of that day. A material possessing qualities of pliability and durability and offering in addition the many other advantages of burnt clay, which rendered it susceptible of almost universal adaptation, once thoroughly understood, inevitably became the building material of the epoch, and its favor has scarcely diminished in modern times. Indeed, it appears doubtful if there is any material which constitutes a larger factor in the building world of to-day. Other materials have been proposed from time to time and have, in fact, been adopted under certain conditions and for certain uses, but this fact, in the opinion of many, has served rather to stimulate and increase the appreciation of buildings whose facades are constructed of brick. That a well designed building built of brick selected with discriminating taste, and laid with the skill of an artisan, possesses a charm beyond that of one constructed of almost any other material will surely be conceded. Of course, there are certain monumental buildings for which no material appears suitable except granite, marble or limestone—buildings which seem to demand a more noble and precious material than burnt

clay for their proper execution, but this is probably due to the fact that their prototypes were designed for execution in such material. It would be equally inappropriate or impossible to construct some of the cathedrals of the middle ages of stone. A design in the fullest sense is more than a portrayal of forms. It includes a selection of materials, either consciously or unconsciously. This fact has not always been sufficiently recognized, and it is one of the most certain indications that architecture is receiving intelligent study, to observe the increased attention given to the selection of materials of construction during recent years.

Day Labor Work

Of the various claims that have been urged in its favor by the exponents of the day labor system of doing construction work, there are two which are just now popular. The first is the difficulty of drawing contracts to cover unknown conditions, and the second is the flexibility of the day labor system in allowing changes in plans, etc., says a writer in "Engineering-Contracting." Just to how much does either of these claims amount? If we may believe the advocates of the day labor system, they amount to enough to warrant day labor construction in very many instances. Neglecting all other phases of the case between the day labor and the contract systems of doing construction work, let us consider these two.

Stated briefly, the propositions we have to consider are: First, it is exceedingly difficult to draw contracts which will cover the multitude of unforeseen obstacles and contingencies to be met on certain classes of work. Second, plans can be modified or even radically changed after work is begun if the work is being done by day labor, while a similar procedure under contract work is, customarily, expensive and difficult. If this is a fair presentation then these two statements are tantamount to saying either that engineers are not capable of determining and predicting the conditions of work with any degree of confidence, or that engineering and legal acumen are insufficient to devise contract requirements for meeting undetermined conditions or that the engineer has not given the work careful and competent investigation and must supply the deficiency by leaving the way open for changes in plan to meet the conditions as they become known, or that contractors as a class are not open to fair business propositions. To which of these alternatives do engineers wish to subscribe?

How frequently do we meet with indeterminate conditions in planning construction work? Undetermined conditions are common enough and occasionally without doubt circumstances arise which involve so much uncertainty as to conditions under which work is to be prosecuted as to make it difficult to prepare satisfactory specifications to cover them; but such occasions are rare. Take, for example, underground work, which as a class is commonly admitted to be particularly subject to uncertainties; how often has it been found impracticable to cover it satisfactorily by contracts and specifications. The Boston and New York subways, the Pennsylvania and other railway tunnels under the Hudson and East rivers, the water supply tunnels of the Metropolitan Water and Sewerage Board at Boston and the Catskill aqueduct work at New York, were all constructed by contract and no unsurmountable difficulty was found in drawing satisfactory agreements and specifications. Other examples can be cited by scores of work quite as complex if one needs them. The truth is that we do not. There is not the slightest impossibility or even very serious difficulty in eliminating uncertainties to such an extent in prac-

tically any piece of construction work that the contract forms in common use will provide amply for all contingencies. In the rare case where they will not, any reputable contractor will meet the engineer half-way in an adjustment of differences. It is a popular notion, we know, to believe differently, but it is a callow notion.

Turning now to the argument of the flexibility of the day labor system in allowing for changes in plans, etc., we must credit it with some force. Conditions sometimes develop which make it desirable or even necessary materially to modify or radically change the plans upon which a contract has been based. Such changes are always unfortunate and usually expensive in contract work, the contractor being in the more advantageous position in the negotiations for the price to be paid for the work under the revised plan. If, on the other hand the work is done by day labor, changes of any kind may be made, at any time, often without unduly increasing the cost of the work and sometimes even materially reducing it. Admitting these things, we may well ask: How often are changes in plan actually the necessity of indeterminate conditions, and how often are they merely the result of insufficient and perhaps inefficient study of the problem before the plans were prepared for its solu-

tion? It is a very common complaint of engineers that they are often prevented from making the thorough preliminary studies that are essential to developing the most efficient and economical plans. Will not the fact of the possible increase in the cost of construction, resulting from changes in the proposed plans after the letting of contracts, lead to more careful and mature study, and hence to an ultimate saving in cost and gain in efficiency? Conversely, may the admitted greater flexibility in this respect of the day labor system of work not be a direct encouragement of hasty and careless preliminary studies? These are legitimate questions and we have not seen them answered convincingly from the day labor advocate's standpoint.

To sum up most favorably, while there may be an occasional piece of work in which the considerations stated may count for something, they furnish a very weak reason for employing generally a method of doing work which experience has proven to be excessively expensive. It is cost that determines the efficiency of a method of doing work and cost is so preponderantly in favor of the contract system as compared with the day labor system that the latter falls little short of economic absurdity.

Design of Small Intermittent Sewage Filters

Satisfactory Solution for Communities of less than 10,000 Population—Suggestions Regarding Sedimentation Tanks, Dosing Chamber and Other Matters*

By Paul Hansen

Where conditions are favorable, the plant should comprise four principal parts: a screen chamber, sedimentation basins, a dosing chamber equipped with automatic dosing apparatus, and at least three filters.

The screen chamber need be only a comparatively small structure. For plants having capacities as high as 500,000 gallons per 24 hours, the chamber need be made only large enough to give convenient access, say 5 feet wide by about 12 feet long. In this chamber should be placed a screen, or preferably two screens, held in inclined grooves sloping at an angle of about 60 degrees, with the horizontal toward the incoming sewage. These screens should be made up of substantial iron bars supported in a frame at the ends only, and vertically placed. Such construction minimizes the difficulty of cleaning the screen by means of a rake. There is some difference of opinion as to the width of open space that should be permitted between the bars of the screen, but $\frac{3}{4}$ -inch openings seem to give satisfactory results. A good arrangement is to use two screens, one with 1-inch openings and the other with $\frac{1}{2}$ -inch openings, the finer screen being placed beyond the coarser. Beyond the screens in the screen chamber should be placed stop-plank grooves, in which may be placed a weir for measuring purposes if desired. The lower end of the screen chamber may be occupied by two gates, one leading to the sedimentation tanks and the other leading to a bypass to the stream. The actual minor details of the screen chamber, of course, permit of great variation.

Sedimentation Tanks

The sedimentation tanks should be rectangular in shape, have a depth to the flow line of not less than 6 feet, and have a capacity of about 10 hours' flow, based on the nominal capacity of the plant. In order to pro-

vide some elasticity in the operation of the sedimentation tanks, due to variations in sewage flow, it is well to divide these tanks into several independent units. A convenient method is to employ two units, one having twice the capacity of the other. This arrangement permits of using three sedimentation periods having a ratio of 1 to 2 to 3. The tanks should have a length of at least twice the width for the purpose of inducing a more even flow and facilitating the deposition of sludge. There should be placed at the inlet and outlet end devices for distributing the inflow and outflow across the width of the tank. Baffles variously placed with the tank are sometimes of advantage, but in the present stage of the art it is not possible to recommend as best any specific arrangement.

One very important point in the design of sedimentation tanks is to provide ample slope in the bottom of the tanks for sludge drainage. A slope of 5 per cent., if obtainable, is none too much. Provision should be made for receiving sludge on a so-called sludge bed which is constructed essentially like intermittent filters (to be described later), and should have an area capable of receiving the entire contents of the larger sedimentation tank without exceeding a depth of about 9 inches. The matter of covering the sedimentation tanks is a much mooted question. In general, it may be said that where the purification works are far removed from habitations and occasional odors will not prove objectionable, covers are not necessary. Where the plant is near habitations or in plain view of public highways, covers are certainly advisable. The covering, however, has nothing to do with the successful operation of the sedimentation tanks. A covering, of whatever design, should permit of ready accessibility to all parts of the interior.

There are a few small plants of recent construction in which sedimentation tanks having comparatively short

* Extracted from paper read before the Ohio Engineering Society

periods of flow are used. These tanks are constructed with hopper bottoms, and are preceded by arrangements for thoroughly screening the sewage. While such tanks give excellent results, they require considerable attention for the reason that the sludge must be discharged about once daily in order to avoid ebullition due to septic action, and moreover, the screening process must be frequently looked to. For these reasons Mr. Hanson, believes that this type of sedimentation tank is not the most satisfactory for small installations.

Dosing Chamber

The dosing chamber should be of sufficient capacity to discharge a dose of sewage which will cover one of the filter units to a depth of between 2 and 3 inches. It is not considered good practice to exceed 3 inches. The discharge of the dosing chamber may be, of course, diverted to the various filters by hand, but in the case of small purification plants this is not practicable for the reason that caretakers cannot be kept constantly on the ground. It is therefore preferable to install some form of discharging device which will automatically discharge the contents of the chamber on to the several filters in rotation. It should be borne in mind that all types of automatic apparatus may at times get out of order, and therefore should have the periodic attention of an intelligent caretaker. The depth and size of the dosing chamber is governed by local conditions, principally the head available. It is scarcely practicable, however, to construct a dosing chamber of less depth than 2 feet. The dosing chamber should be provided with a cover of some sort for the protection of the automatic apparatus. The most preferable form of covering is a well-lighted superstructure.

The intermittent filters may be prepared in a great variety of ways. The simplest form is obtained in those cases where a suitable filtering material is found in situ. It then becomes necessary to level the ground, build dividing embankments, and place rows of underdrains at a depth of not less than 4 feet. Suitable distributing apparatus may be built for distributing the sewage over the several filters. In the great majority of cases, however, especially in Ohio, it is necessary to transport the filtering material. In such cases, owing to the greatly increased cost, it is of advantage to construct the beds as substantially as possible in order to increase their effectiveness, thereby prolonging the usefulness of the plant.

Concrete Walls Better Than Earth Embankments

The best method of dividing the area into beds is by means of concrete walls. This has the advantage over earth embankments in that the material composing the embankments will not be washed on to the surface of the sand. Further, they present a much neater appearance and do not greatly exceed the cost of embankments. The bottom of the beds may be prepared in the natural soil and they should be carefully graded toward the lines of underdrains. The distance between lines of underdrains may be made about 15 feet. The underdrains should be laid carefully in regard to line and grade and should be made of vitrified sewer pipe with bell ends. The space between the socket of one pipe and the spigot of the next adjacent pipe should be from $\frac{3}{8}$ to $\frac{1}{2}$ -inch, thus permitting the free entrance of water. Each joint of the underdrains should be carefully surrounded by gravel, varying from coarse adjacent to the joint to fine at a foot or so away from the joint. The underdrainage of the beds should be supplemented by a layer of gravel covering the entire bottom of the filter. This gravel should be of sufficient thickness to thoroughly cover the underdrains and should have a mini-

mum thickness between the lines of underdrains of about 3 inches. The size of the gravel should vary from about $\frac{1}{2}$ to $1\frac{1}{2}$ -inch. The upper surface of the gravel layer should be accurately level. In order to prevent the superincumbent sand from working its way down into the gravel it is advantageous to top off the gravel layer with an inch or so of very fine gravel, say such as would have diameters varying from $\frac{1}{8}$ to $\frac{1}{4}$ -inch. On top of the gravel should be placed a bed of sand having a thickness of not less than 3 feet. This sand should be practically free from loam, calcareous and argillaceous matter; in short, it should be a clean, silicious sand. The exact size of the sand is not a matter of great importance, but, if available, a sand should be used having a uniformity coefficient not exceeding 3, and an effective size which may vary from 0.20 to 0.50 mm.

A bed constructed in the manner above indicated will produce an excellent effluent with a population tributary of about 1,000 per acre, which, under normal conditions, should represent a sewage flow of about 100,000 gallons per day. It is not always possible to obtain a filtering material of the above-described quality, and when this is the case somewhat larger areas must be used. But under no circumstances should a material be used which is of such poor quality as to have a tendency to cake and crack. In certain localities where sand is very expensive it has been found feasible to obtain satisfactory results by the substitution of fine cinders. In such cases, however, great care must be exercised in obtaining a suitable grade of material. It seems on the whole that locomotive cinders are most preferable in point of perosity and durability. The surface of the sand or other filtering material should always be maintained accurately level so as to promote an even filtration over all parts of the bed. In the past, distribution troughs having a large number of openings have been in considerable favor, but recent experience seems to indicate that some means whereby the sewage may be conveyed to a few points on each filter is preferable. Perhaps it would not be wise to have more than 2,500 square feet of filtering area supplied at one point of discharge.

The Number of Filters

The number of filters to be used is a matter that requires some consideration. As already noted, there should be a minimum of three, which permits of two beds being used alternately while the third is remaining at rest for cleaning or other purposes. As plants increase in size this small number of beds becomes somewhat impracticable. Moreover, it is advisable to have the area divided up in smaller units so that at no time will there be a large percentage of the plant lying idle. There is also a limit to the number of beds that may be used, imposed by the increased complexity of the automatic apparatus. A convenient division for a one to four-acre plant is about six beds; for larger plants more beds are desirable.

Local conditions sometimes make it necessary to vary somewhat the general designs described above. Such variations are almost always imposed by local topography. In this connection there are two principal cases where the plant must be built under conditions permitting the least possible loss of head, and where pumping becomes necessary.

The head lost by sewage passing through a purification plant of the intermittent sand filter type may, of course, be somewhat reduced by giving the dosing chamber the minimum depth practicable. There are cases, however, where a dosing chamber cannot be installed at all. This difficulty may be overcome, though at the expense of considerable awkwardness in the design. It

will be necessary in the first place to divide the filtering area into a large number of small beds, each bed being of such size that the normal flow of sewage will cover its surface to a depth of, say, about 2 inches, within half an hour, thus acting in effect as a dose discharged from a dosing chamber.. Also special effort should be made to obtain a good distribution of the sewage. An automatic apparatus for diverting the sewage to the various beds would be extremely complicated on account of the large number of beds involved. It is possible, however, to arrange the beds in groups of three or four each, whereby it becomes practicable to design an automatic diverting apparatus requiring but 8 or 10 inches loss of head, which will divert the sewage in rotation to each of the several groups. The discharge of sewage on the several filters of a group may be regulated from a suitably placed manhole by means of hand-operated gates. The procedure would then be to have the attendant change the valves in the manholes tributary to the beds of each group once or twice daily.

Pumping Installation

Where pumping is necessary there are two points at which the pumps may be conveniently placed, between the screen chamber and sedimentation tanks, or at the outlet of the sedimentation tanks. The preferable location in any specific instance will, of course, depend on local conditions. If the former method is selected it is advisable to secure a very thorough screening of the sewage before it is admitted to the pumps. The most convenient pumping installation for small sewage purification plants is one consisting of electrically operated centrifugal pumps. While such an installation should, of course, receive the daily attention of a caretaker, yet the pumps may be automatically thrown in and out of service by means of reliable devices.

In order to produce a fairly even flow of sewage through the sedimentation tanks, it is advisable to install pumps of small capacity and in multiple, so that pumping will be continuous. During periods of small flow perhaps only one pump will be in service, whereas during periods of high flow two, three or four pumps may be in operation. It is highly advantageous to place the pumps in a dry well where they are readily accessible for inspection and repair.

Where the pumping station is placed beyond the sedimentation tanks somewhat different conditions are encountered, for in this case fine screening is not necessary, the pumping should be intermittent rather than continuous, and therefore the pumping machinery may consist of a few units of large capacity. The pump well of such a plant may advantageously serve as a dosing chamber, that is to say, the pumps should be so adjusted that they will not pump until a sufficient quantity of sewage has accumulated to flood one or more filters. Then the sewage should be removed rapidly until the pump well is empty. It is not practicable to operate such an installation electrically unless the power is obtained from a large station. On the other hand, the fact that the pumping need be done only intermittently renders other forms of motive power feasible without requiring the constant presence of an attendant. For example, an internal combustion engine may be used. Aside from the difference in pumping machinery and capacity of reservoir, a pumping station placed beyond the sedimentation tanks need not differ materially from one placed before the sedimentation tanks.

Vancouver, B.C., is rushing municipal work this season. About 1,500 men are reported to be on the city's pay roll.

Hot Water Heating at Boiler Level

A preference in heating work can be secured by the man who knows what can be done with different kinds of heating systems, and it is strange to me that more men do not show their customers how rooms in their buildings on the same level with the heating apparatus can be satisfactorily heated. Frequently portions of buildings available for transacting business or doing work cannot be used during the cold season from the inability to make it comfortable. Regardless of the kind of heating system used, these rooms can be heated if the heating contractor knows how to do it.

It is my intention to deal in this article with hot water heating, but before passing to it I want to state that in numerous instances I have taken a pipe from the top of a warm-air furnace and run it along the ceiling and attached it to a register in the side wall of a room on the same floor on which the furnace stood. This brought the hot air for heating the room in near the ceiling, and that is the place where the hot air always rushes wherever the point of delivery may be. Then I have taken a return pipe from a register in the floor of the room on the furnace level and carried it to the furnace so as to keep up a circulation.

With steam heating apparatus, hot water radiators may be placed on the side walls at about the boiler level and the condensation returning from radiators on the upper floors can run through these radiators to heat them. If a small pressure is carried on the steam system the radiators may be used for steam, with a return trap to throw the condensation back into the boiler, or a steam loop may under some conditions be used for the same purpose.

It adds to the prestige of the man in the heating business to be able to do these things for his customers. There is as little difficulty in heating rooms on the same level when hot water is used and it has enabled me to make sales of heating apparatus where I otherwise would not have had the business. My customers have derived comfort and had the advantage of using every portion of their building for whatever work their employees might be engaged in. It is not necessary to carry the hot water up from the boiler to radiators on the floor above it and let the return water from these radiators circulate down through those on the lower floor if the mains to the radiators on the lower floor are of ample size to facilitate circulation and if they are correctly aligned, so the water will move through them with sufficient rapidity to do effective work.

At present I am heating a store building in which the basement is used for packing and shipping and some clerical work. The mains for the radiators upstairs are run independently of the work to be done on the boiler level, and the piping for the radiators on the first floor is done independently of the fact that the heater is connected with radiators in another part of the building. The piping is arranged to prevent the mains from becoming air bound and the work is giving satisfaction.

In another case a much larger building of several storeys is heated with a hot water system and the entire basement in which the heater is placed is taken care of by radiators located as they should be and piped to secure a circulation through them. It will be a good thing for heating contractors to devote some of their time to a study of the operation of such plants, because it will ultimately result in bringing a profitable business to them.

Kenora, Ont., reports vacancies for stone dressers and a scarcity of brick.



Lord Roberts School, Winnipeg

Front Elevation

The Lord Roberts School, Winnipeg, Man.

A Noteworthy Example of the Modern Educational Buildings Now Being Erected in the Western Metropolis—Features of Design and Construction

This school, now being erected in the southwest part of the city, will cost, exclusive of heating and ventilation, \$76,000.

The ground and second floors provide for twelve classrooms, together with principal's room, teachers' rooms, "rest" room and library. In the basement there are provided four classrooms, two of which are equipped for manual training. On this floor are also located toilet rooms and shower bath rooms for both sexes, together with space for heating and ventilating apparatus.

Entrance to the building is gained on three sides, all leading to the main corridor, which is 24 feet wide. The two side entrances enter direct into the two main stairhalls of the building. These stairhalls, which are 10 feet wide, are enclosed in brick walls the entire height of the building; and all openings from same are provided with kalomined doors fitted with spring checks, and having wired glass in panels, and fanlights. The stairs are of iron; landings, reinforced concrete; treads and landings finished with Terrano covering. All entrance and vestibule doors open out, folding back against side walls, thus giving a clear unobstructed exit from the building.

The construction of the building is as follows: Basement walls of stone on concrete foundations, rock-faced from grade level to ground floor line, solid brick walls above, all lined on the inside with hollow brick to preserve plastering. All the interior walls are of brick.

All three entrances, floors of corridors on ground floor, landings of stairs, floors over manual training rooms, and roofs of boiler room and fuel room, also lintels over all openings in walls, are of reinforced concrete. All other floors throughout the building are constructed with short lengths of wood joists, carried on iron beams.

Finished flooring of $\frac{3}{8}$ -inch maple is put down in all classrooms, teachers' rooms, corridors on ground and second floors, and manual training room in basement. Tile flooring of 4 x 4 Red Walsh quarries is installed in toilet rooms, shower bath rooms, entrance landings and vestibules. Metallic ceilings are used throughout, except where reinforced concrete floors occur. The roof of the building is covered with galvanized iron. All electric wiring is laid in conduits.

Two low pressure boilers supply the direct radiation to the various rooms, and mechanical ventilation is also installed. Fresh air passes through tempering coils, water air washer, and reheating coils, and is supplied to all rooms through brick flues by a 140-inch blower, driven by an electric motor, the temperature of the air being controlled by automatic regulators. An exhaust fan driven by an electric motor provides for the special ventilation of the toilet rooms.

This building is being erected according to the design and under the direct supervision of Mr. J. B. Mitchell, Commissioner of School Building.

Lighting the Country Home

"Ten years ago," says "Beautiful Homes," "it was customary for the man who was showing his country home to his friend from the city, to say, apologetically, 'Of course we haven't the conveniences here that you have in the city, but you can't expect to have everything you want when you live so far away from the city.' In recent years, however, modern progress and invention have given more serious attention to the home in the small town, and there is a growing disposition on the part of the man who dwells 'far from the madding

crowd,' to insist on just as much comfort as his city brother. It is now no uncommon occurrence to find a country home equipped with bathrooms, hot and cold running water and lighting gas piped into every room in the house."

For lighting the home, several plans have been devised, and among them is a combination gas machine, which gives the home what is really a gas plant on the premises. The invention can be set up in a corner of the basement or cellar, and requires little or no attention at all, once it is properly installed. It supplies a gas that is perfect in its illuminating qualities, to the different rooms of the house, and, like city gas, it can be used for both heating and lighting. Ordinary burners, open or fitted with the usual gauze mantel, are used for lighting, and the light produced is clear, white and brilliant.

The fuel used is gasoline, stored in a combination fuel tank, buried in the ground outside the house. In most cases it requires to be filled with fuel about once every six months, and requires no further attention. The principal parts of the machine are a pump which works with a weight, and is wound up in a few minutes every few days, and an automatic mixing regulator, which needs no attention whatever.

Experience has demonstrated that gas can be produced by this method at a cost not to exceed \$1 per thousand feet. This makes the cost of light at an 80 c.p. burner about one-fourth of a cent per hour. This is certainly very cheap, much cheaper than the average city dweller can purchase his light.

Roman Ceramic Pavements

The past few years have seen a considerable change in the opinion of most people as to what should be a suitable kind of flooring for the halls and vestibules of large buildings, and, strange to say, there is an almost universal concurrence of opinion that ceramic tesserae, used in the fashion adopted by the later Roman architects, are about the most suitable for the purpose. Fortunately, the art of making ornate mosaic pavements is not lost, though it is doubtful whether modern designers

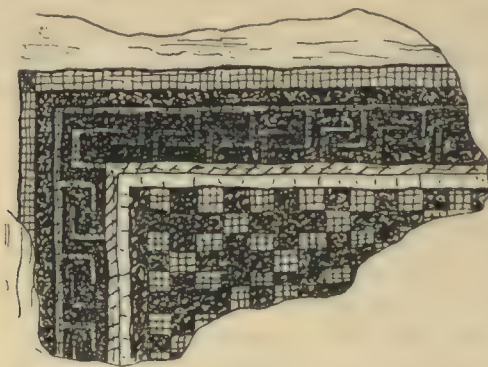


Fig. 1

study the ancient methods sufficiently close to enable them to get the best results, says a writer in "Brick." Any design intending to represent an actual fact must in almost all cases fail, for the simple reason that, for pavement work, the design is too close to the eye and looks unreal. Therefore, conventional work is preferable, and it is difficult to surpass the effects produced by the Romans in this respect.

To take a few hints from the Roman method of handling this mode of decoration, we may first allude to the remains found in the ancient Roman city of Uriconium, at Wroxeter, in Shropshire, as described some

years since by Judge Horatio Lloyd. The panels of the pavements in this case were about 8 feet x 11 feet, and the tesserae of which they were composed were about $\frac{3}{4}$ -inch square.

Fig. 1 shows the mode of their arrangement in rather ornate form. It will be observed that the tesserae forming the border are of approximately the same size as those employed for the smaller squares towards the centre of the design, but not so large as those on the

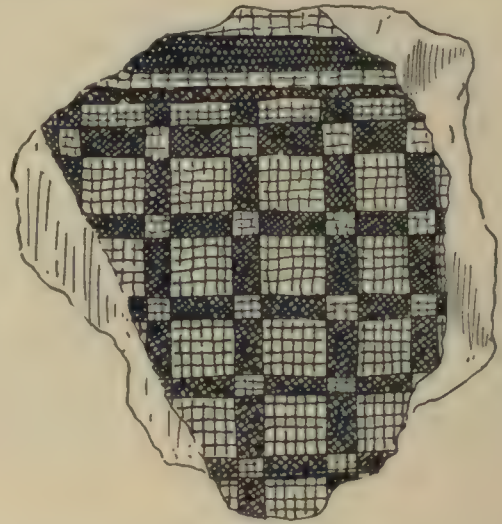


Fig. 2

innermost side of the border. This has the effect of bringing the pattern into relief, so to speak, and is characteristic of ancient Roman work in general.

Fig. 2 does not exhibit such an artistic design, but is none the less effective, and, while this type of ornament is by no means rarely adopted at the present day, it should be remembered that we owe it to the ancients, especially to the Roman workers in ceramics. The double white border with two rows of tesserae, and the long quadrangular pieces with three rows next to it, are not the least interesting parts of this design.

At the annual meeting of the Western Canada Railway Club, held recently in Winnipeg, the following officers were elected: Honorary President, Wm. White (2nd vice-president of the C.P.R.); Hon. Vice-Presidents, E. J. Chamberlain (vice-president and general manager of the G.T.P.), G. J. Bury (general manager of the C.P.R.), M. H. McLeod (general manager of the C.N.R.), and W. Phillips (general manager of the Winnipeg Electric Railway); President, A. E. Cox; 1st Vice-President, G. W. Caye; 2nd Vice-President, R. R. Neild; Secretary, W. H. Rosevear; Treasurer, E. Humphries. This club has met with phenomenal success. It began with a membership of 35. After a little more than a year this was increased to nearly 450.

Mr. Wm. Hurst, who for the last twelve years has been foreman of sewer construction for the city of Winnipeg, has resigned his position and will start business as a general contractor. Mr. Hurst is the inventor of a machine for excavating frozen ground. He built the first concrete sewers in Winnipeg.

The Winnipeg City Council are looking for a suitable paving material for residential and suburban streets which will be something in cost between asphalt and macadam. City Engineer Ruttan will report shortly on his recent investigations into this subject at Montreal.

The Sewerage Problems of Small Towns

Varying Conditions Encountered not Commensurate with Diversity of Engineering Practice—Special Phases of the Subject Considered*

The author was influenced in the selection of this subject by the fact that of recent years there has been an overwhelming amount of matter written on the subject of sewage disposal, but very little on sewerage, and an examination of plans prepared by different engineers shows that there is a greater diversity in practice than can be accounted for by the varying conditions met with. Many of the everyday things of a man's work may appear unimportant to him, but such things are of great value to others younger in age or experience, and it is the details that ensure the successful issue of works, no matter how good the general arrangement of the scheme may be.

Preliminary Work—The first step in connection with a sewerage scheme is to delineate the proposed works in a set of drawings after making the surveys and obtaining information of the physical characteristics of the area to be dealt with. In all cases where the road varies to an appreciable extent from a straight line, the positions of the manholes must be set out on the ground before preparing the drawings, otherwise it will very probably be found during construction that additional manholes have to be constructed to ease the sewers around corners. Such manholes will be close together and probably placed to less advantage for inspection purposes than if they had been provided for in drawing out the original scheme. In preparing sections of roads the author does not consider that spot levels, shown upon the maps, can be usefully employed, but each road must be actually levelled. It is very rarely necessary to chain or measure the distances along the road at which levels are taken. The maps should show the property adjoining the roads in considerable detail, and the position where each level is taken can be located on the plan and transferred to the sections without any measuring at all. When a road is being levelled the author requires that a reading shall be taken on every ordnance bench mark and every existing manhole cover passed, and that further readings should be taken whenever possible on all covers, etc., in adjoining roads, so as to tie the levelling up as closely as possible. Although this adds somewhat to the labor of levelling, the time so spent is amply repaid by the facilities afforded for checking the readings and locating any error. The levels on every section should invariably be referred to ordnance datum. In this utilitarian age, when work has to be turned out at high speed and photo-printing is so universal, the art of draughtsmanship is dying out, but neatness should be insisted on, as carelessness in drawing not infrequently leads to inaccuracy in the information on the drawings.

Capacity of Sewers—The amount of sewage to be provided for in sewers can be estimated with considerable accuracy, but the quantity of rainfall for which provision is to be made varies within very wide limits. It is commercially impracticable to provide for the heaviest rainfall that may occur, although, obviously, if a less quantity is allowed for, flooding of the sewers will take place. The figure selected should be such that the risk of flooding is tolerably remote, while the cost of the sewers is not unduly high. The provision in the sewers may be based on a rainfall over the whole area of the district of which only a very small proportion reaches the sewers, or it may be taken only on the impervious areas abutting on the sewers and allowance made for a larger percentage flowing into them. The latter system is the more scien-

tific and gives more accurate results. Special storm-water drains are insanitary and expensive, and are generally employed to receive only the water from the roads and the front portions of the houses, leaving the back roofs and yards to be drained by the foul water sewers.

Gradients—Whenever practicable sewers should be laid at gradients which will give a mean velocity of from 2½ feet to 3 feet per second when they are discharging one-sixth of their total capacity. It is not sufficient to wait until the sewers are half full to obtain this velocity. Steeper gradients are undesirable, as they lead to a rapid concentration of storm-water and consequent flooding in the lower parts of the system.

Size of Pipes—It is customary to provide that no public sewers of a less diameter than 9-inch shall be constructed. This adds considerably to the expense of sewerage small towns and villages and in some instances makes the cost almost prohibitive. For short branches, pipes of 6-inch diameter would in many cases be ample for carrying off the quantity of liquid they would be likely to receive. The smaller the pipe in comparison to the quantity of sewage, the better the velocity and consequently the cleaner the sewer will be. There can be very little likelihood of a 6-inch public sewer being stopped up by any extraneous matter which can only reach the sewer after passing through the ordinary house traps, the intercepting traps, and a length of 4-inch or 6-inch house drain.

Depths of Sewers—A depth of 6 feet is generally the most convenient. If laid shallower than this it will be difficult to obtain a good fall in the house drains, in both sides of the road, and if the depth is about 3 feet or less, the sewer must be constructed either of stoneware pipes surrounded with concrete or of cast iron pipes, both of which methods are not only expensive in themselves, but add to the cost of making house connections. All sewers over 12 feet deep should be surrounded with concrete to prevent their failing by pressure of the superincumbent earth. When sewers reach 18 feet or 20 feet deep it is advantageous to construct a supplementary sewer at a higher level to receive the connections.

Pipes and Joints—Patent jointed pipes may be divided into two classes—"true invert" pipes and pipes with moulded bitumen rings which fit closely. The advantage of true invert pipes over those with ordinary plain sockets is obvious, but for some reason the majority of contractors with whom the author has discussed their use do not appear to look favorably upon them. In a case where tenders were obtained for some sewers before it was decided what kind of pipes should be used, the contractors were asked to price in a schedule, giving alternative prices for ordinary pipes and true invert pipes, but the prices for the latter laid complete were the higher, notwithstanding that the manufacturers quoted the pipes at the same rate as ordinary pipes. Cement mortar for jointing pipes should consist of two parts cement and one part sand, which gives a strong joint that is not likely to crack in setting. According to information given by the municipal engineer of Elberfeld, the joints in Germany are made with asphalt grouted in. The pipes, which must be absolutely dry and clean, are placed in position and strands of tarred jute are caulked into the joints, then a band of clay puddle is fixed around the pipe against the annular space for the jointing material and melted natural

*Paper read before the Institution of Municipal Engineers by Mr. Henry O. Adams

asphalte, at a temperature of about 380 degrees F., is poured, through an opening made in the clay band at the top part of the pipe. The asphalte must be very fluid and free from all impurities which might cause bubbles to form, and the melting tank must be kept closed to prevent the escape of the light volatile oils. Artificial asphalte made of tar compounds has been found to be unsuitable. The quantity of material used is as follows:

Diam. (inches)	4	6	9	12	15
Tarred jute (lb.).....	0.5	0.66	0.82	1.43	2.20
Asphalte (lb.)	1.43	1.98	2.92	4.62	6.76

After completion the sewers are tested by an air pressure of from 3.7 pounds to 5 pounds, which is maintained for ten minutes. The pipes are usually made in lengths of one metre, say 39 inches, which is longer than is customary in this country, and it is found that the cost of the sewers is decreased by reason of the fewer number of joints. Pipes over 18 inches in diameter are usually surrounded with concrete. In order to lower the cost of digging and to lessen the liability to breakage the trenches are made as narrow as possible, being 31½ inches wide, which would be about 2 feet between the timbers, for pipes 12-inch in diameter and under, and 35½ inches wide, which would be about 2 feet 3 inches between the timbers, for pipes from 12-inch to 18-inch diameter. These sizes cannot be considered excessively narrow, but in the author's opinion there is much less liability for the sewers to be damaged or moved so as to crack the joints when ample room is given for the men to work, and he does not agree that the trenches should be as narrow as possible. The trenches are filled in to a height of 20 inches above the top of the pipes with selected material free from large stones, which is punned with wooden rammers; above the height the material is filled in as it comes and iron rammers are used. In order that trenches should be properly rammed when being filled in, at least three men should be engaged ramming to two men filling.

Junctions—It is customary in new sewers to provide junction pipes at frequent intervals for connections from any houses which may be erected in the future. It is generally found that when the houses are built it is not convenient to utilize any junction in the vicinity, so that their provision is a matter of needless expense. There are several methods of inserting junctions in sewers after they are laid, of which the best is probably that of cutting a hole in the pipe and inserting a saddle junction, but care should be taken to pass the hand through the saddle and carefully to fill the space between it and the cut edges of the pipe with cement finished off flush with the interior of the pipe. When junctions are left in for future use the sealing of them in the meantime requires consideration. The best results are obtained by using junctions which are closed by a stoneware disc placed in position during the moulding of the pipe and burnt on so as to form an absolute seal until such time as the junction is required, when the stopper can be chipped off by cutting round a groove provided for the purpose. Another efficient method is to use a loose disc which is placed on a rubber or other seating in the socket and secured by a metal clamp around the outside of the socket.

Testing Sewers—There are two methods in vogue for testing the water-tightness of sewers, one with air and the other with water. The disadvantage of the former is the difficulty of locating the leakage, if any, and in the latter the provision of the necessary quantity of water is a serious item of expense, and the subsequent disposal of it is frequently a matter of considerable trouble. Testing delays the progress of the work, and, unless it is done in short lengths, results in an excessive length of trench being kept open, which increases the cost of watching and fencing. Sewers should not be tested before the expiration of 24 hours from the time of making the last joint in each section, and if the works are on the sea coast the cement will take longer to set and an

extra six hours should be allowed. If every joint is closely examined the whole of the way round the pipe and any doubtful joint is cut out, chances of leakage will be remote. The maximum internal pressure put upon sewers during testing should be rigidly limited, otherwise more harm than good will result. Although sewers are usually specified to be watertight, they are rarely found in that condition, and any length of sewer which permits the entry of a greater quantity of water than half a cubic foot per minute per mile of sewer should be taken in hand, and the leakage located and stopped.

Manholes—There is no reason beyond the question of expense why the size of manholes on pipe sewers should vary in different towns, as the purposes for which they are used and the size of the men using them do not vary to any appreciable extent. A convenient and reasonable size is 3 feet 6 inches by 2 feet 6 inches, with shafts 2 feet 3 inches square, but if the strictest economy is necessary they may be 3 feet by 2 feet, with shafts 2 feet square. The top of the benching should be practically level with the soffit of the sewer, as if it is built lower sewage matter is deposited on the top of it when there is a big flow of storm water, and in addition the width of the sewage stream increases immediately the sewer enters the manhole, but as it does not decrease with the same facility at the outlet end of the manhole, eddies are set up in the angles which obstruct the flow of the sewage to such an extent that a quantity barely sufficient to fill the pipes will head up in the manhole to a height of a foot or more, which will, of course, increase the pressure in and reduce the flow through the sewer above the manhole. As a preventative against this, the top half of the sewer at the outlet end of the manhole should be formed as a bell-mouth. At those manholes where the diameter of the sewer increases the pipes should be laid so that their soffits are level, and the whole of the drop due to the larger diameter will occur at the invert. In many cases where the carriage of good suitable bricks is a heavy item it is advantageous to build the manholes in concrete. In wet ground concrete manholes will prove more watertight than brick manholes of an equal thickness. There is frequently considerable difficulty in stopping leakages in manholes and many diverse methods are employed from time to time. Manholes built up with cast iron segments are expensive, but are thoroughly water tight; it is, however, useless to build such manholes unless the sewer is composed of cast iron pipes, and even then it is improbable that house drains in the vicinity will be similarly constructed so that they will be the means of subsoil water reaching the sewers and the advantages of the cast iron sewers and manholes will be lost.

Lampholes—Although frequently constructed, lampholes are rarely used for any other purpose than that of ventilation, and unless they are particularly required for this use only, it is better to construct manholes in their stead.

Ventilation—The ventilation of sewers is a vexed question and cannot be dealt with by preconceived rules. The best plan appears to be to fix open manhole covers throughout, and then when the system is in working order, if objectionable smell be observed at any of the manholes, such manhole covers should be sealed and vertical columns erected at those places. If vertical columns are fixed on the edge of the footway, they require to be very tall to allow the gas to escape without nuisance to the occupiers of the adjoining houses, and they become unsightly. On the other hand, the majority of people are very reluctant to give their assent to the erection of a shaft against their premises even if payment is offered for the privilege. It would be interesting to learn and tabulate the methods adopted and the payment, if any, made by various towns. Most of the objections to both columns and open manhole covers are purely sentimental, and the author has known many cases where objections have been continued after the ventilators had been cut off so that escape of sewer gas was impossible.

Branch Sewers—Where branch sewers are connected to manholes they should be arranged at such levels that their inverts are well above the sewage flowing through the main sewer, otherwise such sewage will prevent the branch sewer discharging properly and result in back-pounding of the sewage in it, although the branch sewer may be of ample size.

Flushing—Sewer flushing is necessary when flat gradients occur and the sewers are too large for present need. If chambers are employed, they may be fitted with an automatic siphon or a plain disc valve, and the supply of water may be through a service pipe or from a water cart. If the

former method is adopted most elaborate precautions should be taken to prevent the possibility of any direct connection between the possibility of any direct connection between the water main and the sewer. Properly constructed flushing shafts with a bend at the bottom are useful at the head of a sewer, but shafts terminating with a square junction are practically useless.

Road Gullies—Much of the grit in sewers which is so troublesome to remove can be prevented from entering by using gullies of large capacity. They should be cleaned out at frequent intervals, and after such cleaning should always be filled up with water so as to re-seal the traps.

Pointers on Estimating Concrete Work

Essential to Have Intimate Knowledge of Special Conditions Obtaining on Work—How to Figure Closely and Accurately

One is frequently called on to estimate the cost of various kinds of concrete work, or at least is asked how much a certain job will cost; either for the cement alone or for the entire job, including all material and labor. In figuring on a concrete floor or wall one must know something of the conditions. It is evident that a barn floor which is to support heavy loads will require different figures from those needed for a hen house or dwelling house cellar floor.

Again, the cost of material other than cement varies greatly in different localities. Sand and gravel may cost a few cents per load and need to be hauled but a few rods, or, owing to either its first cost or the distance it must be hauled, it may be quite a large item in the expense. It is desirable that the concrete worker be able to make at least a reasonably close estimate on the cost of any given piece of concrete work. He should at least be prepared to figure out about how much cement will be required.

The expense for labor when using concrete need not be as great as for some other methods of construction since much of the work can be performed by common, unskilled labor under a competent overseer. One need not figure on the entire cost of the lumber used for the forms, as much of this can be used again for some other purpose, unless it is all cut up into short lengths. Again, the cost of erecting the forms may vary greatly on different jobs. I remember, says John Upton, in the "National Builder," one job where some one kept track of this item, and it figured up about 50 cents per cubic yard of wall. This was where carpenters were paid \$3 per day. The walls were 18 and 20 inches thick, from 12 to 15 feet high and from 50 to 100 feet long. It was necessary to do considerable bracing and also to build runways for wheeling the concrete. While this job had some unusual conditions, there were about as many things to help toward a low cost for labor as there were to make this a large item, so this price, 50 cents per cubic yard, can be taken as a safe guide for the cost of erecting forms for plain foundation walls, though in some cases it might be too much; and for a high wall having pilasters, too small.

Patented Plank Holders

If some forms of patented plank holders were used the cost of building forms might be lessened, but as these few plank would need to be handled over many times there should be some allowance made somewhere for the labor. Of course, if but a few plank were used there would not be any large expense for lumber to be figured on. The expense of mixing and handling the concrete is another item, subject to considerable variations, but it is always a factor to be reckoned on. For walls it generally bears a certain relation to that of erecting the forms, since for high, thin walls both

these items would be more than for the same quantity of concrete in lower and thicker walls. Some authorities estimate this item at 3 cents per cubic foot of finished work, and it would seem that this was a fair average.

This gives us 5 cents per cubic foot as the cost of the labor for such work as walls, cisterns, foundations, steps, etc. Let us see what the material is likely to cost. The following figures and estimates are gathered partly from experience and partly from the estimates made by others as a result of their own experience, these latter being largely borne out also by personal experience. After even a little experience one will not expect to have as many cubic feet of concrete as the combined bulk of the different ingredients. The finer materials simply fill the voids between the coarser ones, so the amount of concrete will in no case be much greater than that of the coarser aggregate, and in some cases even less. In a mixture of, say, 1 part of cement and 4 or 5 parts of sand, or 1 part of cement, 3 of sand and 9 of aggregates, the resulting concrete will be a little less in both than the sand or aggregate, owing to the fact that the materials can be and are packed into a smaller bulk after being wet than they make when measured dry and loose.

We will figure that sand or other material to be mixed with the cement will cost 4 cents per cubic foot, delivered where wanted. As cement can be bought for \$1.60 per barrel in most localities, we will figure on this basis:

One cubic foot of cement costs 40 cents, as there are nearly 4 cubic feet in a barrel, or 1 cubic foot in a bag. So we have the following figures for material: Cement, 1; sand, 1; costs, 44 cents. This will make $1\frac{1}{4}$ cubic feet of concrete and costs 30 cents per cubic foot. Cement, 1; sand, 3; costs, 52 cents. This will make 3 cubic feet of concrete and costs 17 cents per cubic foot. Cement, 1; sand, 5; costs 60 cents. This will make $4\frac{1}{4}$ cubic feet of concrete and costs 13 cents per cubic foot. Cement, 1; sand, 2; aggregates, 3; costs 60 cents. This will make $3\frac{1}{4}$ cubic feet of concrete and costs 16 cents per cubic foot. Cement, 1; sand, 3; aggregates, 9; costs 88 cents. This will make $8\frac{1}{4}$ cubic feet of concrete and costs 10 cents per cubic foot. Cement, 1; sand, 5; aggregates, 9; cost, 96 cents. This will make $9\frac{1}{4}$ cubic feet of concrete and costs 10 cents per cubic foot.

Some one has figured out that concrete mixed 1, 2, 5 will require $1\frac{1}{4}$ barrels of cement to the cubic yard, and 9-10 barrel if mixed 1, 3, 7. So for ordinary foundation walls we may safely figure on 1 barrel of cement for each cubic yard of wall. As to the prices obtained for work we have in mind a figure of \$1.85 per lineal foot for cellar walls for houses. This, of course, would mean 7 to 8 feet high, 12 to 18 inches thick, would include everything and require a first-

class job, competing with the best work in stone and costing nearly as much where stone is abundant. To these figures we must add the cost of the needed labor of mixing and handling; also that of erecting the forms if this is a considerable item.

In actual work the following figures hold good for stable floors: One barrel of cement lays 50 to 60 square feet. For floors, walks and similar work the surface covered by a barrel of cement depends on the thickness of the work as well as on the proportions used.

Figuring mason's wages at \$4 per day, common labor at \$2, cement at \$2 per barrel, I find that stable floors may be put in for 12 cents per square foot. This includes everything, after the large stones to make the foundations and provide drainage are in place.

Sidewalk and Other Construction

Sidewalks will cost about the same figure for material and labor, perhaps a little more, as there are more forms to build. For the sidewalks 1 barrel of cement will make from 30 to 60 square feet. Mixing the bottom course 1:1:6 and the top course 3:5, you may get 50 square feet of 4-inch walk or 30 feet of 6-inch from a barrel. For the labor you may figure at \$1.20 to \$1.80 per square foot per man per day, depending, of course, on the thickness of the walk and the other conditions to be met.

The cost of concrete blocks may be figured out as follows: With a 1 to 4 mixture you will get nearly 15 cubic feet of concrete from a barrel of cement. This material costs \$2.25, making 15 cents per cubic foot for the concrete.

Blocks having an air space of one-third of their volume will cost 10 cents per cubic foot. Those having an air space one-half their volume will cost $7\frac{1}{2}$ cents per cubic foot.

A block 8 x 8 x 16 contains a little more or less than one-third cubic foot, according to the size of the air space. So figure five cents for the material. The labor cost will depend on the man and the machine, but should be about two-thirds that of the material. We figure that blocks may be made and laid up in a wall at 25 cents per cubic foot at a good profit. Common bricks cost more than this.

To estimate the cost of making cement fence posts we must find the number of cubic inches in each post. As the concrete may be mixed 1:2½:3 of 4 or 5 parts of aggregates be used, we will figure on 1:2½:4. With these proportions 1 barrel of cement yields 20 cubic feet of concrete when it is packed into the moulds. So dividing 20 x 1728 by the cubic inches in the post gives the number of posts made from 1 barrel of cement. To the cost of the cement must be added the cost of the sand and gravel; also that of the reinforcement and labor. The reinforcement may cost from 2 to 6 cents. The labor will be about 5 cents for each post. The moulds will be still another item to be figured on.

The total cost of the posts vary from 16 cents for one 5 x 3 at the large end, to 28 cents for one 6-inch square at the bottom and half the size at the top.

Standardization of Plumbing Material*

By EUGENE S. WILTARD

At the last meeting of this society, held in Omaha a year ago, I had the pleasure of presenting a paper on the "Standardization of Plumbing Material." The subject matter of my paper met with the hearty approval of this society, and as a result of the reading of the paper and the discussion thereon a committee was appointed from this society to meet with a committee to be appointed from the Manufacturers of Jobbers of Plumbing Supplies. The Central Supply Association appointed such a committee representing manufacturers of soil pipe, and in accordance with a resolution of our society

the National Association of Master Plumbers also appointed members of the committee. A meeting of this committee was held and it was decided that actual measurements should be secured from several manufacturers of soil pipe showing the exact sizes of wall thickness, depth of hub and other details for standard and extra heavy soil pipe from 2 inches to 6 inches. After considerable trouble and a lapse of a good deal of time, this information was secured by our committee and has been plotted on charts, and I have no doubt that at the proper time a report on this subject will be made.

I believe that this society should continue to agitate for the standardization of plumbing material, and that while it is wise to begin moderately and perhaps confine the initial efforts to the standardization of soil pipe, that as soon as possible, without working any hardship upon manufacturers of such material, the standardization should extend to fittings as well. I also believe that it is possible to standardize many other articles of use in the plumbing business. We are here in the home of the manufacture of pottery, and there are many persons in Trenton who are much better able to discuss the standardization of sanitary earthenware than I am. This business has developed into a very extensive and elaborate one, and many new designs of sanitary earthenware have been brought out in keeping abreast of the time, and to meet the progress of sanitation. In fact, I believe the manufacturers of sanitary earthenware have been leaders in the development of practical sanitation, and in no other place in this country will we have a better or more profitable opportunity to see the improvements that have been made than in Trenton, where the largest and best sanitary potteries are located.

As a matter of fact, some of the staples in pottery are already practically standardized, such as in height from floor, width and depth. I doubt, however, whether it will be possible to change the many conditions which are presented to the plumber by the various problems of roughing-in his work, which compels the potter to carry a stock of various measurements.

It is possible that, in addition to making the standards of which I have already spoken, as well as the spud and sizes of thread, and 5½-inch measurement for the seat post holes, that it would be possible to have the sizes of the trap in closets brought nearer to a standard, and this might be of material benefit.

Laying Hardwood Floors

There is a certain amount of art in doing everything well, even to laying hardwood floors, which some operators do not consider in this light. The popularity of the hardwood floor, with its many possibilities as a decorative floor covering, can be stimulated and made so much more pleasing by the addition of painstaking on the part of the finisher, says Warfield Webb in the "National Builder." Simply laying a hardwood floor is one of the least considerations in connection with the undertaking. It is essential to have the foundation perfect, and the floor must be laid with care and neatness, but the job does not end here, because the finish is very important to a fine piece of work.

The average hardwood floor, unless it is of mosaic, and even then it cannot be perfect, must be planed off and sanded and rubbed with considerable care to ensure a job that will be acceptable by one who is a capable judge. If there has been a good foundation to begin with and if the floor has been laid with care in matching the grooves and tongues, and the nailing has been done with the idea in view of making the work passable, then there will be less to do with the scraper and sandpaper. These first considerations are not always adhered to, however, and to neglect them means more labor and trouble, and in the end a job that is not altogether satisfactory.

*Extracted from paper read at annual meeting of American Society of Inspectors of Plumbing and Sanitary Engineers.

The increasing use of hardwood flooring has given rise to a larger demand for operators to lay and finish it. It is used now in many large structures instead of the old softwood flooring, and in many of these contracts, there is not required the same care in the finish as in office or residence work. This does not permit of careless workmanship, even though the floor is simply used instead of the old style flooring, and the carpenter should understand that there is really more pains to be taken with hardwood floors, in the ordinary sense, than is required with plain flooring. If he undertakes to lay a hardwood floor at all, he should give it his best attention, because one poor job of this kind will mean that he will find it difficult to secure similar work in securing other contracts.

If he has been particular to lay the floor with care, then he must be able to complete the work in the same manner, and this requires, first, good equipment. There are on the market a number of styles of tools for doing this work. For smaller contracts the hand scraper is often used, which is operated by electric power. In using the latter machine the operator must be experienced, or his labor will be without the desired results, because using this machine is handled to advantage only with intelligent operation. However, as the average contract calls for the hand machine only, the carpenter will have little difficulty in using it in a satisfactory way provided he is able to do so with intelligence.

Smoothing down the rough places requires pains, and surfacing the floor can be done by an ordinary workman, but he must have in his mind clearly before him just what this means, so that he can work to the desired end. Simply going over the floor in a haphazard manner is not the method to pursue, because the result will be such as to show only uneven places in the floor, and not a clear smoothness that is one of the charms of the hardwood floor. The proper method to pursue is to begin at one side or end of the room and to work steadily toward the opposite side. One may not find it necessary to smooth every board, but this is where the result will tell, and it is the uneven boards that must be made level so that the entire floor will become level. If the operator endeavors to simply work here and there where he sees or believes he sees, an uneven place, he will find that in the end he has gained nothing that will count for anything toward the proper finish the floor should be given.

With the completion of the surfacing it sometimes becomes necessary to go over the floor, or at least certain portions of the surface with sandpaper, and with this additional labor there should result a very uneven surface, such as can be oiled and waxed, giving the whole the effect of glossiness and evenness that is so much a feature in this work. While some floors are varnished with a fine quality of floor varnish, the majority of hardwood floors that are given a finish at all are first oiled and then waxed, though stains are in some instances applied as well, which is the ideal way to finish a floor of this character.

Where wood mosaic or parquetry flooring is laid the same is always finished with oils, wax or varnish, and these floors naturally require more labor and care than the plain hardwood floors. This character of work is confined for the greater part to residences, and the operator who undertakes this special line should be experienced, or his work will lack the essentials that will make it a first-class job. In order to bring out clearly the different designs of the woods used in parquetry flooring, the labor must be done with intelligence and in a way that will prove the ability of the workmen. More work will be demanded for this style flooring than others, and on this account no one should undertake such labor unless he can complete the contract in the manner that it demands.

Most any carpenter can lay a hardwood floor, but the man who essays to make an artistic job of the undertaking will of necessity be forced to look carefully ahead of him, and to

equip himself, not only will good tools, but an equal amount of experience, which cannot be had without practice and study.

Building Apartment Blocks

In view of the increased interest in the building of apartment blocks, we give below the revised building by-law for apartment houses as finally amended for Vancouver city:

(a) The enclosing walls, including the walls of light courts of all apartments or tenement houses having more than three apartments of five rooms each, or fifteen rooms in all (exclusive of bathrooms, closets and pantries on each floor) and being three storeys or over in height (not including basements) shall be made and constructed of brick, stone or like incombustible material.

(b) The floors in such apartment houses shall be of double construction, the first, or under floor, shall not be less than 1½-inch matched or splined flooring covered with two thicknesses of asbestos paper not less than 10 pounds to the 100 square feet, and ½-inch matched flooring over the partitions dividing the apartments, also corridor partitions, and the enclosures of stairs and elevators shall be composed of incombustible material, or of not less than 2½-inch splined or matched wood.

No suite of apartments in such apartment houses except the janitor's quarters shall be installed in the basements. Any building, the ground floor of which is used for stores or mercantile purposes, and having apartment or tenement houses on the floors above, and being over two storeys in height (not including basement), shall not be of lower standard of construction than that defined in subsection 41 of section 13 of this by-law.

(c) All apartment or tenement houses not of fireproof construction and having more than six apartments on each floor shall have a brick fire wall, which shall be constructed as to have not less than a wall composed of one brick thick dividing the building into two or more sections.

(d) All apartment or tenement houses being in height of two storeys (not including basements) and having more than four apartments of five rooms each, or 20 rooms in all (exclusive of bathrooms, pantries and closets on each floor) shall be constructed in accordance with the same standard as that allowed for three-storey buildings.

(e) In any building the ground floor of which is used for stores or mercantile purposes, and having apartments being of two storeys (not including basements) the flooring of the storey or tenements on the floors above and above the storeys shall be the same as that allowed for three-storey buildings.

(f) All rooms, including the bathrooms, shall have one or more windows, which windows in area shall equal at least 10 per cent. of the area of such rooms, such windows shall open to the outside air, and shall be so constructed that at least 50 per cent. of the area of such windows can be opened.

(g) No inside light wells shall be allowed.

(h) All light courts must be extended to the outside walls and in no case shall such walls be less in size than 10 per cent. of the area of the building, except when the buildings in which such light courts are constructed is situated at a corner of two or more streets or a lane, in which case at least 5 per cent. of the area of such buildings must be allowed on the side not abutting on such street or lane.

Mr. Angus Smith, city engineer of Victoria, B.C., will shortly present a special report to his council making recommendations for dealing with the dust nuisance in Victoria. He is now engaged in making a close study of the problem and is writing to a large number of cities seeking information as to remedies that have been applied with success.

Method of Constructing Macadam Roads with Asphaltic Oil Binder

Macadam constructed with heavy asphaltic oil as a binder has of late years come into use for city streets and country roads. The city of Pasadena, Cal., especially, has a considerable amount of this kind of pavement and has found it to be hard, dustless and mudless, and one which the hardest and heaviest automobile traffic cannot ravel. The method of constructing this pavement as employed at Pasadena was described by Mr. S. J. Van Ordum, city engineer, before a convention of the League of California Municipalities.

Preparing Base—The roadbed is first graded, watered and thoroughly rolled with a heavy roller. Stone of a size not larger than $2\frac{1}{4}$ inches in its largest dimension and not smaller than will pass a $\frac{1}{4}$ -inch screen, is then placed to such a depth that after being thoroughly sprinkled and rolled with a 12-ton roller the surface shall be $1\frac{3}{4}$ inches below the surface of the finished pavement. The depth of this base depends upon the character of the soil, drainage, character and amount of traffic upon the street. The average depth of this base under ordinary conditions is about $4\frac{1}{4}$ inches, which, with the top surfacing of $1\frac{3}{4}$ inches, makes a 6-inch macadam pavement.

As the rolling of the broken stone foundation progresses, rock screenings of a size not greater than will pass through a $1\frac{1}{4}$ -inch screen are spread over the surface in sufficient quantities to bind the broken stone foundation and form a true surface.

The idea in placing a binder on the base rock is to partially bind the rock so that it will not be displaced in oiling or placing the subsequent layers of rock. It is not necessary nor is it advisable to thoroughly close and seal all the voids in the rock, for the first coat of oil which is applied to the base would then be unable to penetrate the base.

Upon this base prepared as above specified is then applied liquid asphaltum at the rate of $\frac{1}{4}$ -gallon to each square yard of street surface.

Wearing Surface—A layer of crushed rock consisting of stone which will pass through a $1\frac{1}{4}$ -inch screen and be retained by a $\frac{3}{4}$ -inch screen is evenly spread over the rock base to such depth that, after being thoroughly sprinkled and rolled with a 12-ton roller, it is $1\frac{1}{4}$ inches in thickness.

Liquid asphaltum is then applied at the rate of $\frac{1}{4}$ -gallon to each square yard of street surface, after which a coat of crushed rock of a size which will pass through a $\frac{3}{4}$ -inch screen and be retained on a $\frac{1}{4}$ -inch screen is evenly spread to a depth of $\frac{1}{2}$ -inch in thickness.

The surface is then thoroughly watered and rolled, followed by a coating of liquid asphaltum applied at the rate of $\frac{1}{4}$ -gallon per square yard. After spreading a light coating of rock screenings $\frac{1}{4}$ -inch and under in size, sufficient to absorb all surplus oil and produce a uniform surface, the pavement is watered and thoroughly rolled until it becomes hard and smooth, true to grade and cross section, and free from all hollows and irregularities.

Care should be taken to have the different courses of rock carefully screened and spread uniformly over the street. If crusher run of rock is used the unequal density of the pavement will result in too little oil in one place and too much oil in another spot. The street when completed should have a surplus of rock screenings on the surface, for the sun and continued surface will bring out the oil which, combined with the fine screenings, gives the street the asphalt finish.

A trench cut in an oil macadam is repaired by first thoroughly tamping the base rock to within about 2 inches of the surface, the edges of the pavement next to the trench should then be cut and the space filled with rock and oil which had previously been mixed by hand. A light coating of screenings is then spread over the surface and the whole thoroughly tamped with a hand tamper.

The oil which has been most successfully used has been the heavy crude or topped oils from the Sunset fields near Bakersfield and contains from 75 per cent. to 87 per cent. asphaltum. Great care should be taken in selecting the asphaltic oil, for the success of the pavement depends to a great extent upon the character of the oil used. Especially is this true if a topped or partially refined oil is used. Refineries are negligent in topping oils and often turn out a bad product which is very hard to detect from a first class road oil. It is also economy for them to top the oil in as short a time as possible, heating the oil to a high temperature, and in so doing cracking the asphalt content.

A Mill Building of Cement Brick

A mill building which possesses the unique feature of being constructed entirely of cement brick made upon the ground has lately been completed not far from the site of the landing of the Pilgrim Fathers in 1620. The concern for which the building was erected owned a large bank of clean sharp silicious sand and a bed of gravel containing a liberal per cent. of stone, and it was therefore decided after some preliminary tests of the material to use cement brick. The mill is two storeys and basement in height and covers an area approximately 114 x 430 feet. The bricks were made in four Standard cement brick machines operated by hand, each machine turning out 20 brick at a time.

The mixture generally used was one part cement and three parts sand, although for lightly loaded walls a few brick were made in the proportion of one of cement to four of sand. All brick used on the outside of the building had a facing $\frac{1}{2}$ -inch thick of one part cement and two parts fine sand, with the addition of 2 per cent. waterproofing for the cement.

In doing the work enough water was used to make a mortar of such consistency that it would hold its shape under compression without flushing water to the surface so as to cause the mortar to stick to the plates. The amount of water used averaged about 8 per cent., and although this amount would seem likely to produce a porous brick, it was shown by tests that the brick so made were quite impervious to moisture. The cement brick formed such perfect bond with the mortar that the resulting wall was practically monolithic. A valuable and interesting feature in connection with the cement brick is the ability to cut it for special places, it being possible to make a cut $\frac{1}{2}$ -inch thick for the full length of the brick and width.

For the entire construction work about 2,400,000 cement brick were used, requiring in the making nearly 7,500 barrels of cement. The building is of a mild gray color, and while the possibilities of ornamental work with moulded brick and concrete castings are unlimited, they were not tried in the present instance except as an experiment, for the general design of the building did not call for such detail.

As compared with clay brick, the cement brick show strength under compression of 40 pounds more per square inch and a resistance to disintegration by sand and rain which does not exist in the case of the former.

The new building is known as mill No. 3 and was erected by the Plymouth Cordage Company at Plymouth, Mass. The two other mills of the company were constructed of clay brick, but when the third one was planned the price of such brick was so high as to cause the experiment to be made of using cement brick, but which, it must be understood, is not concrete brick.

London, Ont., shows a slight falling off in building permits for the month of April. Permits last week totalled \$104,883, against \$177,250 for April, 1909. For the first four months of 1909 and 1910 the totals are \$341,530 and \$326,715 respectively.

Contractors' Equipment: Its Use and Care

Economy in Proper Selection of Plant—Considerations in the Purchase of Second-Hand Equipment—Repair Parts for Emergency Cases

A great many contracts have been undertaken and finished at a loss, and, in fact, a large number of them have actually been given up, because of an attempt to handle work with equipment which was either insufficient or not of the kind which should have been used for rapid and economical construction.

There are a few contracts awarded for work of colossal proportions for which the contractor usually designs a special equipment. The general rule, however, is that the greater number of contracts are of such a nature and so located that a standard contractor's equipment should be figured in making the estimate.

In referring to a special equipment it is not the idea to convey the impression that the contractor should figure on using a style or class of machinery that is an unknown quantity, but that he should figure on a style of equipment that is particularly adapted to the work on which it is to be used, and one which will effect the greatest saving in labor. In other words, the contractor should make a careful study of the particular job of work and decide on the class of equipment with which he can handle it with the greatest economy and in the shortest possible time. It is in rapid progress that the contractor will find his greatest opportunity to increase his profits.

Proper Equipment to Fit a Job—The character of the work to be undertaken, the general layout of the job, the various operations to be done, and the results to be secured, are the things which should be taken into consideration in order to determine the proper style of equipment to be used. If the work is so situated, and the various operations are confined within an area which will make it advisable to use derricks, and, where such equipment when originally installed will cover and complete all parts of the work without the additional expense of changing and resetting, then a plant of this character would be about as economical and effective as any installation that could be made.

In the case of concrete work and the proper equipment for handling it, it is advisable to determine beforehand whether the best economy is in a portable or stationary mixing plant. If the concrete is scattered over a large area the question to determine is whether or not it will be a cheaper plan to use a portable mixer and convey the concrete materials to it, or whether it will be more economical to have the mixing plant stationary and convey the concrete to the forms after it has been mixed.

In the matter of excavation the style of equipment best suited for this purpose should be governed largely by the quantities to be handled and the disposition to be made of same. The contractor should in all cases figure the cost of his equipment installed ready for operation, take a fair average production of such equipment, and make careful comparisons of the cost of output handled in this manner with the cost of such output handled with another style of equipment, and in this way determine the most economical and rapid method of doing the work.

Economy in the Proper Selection of Plant—In the practice of economy, the contractor will find the greatest field for displaying his ability in this line is in the proper selection of his equipment. It is a very good rule for him to observe "not to attempt to do anything by hand which can be accomplished by the use of machinery." As a rule there is sufficient time between the date of the advertisement of a job and the time at which bids are opened to allow the con-

tractor to carefully go over all the details of the work and decide on a class of equipment which will handle everything to the best possible advantage and with the greatest economy. If the work is of a different nature from that with which the contractor is familiar he can investigate similar jobs in the course of construction and decide from such investigation what class of equipment will handle the contemplated work to the best advantage.

In construction work, possibly more than any other line of business, there are so many unforeseen difficulties to contend with that the contractor should prepare himself properly in the beginning to handle his work in the shortest time possible. As an illustration, we will assume that a contract has been undertaken for the erection of a building which requires a considerable amount of excavation for foundations, and that the location is such that the banks will have to be supported and an adjoining structure will have to be protected. While the quantity of excavation to be handled may amount to considerable in yardage, the contractor may figure that he can handle it with more profit to himself by doing the work by hand. He might be justified in this provided no unforeseen difficulties arise to delay the work. However, after he has the work well under way he may be delayed by several days of continuous rain, which will cause his banks to cave and possibly a wash under the foundation of the adjoining structure, allowing it to settle, cracking the wall of the building, or, as has happened in a great many instances, causing such structure to collapse. Accidents of this kind could no doubt be avoided in many cases if the contractor had studied the situation thoroughly and provided himself with an equipment for doing the work in the shortest possible time, knowing that the delay of a day might mean a serious loss in handling this part of the work. If an accident of this kind does not "break" the contractor, it will at least take all his profits on this particular job and in all probability a great deal more.

In the case cited above, if, instead of attempting to handle this excavation by hand and hauling the dirt away in the old-fashioned wagon, the contractor had supplied himself with a steam shovel and the latest improved dump wagons, he in all probability could have finished this part of the work and had his foundations built in time to have prevented an accident of this kind.

Again, while the work in question may have been prolonged by reason of an attempt to handle the excavation by hand, and at the same time this part of the work may have been completed without any delay further than the difference in time between a hand and a machine operation. The work may have advanced to the point where the concrete foundations were being laid, and, instead of handling this part of the work with a mixing plant capable of producing a good daily output, the contractor may have attempted to mix his concrete by hand, thus preventing the rapid progress that should be made on a job where the conditions are such that a delay of days or even hours may mean a heavy loss.

This illustration is given merely to call attention to the fact that when conditions of this kind exist it is best to adopt a rapid means of handling the work, even at some sacrifice of profit, rather than to attempt to accomplish it by a means which may seem to allow a little additional profit but in which the delay is likely to result in serious loss.

Misfit Equipment—It is a comparatively easy matter for a contractor to spend a large amount of money on equipment

and at the same time get his work loaded down with a class of machinery that is not at all adapted to the particular work he has to handle. This can be avoided if he has profited by his past experiences, from which he should be able to determine the best class of equipment for handling work under conditions as they exist. If his past experience has not been such that he has a personal knowledge of the best class of equipment to be used, he can, by a little investigation find out the style of outfit that will answer his purpose best. An improper equipment is worse than insufficient equipment if such a thing is possible, inasmuch as it represents an additional and unnecessary outlay of money, and an increased cost of production and delay on the work. The contractor should be careful to see that he has the latest and best machinery and that it is properly placed, thereby requiring the least number of changes during the progress of the work, and also be sure that he does not have a lot of surplus or misfit equipment to handle and contend with, all of which increases his costs of production and occasions unnecessary delays.

New vs. Second-Hand Machinery—There is little need to call attention to the difference in results obtained by the use of new equipment as compared to those obtained by the use of second-hand equipment, even though the latter is in better shape than the average second-hand condition, unless it would be to bring it to the attention of the contractor on smaller work who has used nothing but second-hand plant. It is not always advisable to purchase new equipment, as it is often possible to secure plant that has been previously used but which is in condition good enough to justify the contractor in placing it on his work and which can be purchased at a great saving over the cost of new. He should, however, know the exact condition of such equipment before he invests his money in it, as a piece of machinery that has been worn out on previous jobs is an expensive addition to any contractor's plant, even though it might be secured without any initial cost whatever. A piece of machinery of this kind is practically out of commission when needed most; and, even if it is not out of commission, the repair bills will in the end amount to as much or more than the original cost of a new machine of the same kind, to say nothing of delays which it occasions.

It is usually the best policy, if the volume of work will permit it, to equip a job with new machinery; but if this cannot be done it is certainly advisable to see that the second-hand equipment is in such condition that the service required of it on the job on which it is to be used can be secured without constant delays, repairs, etc., by reason of its bad condition.

Use of Accumulated Equipment—All contractors who have been in the business a few years find themselves with quite an accumulation of equipment on hand, in good, fair and poor condition. In figuring on a new piece of work it is, of course, good economy to use as much of the accumulated equipment as possible, but a great many mistakes are made by contractors in trying to make use of practically everything they have on hand regardless of its condition. No matter how much equipment a contractor may have idle, if it is not adapted to a piece of work which he is trying to secure, he will find it more profitable not to include it in his estimate, but to allow it to remain idle or dispose of it to the best advantage and figure on equipping his work with something that is especially suited for handling it properly. Do not at any time load up a job with improper or worn-out equipment simply because it happens to be in the storage yard. This is the poorest kind of economy and, in the end, most expensive.

Original Installation—While in some cases it is not possible to locate the plant in the original installation so that all the operations can be performed without rearrangement,

changes, etc., this should be done as nearly as possible so as to avoid the expense incident to such changes. The dismantling and re-erection of derricks, boilers, etc., is expensive and causes considerable delay in the progress of the work; and, in a great many cases, such changes could be avoided entirely if sufficient thought had been given to the proper location at the time of the original installation. There are, of course, a great many jobs that can be done more cheaply by using a style of equipment where it is necessary to make such changes than it could be done with a more elaborate equipment where changes would not be necessary. It is merely a question of estimating the total cost of a plant where such rearrangements will have to be made and comparing this cost with the cost of another style of plant where the original erection cost is the only installation expense.

Equipment of Proper Capacity for Output, and Maximum Loads—The contractor should never make the mistake of installing an equipment on his work that is not of sufficient capacity to handle the output for which it is intended to the best possible advantage. It is a very serious mistake to attempt to operate an engine or engines requiring a boiler capacity of 100 h.p. with a boiler from which but 80 h.p. can be secured. If your requirements are 100 h.p., your boiler capacity should be fully that much or, better, 120 h.p.

If your concrete is such that a one-yard mixer is required to produce the proper output, do not try to handle the work with a half-yard or a three-quarter-yard mixer. It would be much better to use a 1½-yard machine, which will avoid the necessity of working it at any time beyond its rated capacity.

If the rated capacity of your derricks or hoisting machinery is five tons and the work is such that your maximum loads will exceed that weight, do not try to get through with an equipment that is constantly required to work beyond its rated capacity. This is especially true in the case of derricks or similar equipment for lifting and handling heavy loads. You are not only taking the risk of demolishing your plant, but the safety of your employees should be given proper consideration. While a machine which is operating all, or most all, of the time beyond its capacity may get through without an accident that will put it out of commission entirely, or cause the loss of life of some of the workmen, there is always the delay and expense incident to minor breaks of parts such as fittings, lines, booms, etc.

In the case of boiler equipment there is always the additional expense of excessive fuel consumption when they are required to constantly carry a load beyond their rated capacity. It is, of course, expected that any piece of machinery will at times be required to do more than it is designed for, but where an entire plant, or an important part of it, is installed when it is known that the capacity is insufficient to accomplish what will be required of it, it is a big mistake and the contractor should avoid an installation of this kind.

Purchase of Second-Hand Equipment—Mention has been made in a previous paragraph regarding the use of second-hand equipment as compared with new. A contractor will sometimes find it advisable to make use of second-hand equipment rather than to go to the expense of purchasing new plant. This is more especially the case on a job that is not of sufficient size to permit the allowance of a sufficient amount in the estimate to cover the purchase of new equipment, even though the quantity required may be small. However, when the contractor figures on making use of second-hand equipment, if it is something he has on hand, he should include in his estimate an amount to cover such machinery sufficient to put it in place on the job in the best possible condition. He should make a deduction from the first cost of such equipment sufficient to cover the previous service which has been secured from it. He should also be sure not to put any machinery on his job that is not in sufficiently good condition to hold out and perform his work properly until same is com-

pleted. If it is necessary for him to purchase such second-hand equipment he should only do so after a personal investigation of the condition of such plant, and the investigation should be made by some one competent to judge same correctly. Much delay and additional expense is incurred in attempts to make use of second-hand equipment that is not in condition to be of any service whatever.

Inspection and Care of Plant—One of the principal things that a contractor should bear in mind is that in order for him to obtain the best service and the greatest possible good out of his equipment he should see that it is frequently and regularly inspected with a view to keeping it in the best possible working order and to prevent accidents before his plant has been allowed to go too far without attention. Inspections, if regularly made, will in a great many cases prevent serious breaks and the consequent delays to the work which follow by reason of them. A contractor's equipment must necessarily be exposed to all kinds of weather conditions, as most of it is usually erected in the open and consequently cannot have the protection which machinery should have to preserve it properly.

The proper care of equipment is a thing that a great many contractors seem to pay little or no attention to. Quite often the machinery, after being erected, is practically allowed to take care of itself. In view of the fact that equipment on a contract job has to be erected comparatively in a temporary manner, all efforts should be made to care for it in the best way possible. In too many cases lines, sheaves, and equipment of this character are allowed to run exposed to all kinds of weather conditions with no effort being made to keep them properly greased and oiled in order to obtain the best results and preserve their life. All cables, sheaves, etc., which are required to perform heavy duty should be kept thoroughly oiled and special attention given to a good grade of lubricant for this purpose. The costs of lubricants, even if used to excess (which is far better than using none at all), is insignificant when compared to worn boxings, cut-out bushings, broken lines, etc., caused by using too little or no lubricant. When a piece of machinery is set aside it should be thoroughly gone over and properly oiled instead of being allowed to stand in the weather unprotected to be damaged by rust. Cables and lines when taken down to be stored should be thoroughly protected by being given a good coat of heavy grease. If proper attention of this kind is given equipment, far better results can be obtained while it is in use, and the life can be increased, in a great many cases, at least 100 per cent.

Repair Parts for Emergency Cases—If it were possible to secure an individual record, the cost of delays occasioned on construction work, more especially on jobs in isolated locations, by reason of the absence of extra repair parts, the amount would be almost beyond belief. In all, or most all, classes of equipment there are more or less parts that are constantly wearing out or breaking, and if the contractor will make a point of having a supply of such parts on hand he will find in the great majority of cases, that the time saved by such precaution will pay for itself many times over in the course of almost any piece of work. The matter of an expenditure of \$200 or \$300 for extra repair parts is a good investment even though he may have use for but few of these parts during the progress of his work. If, however, he does not have such parts on hand a break is likely to occur at any time that will shut down the entire work a sufficient length of time to more than pay for three or four times the amount of spare parts which he should at all times have on hand for emergency cases. Repair parts which should be kept in stock are always standard, and although there may be no use for some of them, the benefit to the contractor of having them on hand, should an accident occur requiring their use, can hardly be estimated.

Duties of Engineers, Plant Operators and Master Mechanics—All employees whose duty it is to handle and operate the

equipment should be thoroughly impressed with the idea that their greatest duty is the proper care of that portion of the machinery which they have directly in their charge. A great many engineers and others, having in charge of the direct operation of a piece of machinery, seem to form an idea that the only thing required of them is to work their machine to its utmost capacity without giving any attention whatever to the condition or proper care of it. In the case of engineers, it is very frequently found that when a man has acquired sufficient knowledge to open the throttle and apply the brakes he represents himself to be an engineer and quite often it is found that he has no idea whatever as to what the machine he is operating is capable of doing, neither does he know anything regarding it outside of the throttle and brakes. If a man has learned to be a good operator, and the contractor finds that he knows nothing about his machine, he should be given proper instructions along this line, and given to understand that he will be required to keep his machine in proper condition. If he is the right sort of a man he will very quickly learn that this part of his work is of greater importance than merely being able to operate the machine while it is in good condition.

The master mechanic should make regular and frequent inspections of all the equipment on the job and at all times see that the operators have their machinery in a condition to give the best possible service, and also see that everything is looked after at the proper time in order to prevent breaks and accidents and not allow machines to be run until they go to pieces for lack of the proper attention.—“The Contractor.”

Remarkable Church Roof

Reinforced concrete construction is gaining favor with architects for the construction of church roofs, the principal advantages being the practicability of constructing large barrel and domical roofs without unsightly trusses, tie-rods, etc., and the low cost of upkeep. An interesting example of this form of roof, and one of the first to be constructed throughout of reinforced concrete, is that of St. Aloysius Roman Catholic Church, Glasgow.

In plan the church is of the usual cruciform shape, and the building is faced with red freestone in the classic style, the reinforced concrete roof work being carried on the main walls. The roofs over the nave, transepts, and apse are in the form of semi-circular arches, the nave roof having a clear span of 44 feet 6 inches and a length of 65 feet. The nave roof is supported on arch ribs, reinforced in such a manner as to take the whole of the stress due to thrust without putting any thrust on the side walls, where the load is vertical. The ribs carry a 4½-inch slab forming the roof covering, this slab being reinforced with expanded steel. There are two four-light cupolas in this roof. These act also as ventilators. The roofs over the transepts and apse are of somewhat similar construction but of small span. Three of the main arches carrying the large central dome are of brickwork. The central dome, which is 44 feet by 34 feet, 3 inches, has a radius of 29 feet 6 inches for the first portion and a radius of 21 feet for the upper portion or dome proper. There are eight large lights in this dome. The concrete in the dome is generally 9 inches thick throughout, reinforced with expanded steel and circumferential round steel rod rings.

“Inquirer” asks for a comparative statement of building operations at Calgary for the first quarter of 1910 and the corresponding period of 1909.

The value of the permits issued during March, 1910, was \$415,800, and during March, 1909, \$94,900. For the first three months of 1910 the total was \$692,100, compared with \$194,600 for the same period of 1909. The approximate increase per cent. for the first three months of the current year works out at 256 per cent.

Canadian City Engineers

Mr. H. B. R. Craig, Kingston, Ont.

Had Mr. H. B. R. Craig followed the profession of his father, he would have been a Presbyterian minister instead of a city engineer. Whatever influences were brought to bear, however,—adverse or otherwise,—Mr. Craig decided to become an engineer; and, as far as we know, he has not found occasion to regret his choice. He was born at Deseronto, Ont., 30 years ago. His early education was obtained in the Deseronto public and high schools and at the Kingston collegiate institute. Later on he attended school in Stuttgart, Germany, for a couple of years. In 1898 he joined the Royal Military College at Kingston, leaving that institution on account of ill-health in December of the following year. The next connection he made was with the School of Mines, Queen's University, Kingston, from which, in 1903, he graduated as a Bachelor of Science in Civil Engineering. In 1905 he was elected an associate member of the Canadian Society of Civil Engineers. Last year, it is of



Mr. H. B. R. Craig, City Engineer of Kingston.

interest to note, he became a member of the American Society of Engineering-Contractors.

Mr. Craig has seen some useful experience. In 1901 he was associated with Mr. A. K. Kirkpatrick, city engineer of Kingston at that time, in connection with the arbitration with the Light, Heat & Power Company for the control of the electric light and gas plants of the city. The following year he was engaged in preliminary and location surveys from Deseronto to Napanee and from Tweed to Bannockburn, Ont., for the Bay of Quinte Railway. During 1903 and until May, 1904, he was resident engineer on this railway in charge of construction of a ten-mile section, including grading, ballasting and track laying.

From May to December, 1904, Mr. Craig was resident engineer on the Toronto-Sudbury branch of the C.P.R., being in charge of the revision of location and the construction of a ten-mile section from Wahnapiatae river crossing to Sheppard lake. He became connected with the engineering staff of the city of Kingston in December, 1904. Here he remained until May, 1906, from

which date until June, 1907, he was resident engineer on the Lake Superior Branch of the G.T.P., in charge of an 8-mile section at Buda, Ont. Later, he was resident engineer on the Prairie West Division of the same railway, having charge of construction through the Eagle Hills.

The position which Mr. Craig now occupies came to him in March, 1908, when he was appointed city engineer, building and plumbing inspector of Kingston. During Mr. Craig's tenure of office the city has carried out a number of important municipal projects. Among the works that have come under Mr. Craig's direct supervision may be mentioned the construction of 41 miles of railroad construction, 10 miles of tracklaying and ballasting, 2,000,000 feet B.M. timber trestles, one single track railroad tunnel in solid rock, including approaches 2,600 feet long; 23 miles of concrete sidewalks, 2 miles of tile sewers and 3 miles of macadam roadways.

Mr. Craig is city engineer of no mean city. A volume might be written upon the historic associations of Kingston. But we are more concerned with its development and future. In this regard we shall doubtless have plenty to relate in the future.

Personal News and Notes

At Halifax, N.S., the plumbers' strike has been settled by an increase from 25 to 30 cents an hour. Thirty-five cents an hour was asked.

Messrs. Chipman & Powers, consulting engineers, Toronto, have been engaged by the town of Dauphin, Man., in connection with the proposed waterworks and sewerage systems there.

Messrs. Sutcliffe & Neelands, consulting engineers, New Liskeard, Ont., have been appointed town engineers for the new municipality of Cochrane, in northern Ontario. A considerable amount of work will be done at Cochrane this summer in the laying of sidewalks. A sewage disposal system will be installed next fall.

City Engineer Ruttan, of Winnipeg, attended the annual convention of the American Waterworks Association held recently in New Orleans. At the convention Mr. Ruttan read a paper on Winnipeg's high pressure fire system. This paper will be found elsewhere in this issue. So far, the only cities on the North American continent which have a system of this kind are New York, Philadelphia, Toronto and Winnipeg.

Messrs. Jacobs, Davies & Forgie, of New York, have been engaged by the city of Toronto to prepare a preliminary report on the subway question, for which they will receive \$5,000. City Engineer Rust estimates the cost of a subway on Yonge street, from Front street to a point 500 feet south of St. Clair avenue, at \$1,400,000 per mile, or a total of \$4,017,000. The equipment will cost about \$300,000, and the maintenance \$60,000 per year. The surface lines to be constructed in connection with the subway will cost \$70,000 per mile.

Mr. N. C. Nichols, of the New York Dual Continental Filtration Company, is representing the interests of his firm at Montreal, where a new filtration system is under consideration. Messrs. Herring & Fuller, the New York engineers who are reporting on a filtration system for Montreal, state that it will be several months before they will be ready to present plans, specifications and estimates to the authorities. A testing laboratory has been erected at the city waterworks station. Investigations will be made there for the engineers by Messrs. Hinkley & Harrington.

Personal News and Notes

The Montreal City Council has voted a million and a quarter dollars for paving work.

Mr. Geo. W. Evans, C.E., of the Transcontinental staff at Quebec, Que., is now located at Red Deer, Alta.

The Saskatoon, Sask., plumbers have gone on strike for an increase of 5 cents an hour, from 50 to 55 cents.

Mr. W. W. Northcott, purchasing agent at Victoria, B.C., has also been appointed superintendent of public buildings for that city.

Mr. H. R. Rindal, late of Winnipeg, has been appointed chief engineer of the Pacific division of the C.P.R., vice Mr. C. E. Cartwright, resigned.

Mr. J. D. Whitmore, consulting engineer, Regina, Sask., has been engaged to plan the installation of a sewerage, water works and other plant for the town of Melville, Sask.

Mr. McGillivray, Government Good Roads Commissioner for Manitoba, has returned to Winnipeg after a trip through the province, undertaken with a view to inspecting the existing highways.

It is interesting to note that the ships required for the new Canadian navy will be built by contract. It is stated that tenders for the vessels will probably be taken next September or October.

One of the new Municipal Commissioners at Regina, Sask., is Mr. A. J. McPherson, who for some time has been consulting engineer to the city. Mr. McPherson's appointment is worth \$6,000 a year.

Mr. W. M. Davis, town engineer of Berlin, Ont., has been appointed city engineer for Prince Rupert, B.C., at a salary of \$5,000 per year. Fourteen applications were received. The salaries asked ranged from \$900 to \$6,000.

Mr. A. S. Blizzard, a prominent British business man now visiting Canada, spent several days in Toronto recently. He had previously visited Montreal, Ottawa, St. John and Halifax, and intends before returning to see this country from coast to coast. Mr. Blizzard is making arrangements for representation here of the well known Woolliscroft firm, of which he is managing director. They are large manufacturers of tiles, terra cotta, etc., and expect to work up a large market here. The visitor is greatly impressed with Canada.

Handy Reference Book for Contractors

The Canadian Fairbanks Company, Limited, have just completed their general catalogue, which will be ready for distribution July 1. The catalogue is a very artistic production and should prove of general interest to every manufacturer and purchasing agent throughout Canada. It is profusely illustrated and shows the many and varied lines handled by the company. The catalogue is divided into the following sections: Fairbanks scales; electrical apparatus and supplies; pumps, steam, belt and gasoline; valves and steam goods; railway and contractors' supplies; small tools and supplies; power transmission appliances; safes, vaults, and metal office furniture.

In addition to the general catalogue, small sectional catalogues as listed above are being issued. The general catalogue consists of approximately 1,200 pages. A heavy coated paper is used in both the general and sectional catalogue, so that all engravings are shown up to best advantage. The general catalogue is bound in cloth covers, the sectionals in heavy cover stock, richly embossed. Neither time nor expense has been considered in preparing this catalogue, and it is with a great deal of satisfaction that we now present it for your consideration.

As a reference book it will prove of very great value in

every manufacturing plant and a glance through its pages will bring to mind very strongly the position being filled by the Canadian Fairbanks Company, Limited, as Canadian distributors. Copies of this catalogue will be mailed free upon application.

Improved Design in Pumps

The accompanying cut illustrates a single acting triplex stuff pump, built by the Smart-Turner Machine Company, Limited, Hamilton. They have supplied a number of these pumps to paper mills. The pumps are designed so as to give ready access to all valves, cylinders and working parts. The plungers are outside guided and outside packed. The pump is brass fitted throughout, and provided with bronze ball valves, on bronze valve seats, which are held between the flanges of the valve boxes. There are no corners or pockets



Up-to-date Pump Manufactured by The Smart-Turner Machine Co., Ltd., Hamilton, Ont

in which the stock may lodge. Gears and pinions are cut from the solid, and connecting rods and crank shafts are of steel. The pump is built in a careful and substantial manner.

Choloride of Calcium in Concrete Mixtures

One of our friends in the builders' supply business asks us the following question and, as it is one of vital importance, we are answering it so that other dealers, and, in fact, anyone engaged in the building material business may have the benefit of our advice, says "Rock Products":

"What effect upon the strength of concrete has a mixture of ten to twenty per cent. chloride of calcium by weight of water? Also, will it cause the concrete to chip?"

The effect of calcium chloride on cement mixtures is practically of recent demonstration, consequently a great deal remains in theory which must be put on a practical basis. It seems to be the general consensus of opinion among those who are familiar with this compound and its peculiarities, that a two or three per cent. solution is ample to give the desired results and far enough within bounds to prove of safety. Percentages ranging above ten would give highly saturated solutions having the probable tendency to rapidly shorten the initial setting time of the cement and directly

interfere with its perfect crystallization. Naturally this would seriously decrease the original strength of the concrete with after effects which might altogether disrupt the bond. Later, its inclination to redissolve in the presence of moisture might cause the disintegration of the cement surface, penetrating deeper and deeper until the structure, in time, was pretty well destroyed.

The effect of chloride of calcium is somewhat analogous to common salt, technically known as sodium chloride, frequently used in concrete mixtures to prevent freezing. A two per cent. solution of calcium chloride will perceptibly retard the setting of the cement and will lower its freezing temperature to a point where for all ordinary purposes concrete structures can be erected in extremely cold weather without the accompanying bad effects so common to the majority of cases where special precaution is not exercised. In any event, care should be taken to protect the 'green concrete from frost by resorting to the usual methods of covering with straw, etc.

We doubt if high percentage of calcium chloride would cause the cement to chip. It would have rather the opposite effect; that is, slow disintegration. This is a subject, however, that will command further investigation and we hope to have more exhaustive data at hand in the near future.

Novel Method of Laying Rails in Reinforced Concrete

The "Electric Railway Journal" says that Dr. M. Eisig, manager of the Chemnitz, Germany, municipal street railway system, has recently designed a novel construction for rigidly anchoring in a reinforced concrete base rails laid in paved streets. The anchorage consists of iron rods $\frac{3}{4}$ -inch to $1\frac{1}{4}$ -inch in diameter and from 20 inches to 24 inches long

passing through the web or the base of the rail from 6 inches to 8 inches apart and embedded in the concrete girder which surrounds the rail below the head. These rods are securely fastened to the rail by conical channel pins and are bent down at the ends to secure a firm hold in the concrete. The rods not only tie the rail to the concrete, but also serve as lateral reinforcement in the concrete beam. Additional reinforcement can be used by placing longitudinal rods in the concrete beam parallel to the rail and tying the two sets of rods together with wires at the points of intersection. The resistance to lateral motion of the rail under this construction is increased by inserting the transverse rods through the web of the rail close under the head. The distance between the top of the head of the rail and the centre line of these rods depends on the depth of the paving and the thickness of the layer of concrete above the rods. The adhesion of the concrete to the rail and the rigidly attached reinforcing rods prevent any movement of the rail relative to the concrete beam, and thus there is no grinding or pulverizing due to the rail working loose under vibration.

Building permits at Regina, Sask., for the month of May totalled \$392,975, bringing the total for the first five months of the present year up to \$967,670, \$200,000 in excess of the whole of last year.

The prosperity of Winnipeg and the West this year is reflected strongly in the building returns for the month of May, and also the returns for the first five months of the year. For the first five months of this year the total is \$7,428,900, or \$1,807,200 over the previous best year in the city's history. The total amount for the month of May this year is \$2,091,500. The number of permits issued in May was 497 for 597 buildings.



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Tenders

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your client many hundreds of dollars.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Clareholm, Alta.

The \$15,000 waterworks bylaw was carried.

Coldwater, Ont.

The citizens authorize the expenditure of \$23,000 for the installation of a gravity system of waterworks.

Fernie, B.C.

Tenders were called until the 3rd inst. for construction of a system of sewers and extension to the waterworks system. Plans, etc., with city engineer. G. H. Boulton, city clerk.

Guelph, Ont.

Tenders will be received until June 10th for approximately 11,700 square yards of bituminous pavements. James Hutcheson, city engineer. See advertisement in "Tenders and For Sale Department" of this issue.

Glasgow, N.S.

Engineer Mitchell has completed the survey in connection with the proposed waterworks.

Hamilton, Ont.

Tenders addressed to J. I. McLaren, chairman Board of Control, will be received until June 2nd for the construction of sewage disposal works pump house. Plans, etc., at office of City Engineer Macallum. S. H. Kent, City Clerk.

Edmonton, Alta.

Alexander Potter, C.E., of New York, has been engaged to prepare a report on the problem of sewage disposal in Strathcona and this city.

Esquimalt, B.C.

The necessity for a sewerage system is felt. Amount required, estimated at about \$50,000. Dr. C. J. Fagain, provincial health officer.

Montreal, Que.

Tenders will be received by the City Clerk until Thursday, June 9th, 1910, for the construction of a sewer on Labelle street between Morin street and Garry street, to St. Hubert street sewer. John R. Barlow, City Surveyor.

Tenders addressed to L. O. David, city clerk, will be received until June 2nd for the supply of about 4,000 tons of c. i. pipes. Specifications at office of the Superintendent of Water Works.

New Westminster, B.C.

Tenders are required for the laying and jointing of about 14 miles of 25-inch riveted steel watermain and about 7,780 feet of 12-inch and 7,500 feet of 13-inch lap-welded pipe. Plans, etc., obtained from the city engineer by the 6th of June. W. A. Duncan, city clerk.

North Bay, Ont.

Council has passed a bylaw to issue \$65,835 debentures for the sewerage system.

North Toronto, Ont.

The following tenders for 7,000 feet con-

crete sidewalk were received: Forcott Construction Company, 13½ cents a square foot; Royal Artificial Stone Company, of Guelph, 14 cents a square foot (accepted); J. Thompson, Toronto, 16½ cents a square foot.

Oshawa, Ont.

Tenders will be received until June 13th for the construction of 5,500 lineal feet, etc., of cement concrete sidewalks. F. Chappell, town engineer. See advertisement in "Tenders and For Sale Department" of this issue.

Port Hope, Ont.

Tenders are being called until June 13th for construction of five miles of concrete sidewalks, etc. See advertisement in "Tenders and For Sale Department" of this issue.

Petrolia, Ont.

J. McHattie, town clerk, is calling for prices on street pavement until June 6th. See advertisement in "Tenders and For Sale Department" of this issue.

Peterborough, Ont.

The bylaw to authorize the expenditure of \$30,000 for sewage facilities in the southwestern portion of the city was carried.

Point Grey, B.C.

The council are considering projects for an appropriation of something like \$500,000 to cover the cost of reservoir and site and the laying of mains. A bylaw for \$250,000 will also be introduced for sewage works.

Rosthern, Sask.

The town council is calling for tenders for thirty yards of clean gravel and twenty barrels of cement.

Renfrew, Ont.

Tenders addressed to N. McCormack, M.C., chairman, Waterworks Committee, will be received until June 11th for 2,500 barrels Portland cement.

St. John, N.B.

Tenders were called until June 1st for supplies for the Water and Sewerage Department. Specifications at office of City Engineer W. Murdoch.

A \$11,000 water mains bylaw will be submitted to the ratepayers.

St. Thomas, Ont.

Tenders addressed to Jas. A. Bell, city engineer, will be received until June 3rd for building a reinforced concrete culvert over Mill Creek on Palm street; also for grading, boulevarding and macadamizing Myrtle street from Fifth avenue to Third avenue. Plans, etc., at office of the above.

Stewart, B.C.

A deputation headed by Mr. H. Smith waited upon the government to request a grant of \$30,000 for sewage and sidewalk construction. J. Fred Ritchie, government engineer.

Toronto, Ont.

Tenders are being called for additions and alterations to engine-house at main

pumping station, until June 14th. G. R. Geary, chairman, Board of Control.

The Board of Control have decided to get plans for the 2000-foot extension of intake pipe. G. H. Benzenberg, of Milwaukee, and E. H. Keating, former city engineer, will be asked to report.

The tenders for heavy asphalt pavement for College street from Manning avenue to Dovercourt road from Construction & Paving Company for \$27,000, and that for asphalt block pavement from the Asphalt Block Paving Company for \$42,000, were referred to the City Engineer. Both carry a guarantee for 10 years.

Vancouver, B.C.

City Council have authorized the regrading and block paving of Pender street east, estimated to cost \$105,735, and the block paving of Granville street south, to cost \$741,030.

Granitoid pavement for Davis street having been decided upon, tenders will be called shortly. Estimated cost, \$110,000.

The council will probably submit a bylaw to raise \$500,000 to provide for a complete sewerage system.

Victoria, B.C.

City Engineer Smith in his report, submitted to City Council, outlines an expenditure of \$669,910 on pavement work.

Welland, Ont.

On June 27th the ratepayers will vote on the following bylaws: To raise \$60,000 for waterworks extension; \$5,000 for fire alarm system; \$10,000 for east end sewer.

The adopted report of Wm. Kennedy, consulting engineer, referred to in last issue contains the following suggested changes: A new 3,000,000 gallon per day pumping unit, estimated to cost \$11,500; two new water-wheels, \$2,300; 2,900 feet of 14-inch pumping main, stop-valves and special castings, \$7,100; flexible pipe, \$2,000; 2,800 feet of 20-inch pure water pipe (wood), \$10,700. The report neither provides for a settling basin nor a purification plant, which will be dealt with later.

Woodstock, Ont.

Tenders will be received until June 6th for \$50,000 5 per cent. road improvement debentures for County of Oxford. N. E. Birtch, County Clerk, Woodstock, Ont....

AWARDED.

Alexandria, Ont.

T. A. Morrison & Company, Montreal, have been awarded the contract to supply one Waters' steam road roller and one Champion stone crusher.

Humber Bay, Ont.

The contract for the 4-foot sidewalk between the city limits and Mimico Creek was awarded to W. Buckhurst, the lowest tenderer, of Toronto, at 10 cents per square foot, and 12 cents for crossings. The highest tenders were 10½ cents a foot and 20 cents for crossings.

Montreal, Que.

The Board of Control have recently awarded the following contracts: Supplying of asphalt, Barber Asphalt Company;

supplying macadam, Laurin, Leach & Company; supplying and laying curbstones, J. Mandeville; supplying and laying of blue-stone flags, F. J. Lawrence; supply material for asphalt sidewalks, Sicily Asphalt Company, 30,000 yards; Bithulitic Paving, 20,000 yards; supplying cement for walks, Assam Paving Company; supplying asphalt blocks, Ludger Gravel; laying asphalt on streets, Warren, Quinlan Asphalt Company; supplying granite blocks, Sicily Asphalt Company; scoria blocks, F. J. Lawrence.

North Vancouver, B.C.

The tender of the Canadian Wood Pipe Company, for supplying 17,000 feet of wood pipe to the city was accepted at \$16,397.50.

Ottawa, Ont.

N. H. H. Lett, secretary, writes that the Board of Control received the following tenders: Bank Street pavement—City Engineer, \$7,809; Ottawa Construction Company, \$8,249; The Barber Asphalt Paving Company, \$8,590; Union Construction Company, Ottawa, \$8,700. O'Connor Street pavement—City Engineer, \$14,734; Ottawa Construction Company, \$16,050; The Barber Asphalt Paving Company, \$16,424; Union Construction Company, Ottawa, \$16,990. The tender of the City Engineer in both cases was accepted, subject to approval of council.

Quebec, Que.

Two tenders were received for c.i. pipes and valves from Messrs. L. H. Gaudry & Company, and Bosse & Banks, while for pipes only the following tendered: J. T. Farmer, Montreal, and the Staveley Coal & Iron Company, Limited, of Montreal. As for both Messrs. Gaudry & Company were the lowest, they were awarded the contract.

St. Catharines, Ont.

The contract for sewers was awarded to Thos. Riley for different streets as follows: \$764.50, \$670.00, \$478.00, \$1007.50, \$810.00, \$875.00; the city engineer's estimates on same were as follows: \$741.00, \$621.00, \$780.00, \$1040.20, \$780.00, \$875.00. The award for the construction of sewer on Ottawa street was postponed. The following are the prices of Newman Bros. for same streets: \$845.00, \$699.20, \$540.00, \$1050.40, \$840.00, \$900.00; and those of Elliott & Riley for same, \$839.00, \$807.00, \$586.00, \$1035.20, \$870.00, \$935.00.

Toronto, Ont.

The Allis-Chalmers-Bullock, Limited, of Montreal, was awarded by the Board of Control the contract for the centrifugal pumps and electric motors for the Sunny-side sewage system, at \$3,215. The Canadian Buffalo Forge Company tendered for \$3,000, bidding on 20 horse power motors, whereas the specification clearly provides for 40 horse power.

Virden, Man.

J. F. C. Menlove, secretary-treasurer, writes that the following were the successful tenderers for the cement works, etc., for this municipality: Western Pavers, Limited, Winnipeg, for construction of sidewalks; Manitoba Hardware & Lumber Company, Virden, for 800 barrels Portland cement; W. A. Cook, Virden, for the necessary supply of gravel and sand.

Victoria, B.C.

Messrs. Hutcheson Bros. & Company, Limited, have secured the contract for the supply and erection of a Volute sewage pump, electric motor and an automatic starter, at \$885 each.

The Department of Public Works has awarded the contract for the permanent paving of the drives on Parliament Square

to the Hassam Pavement Company at \$20,000. Work is to be completed by September 30th.

Victoriaville, Que.

The contract for the supply of a road roller for this municipality has been awarded to T. A. Morrison & Company, Montreal, who will supply a Waters' steam roller.

Vancouver, B.C.

The award of the Georgia street bitulithic paving contract was made to the Warren Company.

Winnipeg, Man.

M. Peterson writes that the contract for construction of asphalt pavements in this city has been awarded to J. W. Astley, Engineer of Construction.

Westmount, Que.

The Corporation of Westmount have awarded contracts for pavement and roadway construction as follows: Paving Sherbrooke Street from Green avenue to the western limits of the city, to the Warren-Quinlan Company at \$85,776; paving Metcalf avenue, Selby street, Wood avenue, St. Catherine street from Green avenue to Victoria street, and Lansdowne avenue from Sherbrooke Street to Southern limits, Canadian Mineral and Rubber Company, Toronto, at \$115,396. A. D. Shibley, City Clerk, Westmount, Que.

Railroads, Bridges and Wharves

Armow, Ont.

Tenders are being received by J. Jarrell until June 4th for building a cement arch bridge in the Township of Kincardine. Plans, etc., at office of R. B. Campbell, clerk.

Lachine, Que.

The C. P. R. Company contemplate the rebuilding and double tracking of the bridge over the St. Lawrence river at Lachine, Que. With this in view tenders are now being asked and a decision will be definitely reached when these are all received. (Previously noted.)

Maria, Que.

Tenders will be received until June 20th for the construction of an extension to the wharf. Napoleon Tessier, secretary, Department of Public Works, Ottawa.

North Vancouver, B.C.

Designs for Second Narrows bridge, prepared by Donald Cameron, call for a high-level structure, costing about \$1,250,000. Reeve McNaught, Messrs. J. C. Keith and E. W. Maclean are interested.

New Liskeard, Ont.

Tenders addressed to E. F. Stephenson, Clerk, will be received until June 3rd for the erection of a bridge on the 6th concession of Dymond; bridge to be a 50-foot trestle; wood on the ground, hardware and spikes to be supplied. Work to be completed by July 15th.

Ottawa, Ont.

Tenders addressed to N. Tessier, secretary, Department of Public Works, will be received until June 27th for the construction of a wharf at Lennox Island, P.E.I. Plans, etc., at this department and at the office of J. H. Hogan, district engineer, Charlottetown, P. E. I., and on application to postmaster at Port Hill, P. E. I.

Quebec, Que.

It is stated on good authority that tenders for the superstructure of the Quebec bridge will be called for within ten days. Tenders from at least seven firms in Great Britain, Germany, United States, France and Canada are likely to be sent in.

Quesnel, B.C.

The Board of Trade are endeavoring to have a bridge built across the Fraser river here.

St. John, N.B.

It is announced that Mr. Thos. Macleolm has secured the charter of the Quebec and New Brunswick Railway with a view of completing a line from Quebec to St. John.

Toronto, Ont.

The city engineer will have the concrete bridge at the Island constructed by day labor, the lowest tender being \$500 above his estimate.

Vancouver, B.C.

It is stated that the C. P. R. will immediately call for tenders on construction of Kootenay Central Railway.

Woodstock, Ont.

F. J. Ure, county engineer, is calling for tenders until June 8th for construction of two concrete bridges. See advertisement in "Tenders and For Sale Department" this issue.

Weston, Ont.

Tenders will be received until June 2nd for the construction of a reinforced concrete arch bridge of 119-foot span; also tenders for grading and filling the approaches. Barber & Young, county engineers, Toronto.

Winnipeg, Man.

The Hyland Navigation & Trading Company have bought five acres on Red river, where they purpose constructing docks and pier to cost about \$60,000. J. L. Hyland, president.

AWARDED.

Chatham, N.B.

The contract for the construction of about 8½ miles of railway on the I. O. R. near here costing about \$200,000 has been awarded to Morrison & Clark, of Summerside, P. E. I.

Comox, B.C.

Sabin & Stevens have been awarded the contract for clearing the right of way for the Comox extension.

Kingston, Ont.

Contracts for the construction of four Pacific type locomotives for the T. & N. O. Railway have been awarded to the Kingston Locomotive Works, for \$90,000. Twelve cinder cars will be built for \$15,000, and fifty box cars, with steel frames, for \$55,000.

Ottawa, Ont.

The contract for building section 6 of the Trent Valley Canal has been awarded to Haney, Quinlan & Robertson, of Toronto and Montreal. Cost \$600,000. Distance, about 6 miles.

St. Thomas, Ont.

The following tenders were received for (1) Union Pond and (2) Salt Creek bridges: Williams & Walker (2) \$935; Powles & Gunning, (1) \$2,169, (2) \$997; J. W. Chivers, (2) \$1,100; Jas. Vincent, (1) \$1,895, (2) \$1,275; Jas. Prew, (2) \$1,225; C. C. Stafford, (1) \$1,899, (2) \$1,329; J. T. Leverton (1) \$3,100. Jas. Vincent was awarded the contract for Union Pond bridge and Powles & Gunning that for Salt Creek bridge.

Winnipeg, Man.

Frank Lee, division engineer, of the C. P. R., has let the following contracts: Ditching work between Fort William and Winnipeg to Jackson & Goldie, of Winnipeg; construction of Stonewall station, E. J. McGreevy, Winnipeg; Fort William machine shop, W. H. Braden, Fort William; Yorkton station, T. E. Ames, Winnipeg.

Public Buildings, Churches, Schools, etc.

Amherstburg, Ont.

Tenders addressed to P. Laferte, chairman, will be received until June 9th for the erection of a new Roman Catholic Separate school here. Plans, etc., at store of the above-mentioned.

Belleville, Ont.

The Board of Education will ask the council for an appropriation of \$50,000 for collegiate institute.

Brandon, Man.

Plans for the new theatre have been prepared by Architect Sinclair for Dr. Eagles, who is interested. Estimated cost, \$30,000.

Cumberland, B.C.

Tenders will be received until June 10th for installing a hot air heating furnace in the public school. Work to be completed by the 10th day of August. For plans, etc., apply Thomas H. Carey, Secretary.

Castleford, Ont.

Tenders addressed to B. Ferguson, chairman School Board, will be received until June 10th for the remodelling and enlarging of school here. Plans, etc., at office of W. J. Humphries, secretary.

Duart, Ont.

Tenders will be called shortly for a new Presbyterian church to be erected. Wilson & Son, architects, Chatham, are preparing plans.

Elkhorn, Man.

The bylaw authorizing the issuing of debentures to the extent of \$20,000, for the erection of a new six-roomed school house, was carried.

Fraserville, Que.

Tenders will be received until June 13th for the construction of an armory. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

Guelph, Ont.

A building campaign will be inaugurated by the Y. M. C. A. here. Mr. A. M. Mitchell, secretary.

Halifax, N.S.

The plans and specifications for the proposed North End school, prepared by Architect C. W. Fairn, have been completed.

Ladysmith, B.C.

The design of Mr. S. B. Bird of Vancouver, has been selected for the new hospital here.

Moncton, N.B.

Tenders addressed to F. A. McCully, secretary, will be received until June 17th for construction of brick and stone school, known as Victoria School Annex. Plans, etc., at office of above, also at office of F. Neil Brodie, architect, St. John, N.B.

Moose Jaw, Sask.

A bylaw will be submitted on June 17th to raise \$100,000, part of which will be appropriated as follows: Improvement of exhibition grounds, \$10,000; erection of produce, hay and stock market, \$30,000; erection of an isolation hospital, \$15,000; sub-fire station, \$10,000.

Montreal, Que.

Messrs. Martineau & Prenouveau have commenced work on the construction of alterations and additions to Montcalm School for the Board of Catholic School Commissioners. Marchand & Haskell, architects.

Plans and specifications have been prepared and tenders will be received until June 4th for the erection of a church

building in St. Catherine County, Bourneus Que. Plans and specifications can be seen at the office of Mr. A. Brassard, architect, 9 St. James street, Montreal, or at the Presbytery, St. Catherine, Que. Reverend S. Jolicoeur, parish priest.

Mr. Alphonse Venne, architect, is preparing plans for two school buildings in Cote St. Paul. A school for girls will be erected on the site of the recently destroyed St. Paul's Academy, and a new and extensive academy for boys will be also built. A private residence for the Brothers, who will be connected with the boys' school, will be erected adjoining the boys' academy.

Plans and specifications are being prepared and tenders will be received from June 13th to June 22nd for the erection of two schools for boys, and one girls' school for the Catholic School Commissioners, of Maisonneuve. Mr. C. A. Reeves, architect.

Messrs. Hutchison, Wood & Miller, architects, are now receiving tenders for the erection of the First Presbyterian Church, corner Mance and Prince Arthur street.

Tenders will be received until June 6th for fittings required, Central Post Office, Montreal. Plans and specifications on application to H. N. Lymburner, superintendent of Dominion Building, Post Office, Montreal.

New Liskeard, Ont.

Plans for the new fire hall were approved by the Council. Tenders for the erection of the building will be called shortly. Estimated cost, \$2,300.

Outremont, Que.

The town council are contemplating the erection of a fire station in the near future.

Orillia, Ont.

Tenders will be received until June 4th for the erection of a Public Library building. W. H. Croker, architect.

Ottawa, Ont.

A construction permit for a new solid brick edifice to replace the present Bell street Methodist church has been issued, \$20,000. The addition to the military stores building will cost \$30,000, for which a permit has been issued.

It is stated that the building of a Labor Temple here has been postponed.

Tenders addressed to N. Tessier, secretary, Department of Public Works, will be received until June 14th for the construction of an addition to the Eastern Departmental Building. Plans, etc., obtained at above Department. See advertisement in this issue.

Parry Sound, Ont.

Tenders addressed to G. Rowlinson, will be received until June 10th for the erection of a two-storey brick veneered Sunday school room for Methodist church. Plans, etc., at office of J. S. Russell, Stratford or at store of above mentioned.

Portage la Prairie, Man.

Tenders for erection of north ward school will be called shortly.

Prince Rupert, B.C.

It is reported that a syndicate intends investing \$50,000 in theatrical enterprises.

Strathcona, Alta.

Plans for the new post office and armory have been prepared and are awaiting approval. J. M. Douglas, M.P.

Sapperton, B.C.

At a meeting of the hospital board at New Westminster, it was decided to build

the new \$100,000 Royal Columbian hospital here.

Smith's Falls, Ont.

G. T. Martin, this place, is the architect in charge of the erection of Protestant General Hospital here.

Toronto, Ont.

The Women's Christian Temperance Union will erect a residence for young women. A site has been secured.

Tenders addressed to T. Crawford, Confederation Life Building, will be received until June 4th for the purchase of \$16,000 4½ per cent public school debentures for the Township of Scarboro.

Verona, Ont.

The Methodist Church was destroyed by fire on the 26th ulto. Loss \$2,000.

Vancouver, B.C.

Tenders for the construction of the new Labor Temple will be called at once. Directors, J. H. McVety, secretary; S. W. Thompson, chairman. Architect, Thomas Hooper. Noted previously.

The Sons of Israel have had plans prepared for a synagogue to be erected on Keefer street. Total expenditure, \$10,000.

Winnipeg, Man.

Tenders are being received until June 14th for the erection of two technical high schools. Plans, etc., with J. B. Mitchell, commissioner of school buildings. R. H. Smith, secretary-treasurer, W. P. S.

AWARDED.

Brandon, Man.

The Hospital Board accepted the tender of the Stewart Iron Works, of Winnipeg, for the new boilers and the tender of Jas. McClement for the addition to the laundry at a cost of \$4,000.

Calgary, Alta.

Peers & Macleod, lowest tenderers, were awarded the contract for erection of a 12-room school for \$98,000; Grant Bros. & Company received the contract for heating, plumbing and ventilation at \$15,977. Other tenders were: For the building, D. McDonald, \$125,329; G. H. Archibald, \$100,626; Groundwater & McFarlane, \$99,504.60; L. R. Burn, \$105,583; A. A. McPhail, \$114,498. For plumbing, heating and ventilation, E. J. Young, \$16,011; E. L. Martin, \$15,970.65; Wm. Head & Company, \$16,716.

Lindsay, Ont.

Messrs. Jay & Sons, Oshawa, have been awarded the contract for the erection of both schools here.

Merritt, B.C.

The contract for the new Presbyterian church has been let to Hyland & McLean.

Moose Jaw, Sask.

The following tenders were received for the erection of Nurses' Home: Navin Bros., \$19,000; Thos. Grayson, \$16,822; W. H. Ellis, \$16,149; Willoughby & Hay, \$15,600 (accepted).

Montreal, Que.

Contract for reinforcing steel to be used in the construction of the Earl Grey school building has been awarded to the Pedlar People. Mr. W. E. Ramsay, salesman, agent.

The contract for the completion of alterations to premises on Seymour street for the Society of St. Elizabeth has been awarded to R. Labelle. Mr. J. A. Sawyer, architect.

Contracts for the St. Clements Church, Verdun, Que., have been awarded as follows: Masonry and carpentry, Shewer, Brown & Willis; roofing, Richardson, Si-

mard & Company; pluming and heating, T. Lessard & Sons, Limited; plastering, G. E. Bowen; electric wiring, Sayer Electric Company. Messrs. Ross & MacFarlane, architects.

Messrs. Sibley & Huot have been awarded the sub-contracts for the roofing of the Earl Grey and the Alexandria Schools for the Protestant School Commissioners. Mr. A. F. Dunlop, architect.

The contract for the installation of a fire escape in the Jean Lever School, recently erected on Wellington street for the Catholic School Commissioners of Point St. Charles, has been awarded to Mr. Derjeron.

Messrs. Marchand & Haskell were the successful competitors in the competition of the Catholic School Commissioners for plans of a school for girls to be erected this summer at an estimated cost of \$115,000. Plans will be ready for tendering in the course of a few weeks.

Contract for the erection of a school building for the Protestant School Commissioners at Shawinigan Falls, Que., has been awarded to Heon, Roy & McLeod, general contractors, Three Rivers, Que. Peden & McLaren, architects.

Toronto, Ont.

Contract for galvanized iron, slate and felt roofing on St. Joseph's Convent, has been awarded to A. B. Ormsby, Limited; also that for the galvanized iron and roofing on the Oakwood High School.

R. Robertson & Sons, Limited, this city, have been awarded the masonry contract for the Museum Building, University of Toronto. Notices of other contracts will be announced later. Architects, Darling & Pearson.

The Property Committee of the Board of Education awarded the following contracts for additions to schools: Malvern Avenue High School—Masonry, R. Chalkley & Son, \$1,141; roofing, G. M. Bryan, \$560; painting, R. G. Johnson, \$294. Crawford Street School—Masonry, J. W. Hutcheson, \$430; carpentry, Wm. Eaton, \$203; painting, J. Taylor, \$450. Duke Street School—Masonry, J. W. Hutcheson, \$895; carpentry, Fred Armstrong, \$535; painting, F. J. Cox, \$417. Huron Street School—Masonry, W. T. Jay, \$1,375; carpentry, F. Armstrong, \$2,445; structural steel for fire escapes, Reid & Burns, \$467; plastering, Geo. White, \$591; painting, J. Phenimore, \$315; heating and ventilating, W. F. Rutley, \$1,805.

Residences

Brantford, Ont.

A building permit has been taken out by Mr. H. G. Hartley for a brick dwelling to cost \$2,900.

Duncans, B.C.

Tenders are being called for the erection of a residence here for C. H. Price. Plans at 735 Fort Street, Victoria. George C. Mesher, architect.

London, Ont.

A permit was issued to T. H. Robinson, two-storey, brick veneer on Cathcart street to cost \$2,100.

Montreal, Que.

Tenders for the erection of a residence to be erected on Querbes street Outremont, for Mr. G. S. Mundie, close June the 1st. House of Browne, Limited, architects, 207 St. James street.

Mr. Charles Bernier, architect, has prepared plans for six flats for Messrs. Bisson & Charbonneau, who will superintend the building of same.

Plans and specifications have been prepared and tenders are invited for the erection of a store and dwelling in Notre Dame de Grace for Mr. T. Decarie. Mr. C. Dufort, architect.

Maisonnette, Que.

Building permits taken out during present season include: H. Allan, 568 La Salle avenue, two flats, \$3,500; H. Aubertin, 76 Fourth avenue, three flats, \$4,500; C. Arcand, 91 Joliette, Hochelago, three flats, \$5,000; A. Allard, 545 Ontario, four flats, \$5,000; F. Brow, 573 Iberville, two flats, \$3,000; J. H. Brisson, 242 William David, two flats, \$3,000; E. Bernier, 62 Lafontaine, six flats, \$6,000; Benoit & Freres, 755 Ontario, three flats, \$5,000; A. Bouchard, Orleans street, four flats, \$3,500; Corbeil & Freres, 3 Desjardins street, six flats, \$7,000; H. & A. Charpentier, L'Epiphanie, two flats, \$5,000; F. Charbonneau, 1896 Boyer, three flats, \$4,500; E. Dusault, 154 Fifth avenue, ten flats, \$8,500; T. Desbien, 602 Orleans, five flats, \$5,000; E. Danserau, 673 Notre Dame east, six flats, \$6,000; Dufresne & Locke, Desjardins and Ontario, two flats, \$2,500; George Gravel, 272 Fourth avenue, four flats, \$5,000; G. Gauthier, 660 Letourneaux, five flats, \$10,000; Jouvet & Desbien, 177 Notre Dame east, nine flats, \$6,000; A. Lapierre, Fifth avenue, Viauville, six flats, \$8,000; T. Ledue, 123 Aird, three flats, \$4,500; F. Leipen, 858 Ontario, three flats, \$4,000; N. Leger, 403 Adam street, five flats, \$5,000; A. Louette, 637 Bourbonniere, six flats, \$5,000; H. A. E. Morin, 5th avenue, Viauville, four flats, \$4,500; Merchessault & Morency, 231 Desjardins, four flats, \$4,500; J. D. E. Martin, 660 Bourbonniere, nine flats, \$6,500; N. Morin, 219 Ontario avenue, Viauville, six flats, \$5,000; A. Picard, 95 Jeanne D'Arc, four flats, \$5,000; Roberge & Tremblay, 250 Bourbinniere, six flats, \$5,000; H. Aubertin, Fourth avenue, three flats, \$5,500; C. Roberge, 616 Lafontaine, three flats, \$4,500; D. Roy, 662 Adam street, four flats, \$5,000; Stentzel & Company, 209 Sanguinet, eight flats, \$10,000; A. Sicard, 7 Fifth avenue, six flats, \$7,500.

Victoria, B.C.

Recent building permits include: M. Pollock, one and a half storey dwelling, Denman street and Tolmie road, \$3,000; E. M. Trackwell, for a two-storey, 12-roomed dwelling of frame character with concrete foundation on Foul Bay road, \$10,500; H. Bowen, for a two-storey 10-roomed dwelling on Rockland avenue of frame construction with stone basement for \$20,000.

Winnipeg, Man.

Recent building permits include: A. J. Carson, house, Cathedral avenue, \$2,500; Arni Eggertson, three houses, south McMillan avenue, \$13,500; Arni Eggertson, two houses, Burnell, \$6,000; D. A. Ross, house, Balmoral place, \$5,000; W. Hodgins, house, Margaretta street, \$2,500; J. A. Pottruff, house, Kingsway, \$7,500; J. C. Fitzgerald, house, Florence avenue, \$4,500; E. G. Sherwood, house, Blanche avenue, \$2,600; E. Coleman, house, Church avenue, \$2,900; G. O. Aulsebrook, house, Fawcett street, \$4,000; W. S. Armstrong, house, Hetherington street, \$2,500; C. P. Mason, house, Ross avenue, \$2,500; W. A. Cameron, house, Arlington street, \$4,300; A. Macaw, four houses, Grosvenor, \$4,000 each; J. E. Moxley, house, Simcoe, \$2,500; J. Leggat, house, Kelvin, \$3,300.

AWARDED.

Boissevain, Man.

The contract for building the Methodist parsonage has been let to G. C. Currie and W. J. Armstrong for \$3,580.

Montreal, Que.

Contracts have been awarded as follows for hall and flats to be erected for Mr. J. C. Cassels: Plumbing, heating, roofing, and wiring, Alex. Mackay & Company; steel work, Dominion Bridge Company. J. E. Adamson, architect, 630-631 Coristine Building, Montreal.

The contract for masonry and brick work, residence for H. D. Walker, McGregor street, has been awarded to Peel, Pampalon & Peel. Messrs. MacVicar & Heriot, architects.

Messrs. Saxe & Archibald have awarded further contracts in connection with a residence for Mr. J. M. Wilson on Ontario avenue, as follows: Painting, H. Morgan & Company; plastering, J. Morrison & Company, Limited; electric wiring, M. Rubenstein.

The following contracts for a residence for Mr. Horace Joseph, Sherbrooke street, have been awarded: Painting and glazing, J. N. Archand; plastering, Geo. Hamilton. Mr. H. C. Stone, architect.

Outremont, Que.

Contracts for four houses to be erected for Donald Munro and others, have been awarded as follows: Mason, brick and stone work, James Young; carpentry and joinery, C. E. Frost; painting and glazing, F. X. Lavallee; plastering work, H. Oram; roofing and damp-proofing, Campbell, Gilday Company, Limited; plumbing and heating, D. A. Bethune. Jas. E. Adamson, architect, 630-631 Coristine Building.

Westmount, Que.

The general contract for three houses to be erected in Westmount for W. W. Craig, Esq., have been awarded to Jackson & Company.

The contract for the erection of a block of residences for Mr. A. H. Chave to be erected in Westmount, has been awarded to Mr. W. H. Creed. Estimated cost, \$20,000. Messrs. Ogilvy and Mitchell, architects.

Winnipeg, Man.

The contract for the building of a residence to cost \$8,000 for J. A. Pottruff, has been let to Sparrow Bros. James Chisholm & Son, architects.

Business Buildings and Industrial Plants

Estevan, Sask.

Plans for the two-storey building to be erected for H. J. McNeil have been prepared by McKenzie & Prevost.

Caledonia, Ont.

The Alabastine Company, of Paris, is negotiating for the erection of a new mill here to cost fifty thousand dollars.

Brandon, Man.

Nation & Shewan, and the Adams Shoe Company, have decided to considerably increase their quarters.

Edmonton, Alta.

Dr. J. W. Rowntree of the Van Slyk Plow Company, of Red Deer, is looking for a site for his factory. Edmonton is favorably considered.

It is probable that the Sawyer-Massey Company will in the near future, erect a large warehouse here. Mr. Ramsay, local representative.

Fort William, Ont.

Contracts will be awarded shortly for the construction of annex to Mona block. Estimated cost, \$10,000. Architects, Hood & Scott.

Lacey Bros. have purchased 125 feet on May street, where most likely a business block will be erected before the fall.

Georgetown, Ont.

Tenders will close shortly for erection of three-storey mill building of reinforced concrete throughout. Plans, etc., with L. E. Fleck, this place.

Gananoque, Ont.

A bylaw will be submitted to ratepayers to grant a twenty-year exemption from taxation to the D. F. Jones Stove Company of that place on a proposed extension of their plant.

Kamloops, B.C.

It is stated that Robinson & McKenzie, this place, intend to erect a saw mill at some point on the South Thompson.

Kinistino, Sask.

The mill property of the Kinistino Milling Company was totally destroyed by fire on the 27th ulto. Loss was \$56,000.

Moncton, N.B.

Fire destroyed the large hotel at Memramcook station owned by the McManus estate. Loss about \$10,000.

Meritt, B.C.

The Bank of Montreal has purchased a building site here.

Montreal, Que.

Plans and specifications have been prepared and tenders are now invited for the erection of a four-storey warehouse on St. Lawrence Boulevard for the City House Furnishing Company. Mr. C. Dufort, architect.

Mr. Phil Meehan will shortly erect a three-storey structure to be devoted to light manufacturing purposes, at 8 to 10 St. Monique street, with frontage of 70 feet.

The Hannan Stores, Limited, St. James street, contemplate extensive alterations to their premises.

Plans and specifications have been prepared and tenders will be received until June 1st for the erection of a six-storey fireproof building for Messrs. H. Kellert & Son, corner St. Catherine and St. Urbain street. Messrs. Hutchison, Wood & Miller, architects.

Mistatim, Sask.

The saw mill, stores and other buildings of the Cowan Construction Company were destroyed by fire on the 27th ulto. Total loss estimated to exceed a million dollars. The mill will probably be rebuilt this season.

Owen Sound, Ont.

A syndicate of English capitalists will construct a million-dollar shipbuilding and repair plant and two drydocks at Owen Sound. The plant will be built on the C. P. R. waterfront here, and the company is taking a block of stock in the concern. The construction will cost in the neighborhood of \$1,000,000.

Ottawa, Ont.

The sash and door factory owned by J. Des Rivières, and other buildings were damaged by fire on the 27th ulto. to the extent of \$20,000.

A building permit for the new building

to be erected on Sparks street by A. Rosenthal and Sons, has been issued. The building will cost \$125,000, and will be of concrete construction. Weeks and Keefer, of Ottawa, are the architects, and C. E. Deaken, of Montreal, the builder.

Preston, Ont.

Part of the plant owned by J. Ballantyne & Company, was badly damaged by fire on the 26th ulto. Estimated loss, \$60,000.

Peterborough, Ont.

Mr. R. J. Manning, of Owen Sound, has opened negotiations with the industrial commissioner, with a view to the establishment of a wood-pulp factory in Peterborough.

Pense, Sask.

Scuber & McIntyre's implement warehouse, and Byer's butcher shop were destroyed by fire on the 29th ulto. Loss was \$5,000.

Quebec, Que.

The mill of the Beauce Pulp & Lumber Company, the property of Messrs. Gooday & Foy, merchants, this city, was destroyed by fire on the 25th ulto. Estimated loss, \$40,000.

Regina, Sask.

It is stated that the C. N. R. and the C. P. R. have agreed as to Union Depot. Plans have to be filed with the railway commission, after which work will probably be started. The G. T. P. will have their own entrance and their own terminals.

Tenders addressed to Storey & Van Egmon, architects, Regina and Saskatoon, will be received until June 6th for the erection of an office building for the Trustee Company, of Vancouver, Limited. Plans, etc., at office of the above and at the Builders' Exchange.

Saskatoon, Sask.

The sash and door factory of S. Hill & Son was destroyed by fire on the 26th ulto. Loss not stated.

Vancouver, B.C.

J. Farrier, secretary-treasurer, of the Steger Silica Brick Company, is superintending the erection of their plant on False Creek. Work will be started immediately.

Smith & Sherborne, contractors, are erecting the 5-storey concrete building for the Vancouver Ice & Cold Storage Company at a cost of about \$60,000; also a 5-storey warehouse on Railway street for Messrs. Martin, Robertson & J. Burns.

A permit has been issued for the erection of the plant for the Pacific Pressed Brick Company, \$70,000. E. D. Slagor, architect; Messrs. Towselle and J. Farrier, contractors.

Wingham, Ont.

A bylaw granting C. Lloyd & Son a free site for the enlargement of their door factory was carried.

Windsor, Ont.

The bylaw to grant a motor company a free site, etc., was carried.

Welland, Ont.

On June 27th the ratepayers will vote on a bylaw to give certain privileges to H. S. Peters of Dover, N.J., in return for the erection of a 3-storey factory. Architect, T. L. Nichols.

Winnipeg, Man.

Permits were issued to the Canadian Pacific Railway Company for new car shops at \$65,000; also to the Henderson Manufacturing Company for a new five storey

warehouse, \$50,000. A new store and apartment block will be erected by Frank Moses at the corner of Jarvis avenue and Main street at a cost of \$35,000. The block will be three storeys in height.

Tenders for the new warehouse for Gowans-Kent Western, Limited, will be called shortly. Estimated cost \$60,000; materials tyndall stone, pressed brick and stone trimming. Jas. Chisholm & Son, architects.

James Chisholm & Son, architects, this place, are preparing plans for the 4-storey building to be erected by the Sterling Bank of Canada, of which the cost is estimated at about \$300,000.

S. H. Chapman, president of the Ontario Wind Engine & Pump Company, it is stated, has arranged for the erection of a large brick warehouse here and at Calgary this summer.

The warehouse of the Canada Manufacturing Company, Nena and Logan avenues, was damaged to the extent of \$5,000 recently.

Fire on the 29th ulto., destroyed the plant of the Selkirk Match Company. The loss is \$25,000.

AWARDED.

Brandon, Man.

The contract for the new Royal hotel, to be built on Bosser and Thirteenth streets, has been let to Mr. Forbes, a local contractor. Work to be finished by November 1st.

The contract for the new block to be erected by Clement Bros., has been awarded to C. H. Simpson & Company, of Winnipeg. Estimated cost, \$75,000.

Fort William, Ont.

The contract for the superstructure of the business building being erected for Jas. Murphy has been awarded to J. L. McRae. Total cost of building, \$80,000. Work to be completed by January 1st. Carl Wirth, architect.

Humboldt, Sask.

A. E. Pike has secured the contract for erection of the Union Bank building here.

Montreal, Que.

Contracts have been let as follows in connection with a business building on St. Catherine street for Mr. S. Cuddy. General contract, O. E. Deakin; steel work, Dominion Bridge Company. Mr. William E. Doran, architect.

The contract for the erection of a building for the Canadian Amusement Company has been awarded to J. Jacob & Company. Mr. J. Seath Smith, architect.

The contract for the plumbing and heating of the Beardmore Building, has been awarded to Mr. M. J. Quigley. Mr. H. C. Stone, architect.

The contract for the installation of sprinklers in the Labelle Building has been awarded to the Rockwood Sprinkler Company. Mr. G. A. Monette, architect.

Contract for the alteration to the premises on St. Catherine street west for the Kastell Restaurant has been awarded to Mr. D. M. Long, general contractor. Finley & Spence, architects.

The contract for lathing requirements, Chateau Laurier, Ottawa, has been awarded to the Pedlar People. Mr. W. E. Ramsay, sales-manager.

The contract for the alterations to the building in the rear of the present St. Lawrence Hall, which will be remodelled and used as a hotel building, has been awarded to Messrs. Simpson & Peel, general contractors. Messrs. Finley & Spence, architects. Amount of permit, \$10,000.

Messrs. J. F. Jago & Company have been awarded the contract for the erection of a reinforced concrete building at Lachine, Que., for the Automatic Railway Signal Company at an estimated cost of \$25,000.

Port Colborne, Ont.

David Dick & Sons, Limited, Welland, have the Contract for building the International Cork Factory here. Cost, about \$40,000. The contract calls for completion by August 15th next.

Sault Ste. Marie, Ont.

Contract for the galvanized iron and roofing on the Bank of Montreal has been awarded to A. B. Ormsby, Limited, Toronto.

Swan Lake, Man.

W. H. Rosewarne, of Winnipeg, has the contract for the erection of the Bank of Hamilton here. Cost about \$25,000. Architect, W. Fingland, Winnipeg.

Winnipeg, Man.

The contract for the 3 storey store and office building, corner Notre Dame and Princess streets, for Jos. M. McGreevy has been awarded to Thos. Kelly & Sons for \$70,000. G. W. Northwood, architect.

Snyder Bros., of Winnipeg, have secured the contracts for the new C. P. R. depot at Minnedosa, Man., and the Yorkton station. They also have the new school at Estevan, Sask.

Power Plants, Electricity and Telephones

Estevan, Sask.

A suitable site for a municipal electric light plant has been purchased by Dr. D. R. Davies.

Farnham, Que.

The ratepayers have approved of a by-law to raise \$100,000, for the erection of a dam and for general power development work.

Ingersoll, Ont.

Two bylaws, one to raise \$39,800 to acquire the plant of the Ingersoll Power & Light Company, and the other to raise \$15,000 to make improvements and extensions to the plant, were carried.

Moncton, N.B.

The agreement prepared by the city council with the Street Railway Electric & Gas Company for the leasing of the city lighting plant for thirty-nine years has been endorsed by the ratepayers.

Moose Jaw, Sask.

A bylaw will be submitted to the ratepayers on June 17th to raise \$100,000, of which \$35,000 will be used in extension of electric light system.

Neepawa, Man.

The ratepayers endorsed a bylaw authorizing the town council to sell the municipal telephone system to the provincial government.

Point Grey, B.C.

The B. C. E. R. agrees to supply this municipality with light for ten years. Five hundred electric lights similar to those used in Vancouver will be installed.

Renfrew, Ont.

The bylaw to raise by debenture the sum of \$82,000 for water power development was carried.

Victoria, B.C.

The city will shortly call for tenders for fifty additional arc lights. Cost, about \$3,500.

AWARDED.

Victoria, B.C.

The contract for supplying ornamental pillars and fittings, for the new street lights on Douglas street has been awarded to Hutchison Bros., at a cost of \$54 each.

Winnipeg, Man.

The Board of Control have recommended the following for acceptance (in each case the lowest): Northern Electric & Manufacturing Company whose quotation, based on 280,000 duct feet was 7.82 cents a foot or \$21,896, was given the contract for conduits. This allows for the completion of all runs, plans for 1910, and provides a general amount of surplus stock for short extensions.

The contract for the McPhillips street sub-station—known as No. 2—goes to the engineer of construction, J. W. Astley, at \$11,423.19. The equipment of substation No. 2 is to be placed in the hands of the Canadian Westinghouse Company at a cost of \$29,616. This includes a bank of three transformers of 1,500 k.w. gross capacity as well as the necessary auxiliaries for installation in the terminal station building. In respect to the contract for construction of conduit runs, the recommendation will provide that G. M. Gest be awarded the contract, which is not to exceed \$40,000.

Miscellaneous

Hull, Que.

It is stated that this municipality will shortly purchase a fire engine similar to those in use in Ottawa.

Montreal, Que.

Recent building permits include the following: Diamond Flint Glass Company, 179 Delorimiere avenue, one house and one factory, \$7,000; St. Matthew Apartments, Limited, apartment house, \$45,00; J. E. Lalond, 2623 Esplanade, two houses containing four dwellings, cost \$2,500; N. Legault, 315 Breboeuf, one house containing three dwellings, \$3,000; J. H. Lafond & Company, 2623 Esplanade, two houses containing twelve dwellings, \$8,000; Cusson & Gagne, 171 Lac Cartier, one house containing three dwellings, \$3,000; E. Duesnard, 282 Aqueduct street, two houses containing six dwellings, \$6,000; V. Depatie, 2472 Mance, one house containing two dwellings, \$4,000; McGill University, Sherbrooke street, one educational building, cost \$150,000; L. P. Venne, 237 Ontario east, one house containing two dwellings and one store, \$6,000; A. Fortier, 15 Mt. Royal avenue, one house containing three dwellings, \$3,000; Montreal Steel Works, St. Patrick and St. Etienne street, two houses containing six dwellings, \$11,000; A. Deschamps, 1308 St. Hubert, two houses containing six dwellings, \$5,500; Collette & Frere Company, Limited, 477a Moreau, one house containing three dwellings, \$3,000; Jos. Villeneuve, 457 Panet, one house containing five dwellings, \$8,000; Jos. Senecal, 1381 St. Andre, two houses containing six dwellings, \$6,000; A. Christin, 1588 Labelle, two houses containing four dwellings and one store, \$5,000; Fortier Freres, 2553 Mance street, one house containing three dwellings, \$5,000; O. Berthiaume, 455 Plessis street, one house containing five dwellings, \$7,000; H. Rheau, 618 St. Hubert, two houses containing eleven dwellings, \$7,000; T. Raymond, 1177 Chabot, two houses containing four dwellings and one store, \$6,000; Rev. P. J. Heffernan, St. Anthony's Church, two houses containing six dwellings, \$4,000; the School Commissioners St. Gregoire de Thaumatzge, Marie Anne street, one house and one educational building, \$18,000; the School Commission-

ers St. Gregoire de Thaumatzge, on Delorimiere avenue, one house and one educational building, \$80,000; H. Cardinal, 462 Champlain, two houses containing four dwellings and two stores, cost \$8,000; Berthe Claude, 1821 Park avenue, one house, \$6,000; Leon Pichi, 1760 Mance, one house containing three dwellings, \$7,000; E. Martel, 569 Lfrontenac, two houses containing six dwellings and one store, \$5,500; D. Boucher, 660 Sherbrooke east, two houses containing six dwellings, \$5,500; F. Freniere, 611 Lafontaine, one house containing three dwellings, \$3,500; A. Ladouceur, St. Dorothee, County Laval, two houses containing six dwellings, \$6,000; Dement & Duffield, Toronto, Ontario, one house and one store and one warehouse, \$12,000; A. L. Whittet, 839 Cadieux, alterations to one house, one dwelling and two stores, \$2,300; Montreal Light, Heat & Power, alterations to factory on Craig street, \$16,000; Quebec Bank, alterations to building, \$2,500; S. Carsley Company, alterations to building, \$4,000; C. P. R. Company, alterations to the St. Lawrence Hall, \$10,000; J. W. Reed Company, Craig street west, alterations to factory, \$2,500; S. L. E. Cuddy Company, 535 St. James street, factory building, \$40,600; Bisson & Charbonneau, two houses containing six dwellings, \$15,000; W. Ouimet, 1371 St. Lawrence boulevard, one house containing two dwellings, \$4,000; M. Martin, 1790 St. Lawrence boulevard, one house containing three dwellings, \$2,500; Canadian Amusement Company, 207 St. James street, one house, \$8,000; F. Charlebois, 150 Boyer, one house containing two dwellings, \$3,400; J. H. Labelle, 2178 Hutchison, one house containing two dwellings, \$5,500; Catholic School Commissioners, Plateau Academy, one school building, \$14,500; J. Hogue, 695 Berri, six houses containing twelve dwellings, \$8,000; H. Hogue, 1591 St. Hubert street, four houses containing eight dwellings, \$5,000; A. Lamoureux, 853 Berri, two houses containing four dwellings, \$3,200; P. Meehan, Atwater avenue and St. Antoine street, factory building, \$10,000; S. C. Rodier, 62 St. Martin street, three houses containing twelve dwellings, \$6,000; A. Lemoine, 1227 Simard, one dwelling and four houses containing eight dwellings, \$9,000; M. C. Renaud, 340 Chambord, two houses containing four dwellings, \$4,000; C. J. Miller, 1163 Bordeau, two houses containing six dwellings, \$4,000; J. A. Therien, La Patrie Building, four houses containing twelve dwellings, \$8,000.

Ottawa, Ont.

Recent building permits include: Patrick Labelle, apartment house, to cost \$32,000; Jas. E. Wilson, solid brick shop, Bank street, \$5,000; J. Robertson, solid brick dwelling, Centre street, \$7,000; J. G. Davidson, brick veneer dwelling on Carling avenue, \$4,000; W. Burns, brick veneer dwelling, McLeod street, \$3,000.

Toronto, Ont.

Recent building permits include: E. Pullan, 3-storey brick addition to warehouse, Adelaide street, \$11,000; Park Blackwell Company, 3-storey brick addition to factory, Bathurst and Front, \$15,000; Mrs. G. Smith, 2-storey and attic brick dwelling, Heath and Warren, \$13,500; Bowles & Company, 2 detached 2-storey brick dwellings, on Keele, \$7,200; Masten & Fitzgerald, 3 attached 2-storey brick stores and dwellings, Gerrard, \$7,000; C. C. Robinson, 2-storey and attic brick dwelling, Sultan, \$9,000; L. M. Hall, 6 detached 2-storey brick dwelling, Willoughby, \$12,000; Dunfield & Company, 4-storey brick addition

to store and office, 102 Yonge street, \$12,000; Isaac Lennox, 2-storey brick dwelling, 90 Spencer avenue, \$5,000; J. H. Maguire, 3 detached 1½-storey brick dwelling, Keele, \$10,000; Jackson & Brooks, one pair semi-detached 2-storey brick dwelling, on Fairview, \$4,000; G. F. Hurlbut, 1 pair semi-detached 2-storey brick dwellings, on Stonehouse crescent, \$4,000; C. Rathbone, 2½-storey brick dwelling, on 100 Wells street, \$4,000 Mr. Mitchell, 2-storey brick dwelling, corner Pape and Bain, \$4,000; Jackson & Brooks, pair semi-detached 2-storey brick dwellings, Fairview, \$4,000; A. Bryce, 2½-storey brick dwelling, Russell Hill road, \$6,000; H. J. Rea, 2-storey and attic brick dwelling, Binscarth road, \$4,500; J. G. Booth, pair semi-detached 2-storey brick dwellings, Warren road, \$4,000; A. Hutchins, 2-storey brick dwelling, 7 Lippincott street, \$4,000; Geo. Martin, 3 attached 2-storey brick stores and dwellings, Harbord and Givens, \$9,000; Mrs. Grafton, 2½-storey brick dwellings, on Russell Hill road, \$7,500; Mrs. G. F. Madden, 3-storey brick apartments, on 36-38 St. Albans, \$35,000; J. W. S. Corley, 2-storey and attic brick dwelling, on Dunvegan road, \$10,000; Mrs. M. Clarkson, 2 pair semi-detached 2-storey brick dwellings, on Symington, \$10,000; Elias Rogers Company, roughcast stable, near Shirley, on Lansdowne, \$8,000; Wilson & Slayer, pair semi-detached 2-storey brick dwelling, Albany, \$8,000; J. Pearl, 4 attached 3-storey brick stores and dwellings, corner Bloor and Lippincott, \$14,000; R. Lankin, 7 pair semi-detached 2-storey roughcast dwellings, brick fronts, 649 Pape avenue, \$22,000; G. White, pair semi-detached 2½-storey brick dwellings, Montrose, \$6,500; T. F. Fleming, 3 detached 2½-storey brown dwelling, Evelyn avenue, \$7,500; C. Buschlen, 2 pair semi-detached 2-storey brick dwellings, on Gerrard east, \$8,000; M. Chapman, 2-storey and attic brick dwelling, on Alina, \$11,000; R. D. McLeod, 2 detached 2-storey and attic brick dwelling, on St. Clair, \$9,000; Love Bros., 4 detached 2-storey brick dwellings, on Dearbourne avenue, \$9,600; W. A. Forster, pair semi-detached 2-storey and attic brick dwellings, on corner Mutual and McGill, \$6,500; A. Butler, pair semi-detached brick dwellings, on Euclid, \$6,000; W. A. Goy, 4 attached 2-storey roughcast dwelling, brick fronts, on Marshall, \$6,200; Love Bros., 3 pair semi-detached 2-storey brick dwellings, on Dearbourne, \$12,000; Walter Scott, 4 attached 2-storey brick dwellings, on Lansdowne, \$7,000; W. P. Gundy, 2-storey brick dwelling, on Hawthorne avenue, \$10,000; Cameron Stewart Company, 3 detached 2½-storey brick dwellings, Redford avenue, \$9,600; Wm. Vokes, 2 detach 2½-storey brick dwelling, Indian road, \$7,000; G. E. Bayeroff, 3 attached 2½-storey brick dwelling, Bain, \$6,600; Thos. Leeming, 2½-storey brick dwelling, High Park Boulevard, \$6,000; J. A. Gallagher, 3-storey brick stores and dwellings, on Danforth, \$10,800; W. W. Hultz, 4 detached 2½-storey roughcast dwelling, on Dingwall avenue, \$7,000; A. E. Simpson, pair semi-detached 2-storey brick stores and dwellings, on Dovercourt, \$7,500; Salvation Army, 1-storey brick salvation army hall, corner Northumberland and Dovercourt, \$8,500; Geo. Knaggs, pair semi-detached 2-storey and attic brick dwellings, on Triller, \$9,000; Gordon Marr, 2 detached 2½-storey brick dwelling, near Keele, on Humberside, \$6,000; Mrs. A. H. Read, pair semi-detached 2-storey brick dwelling, near Laughton, on Gourley, \$5,000; E. G. Switzer, 2 detached, 2-storey brick dwelling, near Sunnyside, on West Marion, \$5,000; Our Lady of Lourdes, church, near Earl, on Sherbourne, \$60,000; Home for Incurable Children, 2-storey ad-

dition (brick), to dwelling, on 152 Bloor street east, \$6,000; J. A. MacMurehy, 3 pair semi-detached 2½-storey brick dwellings, near Dundas, on Chelsea, \$15,000; J. Smith, 3 attached 2-storey brick dwellings, on Osler avenue, \$6,000; Dundas Building Company, 2 pair semi-detached 2-storey brick dwellings, on Weston road, \$7,200; John Cook, 3 attached 2-storey brick dwellings, on Concord, \$7,500; Brown & Cooper, altering dwellings into stores, on 147-149 Church, \$7,600; G. L. Thompson, 5 pair semi-detached, 2-storey brick dwellings, near Harbord, on Mntrose, \$20,000; M. Tuckett, 2 pair semi-detached 2-storey brick dwellings, near Sinclair, on Chelsea, \$8,000; Dr. G. H. Burnham, 2-storey brick dwellings, on corner Lynwood and Warren, \$10,000; H. Sheinkman, 3 pair semi-detached 2-storey brick dwelling, on Symington, \$15,600; F. Love, pair semi-detached 2-storey brick dwellings, corner Garden avenue and Sunnyside, \$6,000; J. W. & W. W. Schofield, 3 pair semi-detached 2-storey brick dwellings, on 264-274 Symington, \$12,000; J. S. Lougheed, pair semi-detached, pair semi-detached, 2½-storey brick dwellings, corner Sunnyside and Garden, \$6,000; F. Elliott & Sons, 2 detached 2-storey brick dwellings, Parkway, \$5,000; E. P. Atkinson, 2½-storey, brick dwelling, High Park Boulevard, \$6,000; H. Sparrow, pair semi-detached 2½-storey brick dwellings, Hampton, \$5,000; Proctor & Gallagher, 3 attached 2-storey and attic brick dwellings, corner Humberside and Mavety, \$10,500; Justice Riddell, 2-storey and attic brick addition to dwelling, 109 St. George street, \$9,000; W. B. Charlton, 2½-storey brick dwelling, on Rowanwood, \$5,500; K. Gladman, 3 pair semi-detached 2-storey roughcast dwellings, brick fronts, corner Pape and Hazelwood, \$9,000; Dr. Peaker, 2-storey brick dwelling, on 133 Jameson; R. C. Brown, 2-storey and attic brick dwelling, Clarendon avenue, \$20,000; J. S. Robertson, 2½-storey brick dwelling, on Castle Frank avenue, \$10,000; I. W. W. Plwes, 3-storey brick flour mill, on 373 Front street east, \$11,000; Edward Moore, 10 detached 2-storey frame dwellings, on Coxwell avenue, \$7,000; Jas. Paton, pair semi-detached 2½-storey brick dwellings, on Roncesvalles, \$5,600; J. Lancaster, 4 attached 2-storey brick stores and dwelling, on Dundas, \$10,000; J. A. Egan, pair semi-detached 2-storey brick dwelling, on Thorold, \$5,000; F. Duff, 2-storey and attic brick dwelling, on High Park Boulevard, \$7,000; F. M. Tuckett, 2 pair semi-detached 2½-storey brick dwelling, on Chelsea, \$9,600; Dominion Realty Company, Limited, 2-storey brick bank and apartments, on corner Bloor and Dufferin, \$12,000; Mrs. C. Shafe, 3 attached 2-storey brick dwelling, on 284-6-8 Salem avenue, \$6,000; H. Lant, 4 attached 2-storey brick and stucco dwelling, on McGee street, \$5,000; Love Bros., 2 pair semi-detached 2½-storey brick dwellings, on Dearbourne, \$12,000; J. M. Walker, 3 attached 2-storey brick dwelling on corner of Ossington and Manchester, \$5,000; W. Pennock, 4 pair semi-detached 2-storey brick dwellings, on Emerson, \$16,000; Elmer Duff, 4 detached 2½-storey brick dwellings, on Indian road, \$16,000; J. C. Grace, 2-storey brick dwelling, corner Avenue road and Clarendon avenue, \$7,500; Hall & Son, 2-storey and attic brick dwelling, on Indian road, \$5,500; Weismiller & McKenzie Bros., pair semi-detached 2-storey brick dwelling, West Marion street 2-storey brick dwellings, West Marion street, \$7,000; McKenney & Johnston, one pair semi-detached 3-storey brick stores and dwellings, on College, \$7,000; J. R. Gifford, 2 pair semi-detached 2-storey roughcast dwellings, brick fronts, on Hazelwood avenue, \$6,000.

Vancouver, B.C.

Recent building permits include: Dr. D. H. Wilson, brick building, Pender street, \$7,750; J. Rogers, frame dwellings (2), 1962-1968 York street, \$5,000; G. D. McKay, frame apartment, 1546 Yew street, \$10,000; J. Stephen, 1235 Eleventh avenue west, \$4,500; A. J. Waddle, 1380 Thirteenth avenue east, lumber company, C. P. R. reserve on south side of False Creek, \$4,500. A. Clarke, four storey brick block on Granville street, \$50,000; Martin Robinson and John Burns for a five-storey warehouse at 341 Railway street, \$40,000; Dr. G. A. McGuire, M.L.A., 2720 Yukon street, \$8,500; Mr. Roberts, 436 Thirteenth avenue west, \$2,500; City of Vancouver, fire hall at 906 Twelfth avenue, \$8,500; C. P. R. extension of Pender street freight sheds, \$35,000; Northern Crown Bank, alterations to block on Hastings street, \$14,000; E. G. Findlay, brick block, Broadway, \$12,000; A. Campbell, 1462 Broadway east, \$4,750; two additional storeys on the Woodward departmental stores at a cost of \$35,000; Sharp & Gabriel, 2135 Eighth avenue west, \$2,500.

Winnipeg, Man.

Recent building permits include: Mrs. E. Barclay, dwelling house, Spence street, \$3,500; J. F. Parker, two dwelling houses, \$4,000; F. W. Scott, for a dwelling house on Kingsway, \$13,000; F. Moses, dwelling house, corner of Mulvey avenue and Helen street, \$5,000; F. E. Andrews, dwelling house, Wellington crescent, between Harrow street and Academy road, \$12,000; F. W. Scott, residence, Kingsway, \$13,000; F. S. Andrews, house, Wellington crescent, \$12,000.

AWARDED.

Vancouver, B.C.

Tenders for fire hose were as follows:—Canadian Rubber Company — Keystone, \$1.10; Patrol, \$1.00; Squelecher, \$1.05. Vancouver Rubber Company — Eureka, \$1.25; Paragon, \$1.10; Trojan, 95 cents; Peerless, \$1.00; New Peerless, \$1.05. Dunlop Tire Company — Dunlop, \$1.10; Niagara, \$1.05. It was recommended that the purchase of 5,000 feet of hose be divided as follows: Eureka, 2,000 feet; Keystone, 1,500 feet; Dunlop, 1,500 feet.

Winnipeg, Man.

The tender of the Webb Motor Fire Apparatus Company, of Vincennes, Ind., for a motor hose wagon, was accepted. The wagon is a 50 h.p., and will cost \$4,690.

The B. C. Gazette gives notice of the incorporation of the following companies: The Nelson Iron Works, Limited capital \$150,000, incorporated to carry on the business of engineers, boiler-makers, etc.; Phillips Arm Timber Holding Company, capital \$225,000; B. O. Timber & Land Company, capital \$100,000.

A. T. Stephenson, building inspector of Red Deer, Alta., sends in the following news regarding the progress in municipal construction: The C. P. R. is constructing a new station opposite the end of Ross avenue to cost \$20,000. The Canadian Bank of Commerce in July will commence the erection of a new two-storey block costing about \$25,000. The town of Red Deer is building cement sidewalks on the two principal business streets. G. H. Harvey is completing a new house costing \$2,500. W. H. Lord is building an addition to his residence at a cost of \$3,300. R. G. Cornet is building a new residence costing \$1,200. Mrs. Richardson is building a new residence at a cost of \$3,300. The Gaetz Manufacturing Company are building a shirt and overall factory, two storey.

Tenders and For Sale Department

Tenders for Boilers

Sealed tenders addressed to the undersigned and marked "Tender for Boilers," will be received until noon on SATURDAY, JUNE 11TH, 1910, for two Return Tubular Boilers, 72 inch by 18 feet, to maintain a working pressure of 150 pounds per square inch.

Specification may be obtained from the City Engineer on application.

C. O. DAVIDSON,
City Clerk.

Dated at Prince Albert, Sask., May 17th, 1910. 22

City of Regina

Province of Saskatchewan

Sewage Disposal Works

Sealed tenders will be received until noon, MONDAY, JUNE 6TH, 1910, for the construction of Sewage Disposal Works for the City of Regina. Tenders must be accompanied by an accepted bank cheque or other satisfactory deposit for the amount of \$5,000.

The deposits of unsuccessful tenderers will be returned as soon as the contract is signed.

The right to reject any or all tenders or to waive any irregularities therein is to be at the discretion of the City authorities.

Plans, specifications, forms of tender and all information may be obtained on application to the City Engineer's office, Regina.

A. J. McPHERSON, C.E., A. E. CHIVERS,
Consulting Engineer. City Clerk.

Regina, Sask., May 12th, 1910, 22



Sealed tenders addressed to the undersigned, and endorsed "Tender for addition to the Eastern Departmental Building, Ottawa," will be received at this office until 5.00 p.m. on TUESDAY, JUNE 14TH, 1910, for the construction of an addition to the Eastern Departmental Building, Ottawa.

Plans, specifications and form of contract can be seen and forms of tender obtained at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, made payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

Th Department does not bind itself to accept the lowest or any tender,

By order,
NAPOLEON TESSIER,
Secretary.

Department of Public Works,
Ottawa, May 18th, 1910.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 22

To Builders and Contractors

Sealed, separate or whole, tenders will be received by the undersigned up to six o'clock p.m. of SATURDAY, JUNE 4TH, 1910, for all the work and material (with hot-water heating) required in the erection of a Public Library Building at Orillia, Ont.

Plans, specifications and particulars may be had at the office of architect, on and after Monday, 28th of May.

The lowest or any tender not necessarily accepted.

W. H. CROKER,
Architect. 22

Orillia, May 18th, 1910.

Tenders

Sealed tenders, addressed to either of the undersigned, will be received until noon on WEDNESDAY, JUNE 8TH, 1910, for the construction of a 50-foot reinforced concrete arch bridge over Kettle Creek, in the Village of Belmont, for the Counties of Elgin and Middlesex. Plans and specifications may be seen at the offices of the undersigned. A marked cheque for the sum of \$200,000 payable to either the Treasurer of Elgin or Middlesex, must accompany each tender as a guarantee of good faith. The committee reserves the right to reject any or all tenders.

JAS. A. BELL, County Engineer,
St. Thomas, Ont.

CHAS. TALBOT, County Commissioner,
London, Ont.

St. Thomas, May 21st, 1910. 22



Notice to Architects

Competitive designs for a Residence for the Lieutenant-Governor of the Province of Ontario, proposed to be erected on Bloor Street, in the City of Toronto, will be received by the undersigned at the Department of Public Works, Parliament Buildings, Queen's Park, Toronto, up to noon on the 15TH DAY OF JULY NEXT.

Information and particulars as to the extent and character of the said designs can be obtained upon application to the office of the Secretary of Public Works.

Subject to such terms, conditions, etc., the following premiums are offered:

For the design most approved..... \$1,000.00
For that approved as second in merit 500.00

The designs for which said premiums will be awarded are to be selected and approved of by the undersigned, and the same are thereupon to become the property of the Province.

J. O. REAUME,
Minister of Public Works.

Department of Public Works, Ontario.
Toronto, May 12th, 1910. 23

Wanted

Tenders for mill building to be made of reinforced concrete throughout. Three-storey building, 260 x 64. For plans and specifications apply to L. E. FLECK, Georgetown. Tenders will close shortly. 22

To Architects Competition Plans

The Board of Management of Knox College, Toronto are desirous of obtaining plans for their proposed new College Buildings to be erected on St. George Street to the westward of the Lawn of the University of Toronto.

Conditions of Competition, with all information, can be had on application to the Rev. John Sommerville, Confederation Life Building, Toronto.

Plans must be sent by the FIRST OF NOVEMBER NEXT. 23

Tenders

Sealed tenders for brick veneered Sunday School room, consisting of two storeys and basement, for Methodist Church, Parry Sound, will be received by the undersigned until noon on JUNE 10TH, 1910.

Plans and specifications may be seen at my store, James Street, or at the office of J. S. Russell, Stratford.

The lowest or any tender not necessarily accepted.

GEO. ROWLISON,
Recording Steward.

Parry Sound, May 18th, 1910. 22



Temiskaming and Northern Ontario Railway Commission

Sealed tenders addressed to the undersigned, and endorsed on envelope "Tender for Nipissing Junction Spur," will be received up to 12 o'clock, noon, JUNE 8TH, for Clearing, Grading, Embankment Protection, Driving of Piles, Building of Culverts and Laying of Tile, that may be required in connection with the construction of a branch line for the T. & N. O. Railway, between North Bay and Nipissing Junction.

Plans and specifications may be seen at the office of the Chief Engineer, North Bay, and the Secretary-Treasurer, 25 Toronto Street, Toronto.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-Treasurer of the Commission, for 10 per cent. of the amount of the tender, must accompany each tender.

Lowest or any tender not necessarily accepted.

A. J. McGEE, Secretary-Treasurer,
25 Toronto Street, Toronto, Ont.

Dated at Toronto, May 18th, 1910.

Papers inserting this advertisement without authority will not be paid for same. 22

Notice

The Town of Petrolia intends to construct about 7,000 square yards of Street Pavement on a residential street. The pavement must be of the noiseless character, and the Council invite contractors to submit prices for such class of pavement. Prices are asked to be sent in before MONDAY EVENING, JUNE 6TH. Address all communications to

J. McHATTIE,
Town Clerk.

22

Tenders Wanted

Tenders will be received until MONDAY, JUNE 6TH, for Masonry, Brickwork, Carpenter Work, Iron and Steel Work and Roofing in connection with the erection of a Laundry Building for The Sisters of Our Lady of Charity, West Lodge Avenue, Toronto.

Plans and specifications can be seen, and all other information obtained at the offices of

J. M. COWAN, Architect,
65 Adelaide St. E., Toronto.

The lowest or any tender not necessarily accepted. 22

Tenders for Concrete Sidewalks, etc.

The Corporation of Port Hope invite tenders for the construction of five lineal miles or thereabouts of Concrete Sidewalks and Crossings, with the necessary works connected therewith, in accordance with detail and specifications prepared therefore, copies of which, with forms of tender, may be obtained on application to the undersigned. A marked cheque equal to five per cent. of the gross amount of the contract to be furnished with each tender, and the lowest or any tender not necessarily accepted. Tenders received to 13TH JUNE, NOON.

J. W. SANDERS,
Town Clerk. 23

Dated, 25th May, 1910.



TENDERS

TENDERS FOR ADDITIONS AND ALTERATIONS TO ENGINE-HOUSE AND BOILER-HOUSE AT MAIN PUMPING STATION, FOOT OF JOHN STREET, TORONTO.

Bulk tenders, or tenders for the several trades mentioned below, in connection with the above building, will be received by registered post only, addressed to the undersigned up to noon on TUESDAY, 14TH JUNE, 1910.

1. Mason Work, etc.
2. Carpenter Work.
3. Galvanized Iron and Roofing.
4. Painting and Glazing.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering, as prescribed by city by-laws must be strictly complied with, or tenders may not be entertained.

Tenderers shall submit with their tender the names of two personal sureties, or the bond of a guarantee company.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman Board of Control.
City Hall, Toronto, May, 1910. 22

Tenders for Pavement

Sealed tenders will be received by the City Clerk of the City of Guelph, until 5 p.m., on FRIDAY, JUNE 10TH, 1910, for approximately 11,700 square yards of Bituminous Pavements.

Plans and specifications may be seen, and instructions to bidders and forms of tender obtained at the office of the City Engineer.

Tenders will be received for the concrete base and curbs, and the surfacing, separately. The lowest or any tender not necessarily accepted.

JAMES HUTCHESON,
City Engineer. 23

Guelph, May 21st, 1910.

Bridge Tenders

Tenders will be received by the undersigned up to noon of WEDNESDAY, JUNE THE 8TH, for the construction of two Concrete Bridges of 20-foot span, near the Village of Thamesford, for the County of Oxford. Plans and specifications at my office or with W. W. Day, Reeve of East Nissouri, Thamesford.

F. J. URE, County Engineer,
Woodstock, Ont. 22

Corporation of Oshawa Concrete Sidewalks

Tenders will be received up to noon of MONDAY, JUNE 13TH, 1910, for the construction of 5,500 lineal feet (more or less) of Cement Concrete Sidewalks.

Specifications and other information may be obtained at the office of the Town Engineer. The lowest or any tender not necessarily accepted.

FRANK CHAPPELL,
Town Engineer. 22

Positions Wanted

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Business Notes

The Corbet Foundry & Machine Company, of Owen Sound, Ont., have started to build a new factory, which they hope to have completed by November. It will consist of main building, 50 x 120 feet, with pattern house, cubulo and boiler house attached. The building will be of cement, steel trussed, galvanized corrugated iron roof and will have no supports but clear spans, and will be fitted out with the very latest machinery.

The Canadian Government has decided to renew subsidies previously granted for 3,048 miles of railroad. In all 44 subsidies are proposed, and on the basis of \$3,200 a mile the total will amount to \$8,862,400, but there is small probability that 10 per cent. of this amount will ever be called for. Among the subsidies renewed are the following: To the St. Mary's & Western Ontario Railway Company, for a line of railway from Embro to Exeter, not exceeding 36 miles. To the Manitoulin & North Shore Railway Company, for three lines of railway, not exceeding in all 194 miles. To the Algoma Central & Hudson's Bay Railway Company, for three lines not exceeding in all 275 miles. To the Bracebridge & Trading Lake Railway Company, for a line of railway from Bracebridge, in Muskoka, to a point at or near Baysville, Ontario, not exceeding 16 miles. To the Lac Seul, Rat Portage & Keewatin Railway Company, for a line not exceeding 22 miles. To the Nipigon Railway Company for lines not exceeding in all 80 miles. To the Ontario, Northern & Temagami Railway Company for a line from a point at or near Sturgeon Falls in a northwesterly direction, to a point on the westerly shore of Lake Temagami, in the district of Nipissing, not exceeding 50 miles. For a line of railway from Sharbot Lake or Bathurst station, in the Province of Ontario, or between these points, via Lanark village, to Carleton Place, not exceeding 41 miles. To the Erie, London & Tillsonburg Railway Company for a line of railway from Port Burwell to London, not exceeding 35 miles. To the Toronto Lindsay & Pembroke Railway Company for a line of railway from Golden Lake to Bancroft, not exceeding 51 miles. To the Kingston, Smith's Falls & Ottawa Railway Company for a line of railway from Kingston to Ottawa, not exceeding 101 miles. To Pacific, Northern & Omineca Railway Company for a line of railway from Edmonton northwesterly, to or toward Peace River, not exceeding 110 miles. To Southern Central Pacific Railway Company, for following lines of railway: (a) from a point two miles west of Pincher station on the Crow's Nest Pass branch of the Canadian Pacific Railway, northwesterly, not exceeding 10 miles; (b) from a point two miles west of Pincher station on Crow's Nest Pass branch of Canadian Pacific Railway southwesterly, not exceeding 40 miles. To Kettle River Railway Company for the following lines of railway: (a) from Midway to a junction near Merritt with Nicola, Kamloops and Similkameen railway not exceeding 250 miles; (b) from a point on the company's line of railway near Coldwater River to a point on the Fraser River, not exceeding 50 miles. To Kootenay Central Railway Company for a line of railway from Golden toward the international boundary line via Windermere and Fort Steele, then crossing the Crow's Nest Pass Railway at or near Elko, not exceeding 180 miles. To Esquimalt & Nanaimo Railway Company for a line of railway at or near Duncan's to Cowichan Lake, not exceeding 24 miles.

Bituminous Macadam Road Construction

Instructive Data for Municipal Authorities—Practical Directions as to most Satisfactory Methods of Work—Specifications for Placing Material

Tar and asphalt are the materials which have been most generally employed, either in construction of new roads as a binder, or as a surface treatment for old roads to keep the dust down, says the State Highway Commissioner of Maine in his annual report for the past year. Where new macadam has been built with a bituminous binder or old roads given a surface treatment, it has been observed that the wearing of the road has practically stopped and that the roads have been far more satisfactory to all classes of users.

The roadbed is prepared as in the construction of a regular macadam or gravel road. On this is then spread seven inches of No. 1 stone, that is, crushed stone varying in size from 1¼-inch to 2½-inch, which after thorough rolling with a steam roller, compacts to about five inches. Over this is spread a three-inch layer of No. 2 stone which has been thoroughly mixed and coated with a bituminous binder. After spreading, this is allowed to stand from a few hours to a day, depending upon the temperature of the air, after which it is rolled down to about two inches. It is then allowed to set until sufficiently hard, after which the surface is painted with hot refined coal gas tar or hot asphalt and immediately covered with from ¼ to ½-inch of dry stone screenings from which all dust has been removed. A light rolling is then given to force the screenings into the surface voids of the No. 2 course and into the surface coat of bituminous material. This completely seals the surface of the road, making it impervious to moisture and also makes a gritty surface which affords a good foothold for horses.

Details of Construction

The following points must be observed in carrying out this work:

The stone must be clean and dry. Tar or asphalt will not adhere to dirty, dusty or damp stone. A uniform grade of stone and bituminous materials should be used. Thorough mixing and careful spreading and rolling must be insisted upon. The road must not be opened for traffic until the bituminous binder has completely set.

The advantages claimed for this form of construction are that it is waterproof and consequently sanitary; noiseless, dustless, and that the wear is almost imperceptible, making the maintenance expense very light. The road is resilient, making it very easy for horses to work upon. Automobile traffic does not injure it, but rather benefits it. The statements made in this paragraph are not conclusions based upon experience in Maine. They are the conclusions of officials who have been building and observing these roads for four or five years.

The cost of this construction, generally speaking, is about 50 per cent. more than for ordinary macadam. The method described above is called the "mixing method." Similar results are accomplished by what is called the "grouting method" or "penetration method." By this method the bituminous material instead of being mixed with the No. 2 course is spread upon it after it is partially rolled and allowed to penetrate. The road is finished as in the mixing method. It has seemed to your commissioner that such uniform results could not be obtained by this method as by the mixing method, and no work of this kind has been undertaken.

The method of conducting this work is as follows: A contract is let for the construction of a plain macadam road. A supplementary contract is let specifying at what prices extra labor on account of the bituminous work will be furnished

and what discounts will be made on account of substituting the bituminous second course for the ordinary macadam. In this way the exact labor cost can be determined. The department or the city or town furnishes the bituminous material.

Specifications for placing the bituminous material are as follows:

SPECIFICATIONS FOR BITUMINOUS MACADAM

These specifications are supplementary to and an integral part of the Standard Specifications of the State Highway Department, for macadam roads, and in no way replace them, except in so far as the construction of the No. 2 course and finished surface is concerned.

Plant—The roller used in rolling the bituminous macadam surface shall not weigh more than ten tons.

The kettles shall be of such shape and size that they can be easily transported by hand from point to point. No kettle, however, shall be used that will not hold two barrels of tar, except by special permission of the engineer.

When mixing on the road, a mixing board shall be provided for each gang so engaged. The mixing board shall be made of 2-inch plank in three sections each 8 x 8 feet.

Bituminous Compounds—Coal-tar shall be placed in the kettles so that the depth of tar is not more than 18 inches unless otherwise directed by the engineer. Water in the tar shall be caught when the tar is being run into the kettle. If any rises to the surface of the tar in the kettle it shall be skimmed off. When tar is the only bituminous compound used, it shall be heated for two hours at a temperature between 150 degrees and 180 degrees Fahr., then raised to at least 200 degrees before using.

Kettles shall be placed so that hot tar will not have to be carried more than 50 feet.

In storing tar, barrels shall be laid on their sides with the bungs up. Asphalt shall be placed in the kettles in such quantities as may be desired, and brought to a heat of 350 degrees Fahr., before using. When the bituminous compound consists of tar and asphalt mixed half and half, the tar shall be heated in one kettle and the asphalt in another. The tar shall be brought to 200 degrees Fahr., before using, the asphalt to 350 degrees Fahr., before using. In mixing by hand the tar shall be placed on the stones before the asphalt.

Stone—The No. 2 stone must be dry and free from dust. No No. 1 stone will be allowed in the No. 2 course. No work shall be done when the No. 1 course is wet. The work shall not be resumed until the stone has dried out to the satisfaction of the inspector.

Mixing Bituminous Compound—The bituminous compound shall be mixed with the stone either by hand or by machine until the stone is thoroughly coated to the satisfaction of the engineer or inspector. One and one-quarter gallons of bituminous compound shall be used per square yard of surface, unless otherwise directed by the engineer. The No. 2 stone shall be laid to a thickness of three inches and rolled to two inches. The No. 2 course shall be rolled as directed by the engineer or inspector.

Painting—After the surface has been thoroughly rolled and shaped up to the satisfaction of the engineer, the surface shall be swept clean. The bituminous compound shall be spread on the surface either by brooms or mops. Six-tenths of a gallon of the bituminous compound shall be used per square yard of surface, unless otherwise directed by the engineer.

Dust—Dust screenings shall be perfectly dry. Dust screenings shall be put on to a thickness not exceeding ¼-inch unless otherwise directed by the engineer or inspector. No dust shall be put on until the surface has set to the satisfaction of the engineer or inspector.

When the surface is required to be painted, the dust screenings shall be put on immediately after the flush coat of bituminous compound has been applied. The surface shall be rolled as directed by the engineer or inspector.

Screenings for Flush Coat—Screening for the tar flush coat shall consist of crushed stone of the kind and quality above specified, that will pass through a ½-inch circular ring and be retained on a screen having meshes ⅜-inch square.

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Recent Developments in the Purification of Public Water Supplies

The paper dealing with the above subject prepared by Mr. R. S. Lea for the Canadian Society of Civil Engineers, and reprinted in this issue, should be of the greatest interest to all whose professional interests identify them in any way with this field as well as to those whose civic duties make it desirable that they have some knowledge of the present day systems of water purification and the relative merits thereof.

The extracts from the author's paper published here-in relate entirely to recent developments. It may be of interest to refer to Mr. Lea's introductory remarks, which set forth how the idea of sand filtration and its direct application originated with Simpson in 1829. The discovery by Dr. Koch of the plate culture method of studying bacteria marks the beginning of a period, since when it has been possible to deal with the purification of water in a rational and scientific way. This discovery, which took place in the year 1880, constitutes the second advance in the art. A third advance soon followed in the discovery of the utility of coagulation, or rather its adaption to a useful purpose in the field of water purification.

Since that time such developments as have taken place in either system have been confined chiefly to improvements in materials of construction and in appliances for operation and control. Apart from this, however, a much better idea now prevails of the importance of the characteristics of the water as factors in the selection of the type of system best adapted for its purification. As a result, plants of recent date seldom fail to

accomplish the purpose contemplated in their construction, and, though the last decade has not been productive of any fundamental changes with respect to either system, such improvements as have taken place may, perhaps, on account of their great practical worth, be of interest on the eve of what promises to be a permanent filtration movement in this country.

In illustrating and describing the main features of a slow sand filtration, Mr. Lea prefaces his remarks as follows:

"As might be expected of a system, which from its inherent simplicity was susceptible of but little improvement since its first appearance, there is not very much to record in the recent development of slow sand filters. In this familiar type the raw water after preliminary sedimentation, where necessary, is applied to beds consisting of horizontal layers of rather fine sand supported by gravel, and underdrained, the whole being enclosed in a suitable tank or basin. The efficiency of this system to some extent depends upon, and is improved by, the fineness and depth of the sand employed, and on the lowness and uniformity of the rate adopted."

The subject of water filtration is a most vital issue for all concerned, and we shall make an effort to publish a number of authoritative articles that will be of material benefit to those interested. In our next issue we hope to publish some interesting information relating to the ozone system of water purification.

Prairie Provinces' Great Showing

It is estimated by Vice-President Whyte, of the C.P.R., that the area of land devoted to wheat growing in the prairie provinces this year will be 8,600,000 acres, or between 12 and 15 per cent. more than last year. Of this total, 4,600,000 is in Saskatchewan alone. Of oats there will be 4,500,000 acres, slightly more than last year; of barley about 1,000,000 acres, and of flax about 600,000 acres, nearly double the acreage last year given to this grain. Less than 10 per cent. of the arable land of Saskatchewan is now under cultivation. There has been very little anxiety about the wheat crop in the West this year, and the most optimistic predictions that have been made are likely to be more than fulfilled. The outlook for the crops is of the greatest significance to the building industry and others interested in the development of the country. The present situation must be particularly gratifying to all concerned.

The Board of Control of Montreal received 127 tenders for public works in one day last week. The comment of the Montreal "Star" conveys a subtle suggestion as to the manner in which contracts were awarded in Montreal in the past: "No less than 127 tenders were received. Nothing like this in the matter of competition is reported in civic annals. The custom in the past was for a few contractors to send in offers. As these favored individuals generally carried off the contracts, competition practically died out. The number of offers received to-day was considered to be a marked tribute to the new system of civic government."



Complete Scheme for Rosedale Presbyterian Church, Toronto.—Architects, Chapman & McGiffin, Toronto.

Rosedale Presbyterian Church, Toronto

In undertaking the design for the Rosedale Presbyterian Church, the architects, Messrs. Chapman & McGiffin, had to deal with a problem that was unique in several respects. The congregation elected to carry out a portion of a comprehensive scheme, rather than build a large church in an unsubstantial and unsatisfactory manner. When completed, the group shown in the perspective will form a quadrangle—the main church on the right, the Sunday-school on the left, and the administration building at the end. By this plan the buildings are enclosed to a certain extent from the surrounding property.

The requirements in brief were to secure a building which for the present could be utilized as a chapel and

later on be converted into a Sunday-school. The main desideratum was that the present building should have a distinctive church character. The portion of the scheme now carried out, as shown in the second illustration, provides church accommodation, suited to the present needs of the congregation, and various administration rooms, including ladies' room, trustees' room, vestry, kitchen and serving pantry; also, in basement, lockers and showers for the boys' club.

The general character of the design is perpendicular Gothic, the administration portion developing into the English collegiate. An effort was made to keep the lines severe and substantial, giving the style more of the Scotch cast than the English.

The materials used in the building are Credit Valley greystone and Indiana limestone trimmings and tracery



Rosedale Presbyterian Church, Toronto.—The portion of the design now carried out.

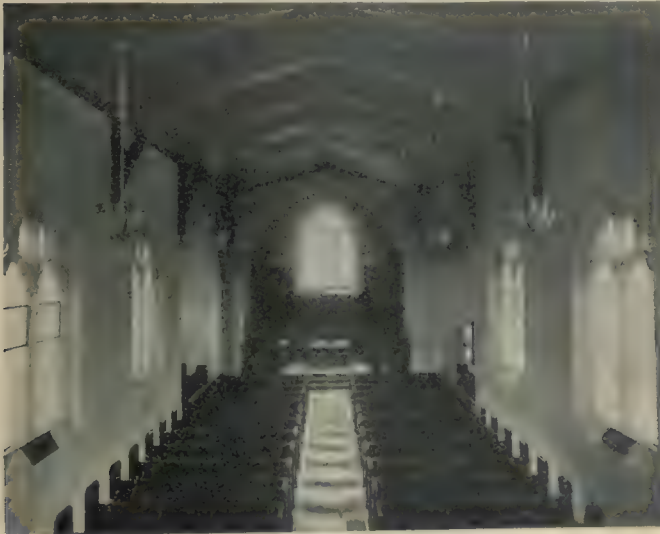
The roof is of unfading green slate. The interior furniture and trim are of oak, and the roof trusses of Georgia pine. The walls are stucco plaster with Indiana stone trimmings.

The system of heating and ventilating evolved has eliminated all radiators in the church part, the heating being obtained by means of artificial draught. The air is drawn in from the outside, passed through a bank of coils, and forced into the church by means of a large fan. By this means perfect ventilation is secured and there is no possibility of having the heat localized as in the case of radiators.

The contracts for the portion of the scheme now carried out were executed by the following firms: Witchall & Son, Limited (represented by Aikenhead Hardware Hoidge & Son, plastering; W. Davidson & Company, carpentry; J. R. Seager, plumbing and ventilation; Hope & Son, Limited, represented by Aikenhead Hardware Company, Toronto), metal sash; R. Rennie & Son, roofing; Globe Furniture Company, furnishings.

Contracting for Profit

The contracting business, like mercantile business, is buying and selling materials and labor for profit; yet



Rosedale Presbyterian Church—Interior of Sunday School.

it is surprising how many contractors and builders buy from the same dealers year in and year out, without taking the trouble to discover if they could not do better elsewhere. The old rule, "An article bought right is half sold," applies as much to the contractor and builder as to any other line of trade, says the "National Builder."

The successful contractor buys his supplies where he can do the best and take advantage of every trade discount, for here is where a large percentage of his profits is made. Do not continue buying from one dealer. See whether you are paying more than you should or not. Some dealers, when they have a customer for a long time, take it for granted prices are not obtained elsewhere, and charge the top notch price. It is necessary, in order to meet competition, for you to buy to the best advantage.

Concerning Credit—No business can be carried on successfully without a line of credit, even though you pay for everything as you get it, or send cash with the order. It would not be practical to do so; there is bound to be more or less errors occurring in the filling of orders. If the goods are paid for, it is not so easy to get these

errors corrected, and for many other reasons a good line of credit is necessary for the contractor. The better your credit, the closer prices you can get. Supply men classify contractors about as follows:

First, the gilt-edged man, or the contractor who pays promptly, who can get anything he wants without delay. Second, the contractor who must depend on his collections to pay his bills, but is known to be reliable. Third, the man who is noted to be slow pay. Fourth, the man who has lost his credit and cannot get anything unless he pays cash, or has the owner to go security. Fifth, the new beginner, who has not yet proved himself.

Very few can rank in the first class, at least for an indefinite length of time, after beginning, but can soon advance to the second class, which is nearly as good, even if you have not got a large capital.

Do not try to deceive in any way. If you are not known to the dealer, you can easily prove to him you want to do the right thing. Take him into our confidence, tell him what you are getting for the work, so that he will see that your price is sufficient to pay for the materials. It is his right to protect himself against loss, and he will be only too glad to help you along. Many of the largest contractors have started in this way; it will not take you long to do it. A few jobs carried through successfully will be sufficient to prove your ability. It is not a question so much of your having a large capital, but a question of your honesty and ability to figure safely. If a contractor takes a piece of work for less than it can be done for, and he has not the capital to pay the difference himself, it gets the supply man into trouble. Try to live up to your agreements. Never get into the third and fourth classes. Remember that dealers have rights and do not infringe on them.

You will not be long in business before you will be rated by the mercantile agencies, and when you correspond with business concerns outside of your own locality, you will be quoted according to your rating. Unless you are rated as good pay, you will be required to pay spot cash for materials ordered, which would hamper you very much.

The Handling of Help—The handling of help is another phase that calls for careful and judicious management. Some men can accomplish more with the same crew than another can, without working them any harder. The writer has learned from experience that it pays best to hire the best mechanics to be had and pay them the best wages. Then you have a right to expect them to do the work and do it right without watching them. It is a serious mistake to try to get your work done with cheap, handy men. You have to waste your time or the time of another good, expensive man to oversee them. There are, of course, certain places where you can use some such help to advantage, but in the main it does not pay. They waste materials, and the work is not satisfactory to the architect or owner. Very few men are good, all-around men, so you must find out what each is best at, and keep each as much as possible where he will accomplish the best results.

Some contractors keep changing men all the time and drive them like a lot of slaves. I do not believe this to be good practice. It is better to keep a steady crew, if possible, and when you find a man is not doing the square thing with you, let him go, but by keeping mainly the same crew you get to know the best qualifications of each man, and where to place him to the best advantage. He also gets to know you, and knows what you want, and if harmony exists on your work, he will try to do his best for you, but a man who is always rushing the men will find them taking advantage of him at every chance.

Modern Apartment House at Vancouver, B.C.

The above illustration is a view of the substantial apartment house now being erected at Vancouver, B.C., by the Pacific Investment Corporation. The structure is being built upon a lot 182 feet by 181 feet, at the southeast corner of Davie and Jervis streets, which is the crown of the hill, and affords a magnificent view in all directions.

The building as it will appear on Jervis street will have a prominent entrance court, 30 feet wide, with arched gateway on each side, and the driveway in the centre.

The building will be six storeys high, faced with deep red pressed brick, and light trimmings, excepting at the two principal entrances, which are to be either light sandstone or terra cotta.

The dimensions of the building are 181 feet by 111 feet, leaving 21 feet on the south side for a garden plot, and for securing sunshine to a major portion of the apartments. There are no inside rooms in the building. All have abundance of light and air, 60 per cent. of the apartments being on a "corner" with windows on two

recently to the Wells Construction Company, Vancouver. The remaining contracts will probably be awarded during the next week or two.

Novel Method of Heating Materials for Concrete

During the construction work on a recent power development it became necessary, in order to carry on winter concreting, to devise some way of heating materials more economically than the usual methods.

Ordinarily when the temperature of the air drops to 15 degrees or 20 degrees Fahrenheit, concreting becomes a hazardous undertaking if one is to secure good results and still keep the cost of construction within reasonable limits.

Our summer method of measuring materials was to charge a single horse dump-cart at the crusher bin with the measured proportion of crushed rock. From the bin the cart was driven to the sand pile, where enough sand was added to complete load.

Of course, one could heat sand and water to any degree, but the problem was to find a way of heating



Pacific Investment Corporation's Apartment Block, Vancouver, B.C.

sides. There will be 82 apartments in all, comprised as follows: 56 3-room, 22 4-room, 2 5-room and 2 2-room. In addition, there is a store on the corner suitable for grocer or druggist. Provision is also made for a cafe below the ground floor on Davie street, with stairway from the entrance vestibule.

The basement will contain the heating plant, hot water service, vacuum cleaning plant, storage rooms, and janitor's quarters.

For the convenience of tenants, there will be dumb waiters, messenger and telegraph call boxes, mail chutes, patent sanitary garbage chutes, and vacuum cleaning system. Near the passenger elevator will be a 'phone with connection to each apartment.

There will be 22 fire hose reels, besides portable chemical fire extinguisher on each floor; also two outside fire escapes and two auxiliary inside stairs, well separated from the main staircase and elevator.

It is estimated that the property when completed will represent an outlay of \$157,000.

The architects for the building are Messrs. Wright, Rushforth & Cahill, Vancouver. The contract for the excavation and concrete basement was awarded quite

the rock quickly and cheaply. It was solved satisfactorily to every one in this way. Taking some 1¼-inch pipe and cast tees, a frame was made consisting of a set of 18 pipes crossing to and from the respective headers. ½-inch holes were drilled every inch on one side of the pipes. A piece of canvas was rivetted to the top of the frame of pipes, forming a cover, and one header was connected to a boiler under pressure of 80 pounds steam. A block and tackle was then attached to the set of pipes. This enabled the operator to move it quickly.

When work began in the morning, the cart, charged with rock, was driven under heater. The operator lowered it directly on the cold crushed stone and then turned live steam on for one-half minute by his watch. He then raised the heater ready for the next cart.

The rock was thoroughly warmed, all pieces of ice being melted, and when warm sand and warm water were added, a batch of concrete was mixed, that set nicely in the coldest weather. In fact, in looking at the finished wall one cannot detect any difference in the concrete mixed during weather of a temperature of 25 degrees and that placed in summer.

Notes on the Hardening of Portland Cement

Prepared Especially for this Journal by Mr. A. G. Larsson, C. E.,
Chemist, Grey and Bruce Portland Cement Co., Owen Sound, Ont.

As my paper on the hardening of Portland cement, read at the London convention of the Canadian Cement and Concrete Association, was intended rather for the cement expert than for the practical cement user, I shall now try, in a few words, to deal with the subject in a way to suit even the latter.

Until one or two years ago it was generally considered that the hardening of Portland cement was caused solely by the crystallization of hydrate of lime. This theory fails, however, to explain even the most important phenomena in the mortar-technique. For instance, how is it possible that a cement mortar can harden in water or even remain firm and intact after it is set, if the soluble hydrate of lime is the cause? Besides, how can a mass of hydrate of lime crystals give the high tensile strength which our present Portland cement possesses? The first to give a reasonable explanation to these and other phenomena in the hardening process was Prof. Michaelis, of Germany, who in a paper read last year at the meeting of the German Association of Cement Manufacturers, laid the foundation for the so-called hydrogel theory. The views I shall now bring forth are founded on this.

From researches which I have made and from reports published by other investigators, I have been able to enlarge the same in some respect, thus adding my unite to a great man's work.

Portland cement is, as we know, a combination of lime with silica and oxides of iron and alumina. The clinker we obtain from our rotary kilns will, however, invariably, when ground to cement, give a product so quick setting as to render it almost useless for ordinary work. The manufacturer must on this account add some kind of retarder. He uses for this purpose gypsum, plaster of paris, or calcium chloride. Besides these matters there is, as a rule, a small amount of magnesia present.

Positive and Negative Substances

The substances entering the cement may from a chemical, or rather an electrical, point of view, be divided into two classes, the positive and the negative. There exists, as we know, a certain amount of attraction between these two kinds of bodies. Lime and magnesia belong to the first group, silica and the oxides of iron and alumina to the latter.

Let us now assume that water (about 22 or 26 per cent.) has been added to the cement. Several reactions set in now, depending on certain chemical and physical forces. One of the first is the liberation of the lime which enters the water as hydrate of lime. This process takes place faster or slower depending on the nature of the cement, i.e., comparatively fast for a quick setting and slow for a slow setting product. More and more lime will thus immigrate into the water. But, as was said above, it is positive, and the residue of the cement will naturally become more and more negative. The attraction between this and the lime must then increase in the same ratio; in other words, it is getting more and more difficult for the latter to separate and dissolve. The process would thus soon cease. Some changes, however, are setting in, and these enable it to continue. The negative part of the cement, especially the silica,

has the property to combine with itself. We may also note the difference between a slow and a quick setting cement. The former gives the silica more time and opportunity to unite with itself to more complex units than the latter. This circumstance explains the difference in strength between the two kinds mentioned.

Owing to these reactions, the amount of lime in the water is steadily increasing. The concentration will finally reach the point where a little of the lime and some water are forced to unite with the formed complex silica compounds. The resulting body has been named "hydrogel." It has also been called mineral glue, as it resembles ordinary glue very much. At this stage the mass is colorless and sticky. It is practically insoluble in water, but absorbs the same to a great extent, thereby swelling. It acts like a filter towards dissolved crystalline bodies, as, for instance, hydrate of lime, i.e., it retains them, thus preventing their escape.

Properties of Oxide of Alumina

Let us now for a moment leave the silica compounds and see what part the oxides of iron and alumina take in the hardening process. As comparatively small quantities of the former are present in the ordinary Portland cement, its actions, as far as the setting is concerned, are of little importance. We will therefore consider only the latter (Al_2O_3). At least two different kinds of reactions must here be taken into account.

One of these may be called the hydrating process. A part of the lime is separating from the cement and dissolves in water as hydrate of lime. Owing to the comparatively weak negative properties of the oxide of alumina, the attraction between it and the lime is only small. The reaction, therefore, takes place more easily and more rapidly than is the case when silica is acting. This circumstance explains why a cement high in alumina has a tendency to be quick setting.

The oxide of alumina has very little tendency to form such complex compounds, as is the case with the silica. Therefore, it seldom, if ever, unites with lime to a hydrogel-like substance. Instead of that, the two form thin hexagonal crystals of calcium hydro-aluminate.

The other reaction to be considered in connection with the oxide of alumina is, that it, together with lime, unites with gypsum, thus forming a new body under absorption of water and great expansion. This circumstance explains why gypsum, when present above certain limits, causes "cracking." The above reaction also explains why some Portland cements resist sea water better than others. There are always more or less sulphates in sea water. These form with the lime in the cement gypsum, which, in its turn, will react as described above. As already noted, this causes expansion, which will naturally be the greater, the more oxide of alumina there is available. The less of this a Portland cement contains, the better will it resist the deteriorating influence of sea water.

Canadian Cement Contains Little Magnesia

As for the magnesia, I can say that our ordinary Portland cement contains very little; consequently, its actions during the hardening process are of no interest to the cement user. Five per cent. may be considered the magnesia limit. The average Canadian product is

somewhere round 3 per cent., with one or two exceptions. Specifications demanding less than 3 per cent. are too severe, as it has been proven beyond doubt, that as long as the magnesia is not above 5 per cent., it has no detrimental influence. I do not think anybody in the whole of Canada ever saw magnesia cracking Portland cement.

The first part of the hardening may be considered over when the hydrogel is first formed. At this stage cement pastes or cement mortars have surrounded the grains of cement or sand with the colorless gluey sub-

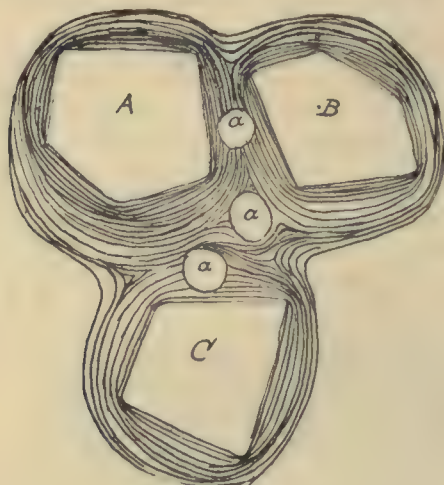


Fig. 1

stance, which also contains small cavities filled with saturated lime solution. Fig. 1 indicates this. A, B, and C are particles of cement in sand, and *a* represents cavities.

Cement is composed of more or less fine grains. The above described reactions, naturally, take place first at their surface, advancing from there into the interior. Only about 50 per cent. are hydrated in ordinary Portland cement. The rest consist of particles so large, that the water can only partly penetrate and harden them. The first appearance of the hydrogel, therefore, is not a sign that the setting is over. Instead, the reactions

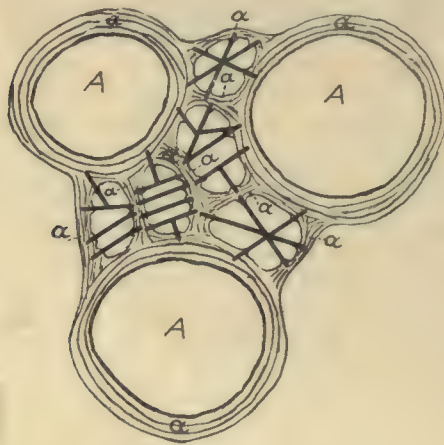


Fig. 2*

described above continue as long as water can reach the parts not hydrated. Hydrogel, calcium-hydro-aluminate, calcium-hydro-ferrit and hydrate of lime are thus still formed. The necessary water is gotten from the lime solution in the cavities and the gluey mass. The latter acts hereby as a filter, separating the hydrate of

lime. This must finally crystallize out, thus filling the space formerly occupied by the water. This is of great importance, as we shall see presently.

The Process of Absorption

The process of absorbing the water by the cement is drying out the hydrogel. The latter is thereby shrinking considerably. This gives it a good grip on the particles it surrounds or is in touch with. At the same time it is also growing stronger. The grains in the mass, therefore, are being tied together firmer and firmer in exactly the same way as if ordinary glue were used. The gluey substance in cement, however, is superior to common glue, in that it is impenetrable for water. Portland cement is on that account waterproof, and the mortars can be made so by careful selection and grading of the materials.

From what has been said, it will be seen that the hydraulic properties in Portland cement are due entirely to the hydrogel and not to the hydrate of lime crystals. The "mineral glue," also, is a very important factor as far as the strength of the hardened cement is concerned. It is, however, by no means the only one to be considered. The crystals of hydrate of lime, of calcium-hydro-aluminate and calcium-hydro-ferrit have also their mission to fill. The hydrogel or "cement glue," if I may so call it, shrinks very much, as we have seen. Cavities are then formed. To a certain extent, however, these are filled with the said crystals, especially those of hydrate of lime (see fig. 2), which thus acts in the same way as struts in a trestle, stiffening the structure.

Summary

From what has been said, it will be seen that the process of Portland cement may be summarized as follows:

The setting depends on chemical and mechanical forces, which dissolve the lime in water, thus changing the same to hydrate of lime. The silica is forced to combine with itself to a certain extent, depending on the nature of the cement. Hydrogel, calcium-hydro-aluminate, calcium-hydro-ferrit are then finally formed. The former is the real cementing ingredient, which, as the process goes on, dries out and then, like a waterproof glue, unites the different particles in the mass. By this time the hydrate of lime has also crystallized out, and together with the crystals of calcium-hydro-aluminate and calcium-hydro-ferrit, adds to the strength of the hardened Portland cement.

Labor Matters at Toronto

At the time of going to press, the builders' laborers at Toronto have practically declared a strike for June 1st. Their terms are a minimum wage of 28 cents an hour, with a recognition of the union. About 1,500 builders' laborers are employed in the city. Nearly 1,200 of these belong to the union.

The painters' strike is declared off. It is understood that the prevailing wage will be 35 cents an hour, although no agreement has been signed to that effect.

Mr. J. E. Beauchemin, a well known contractor of Sorel, Que., died last week, aged 69 years. Mr. Beauchemin was formerly city engineer of Sorel. His death resulted from congestion of the lungs, contracted while supervising the construction of government wharves at Sorel.

Building permits issued at Vancouver, B.C., since the first of the year total five and a half millions.

*A=Grains of sand; a=cell walls of dry hydrogel. The fine lines indicate crystals of lime hydrate.



West Elevation, Museum Building, University of Toronto—Architects : Darling & Pearson.

Museum Building, University of Toronto

One of the most interesting building projects now under way at Toronto is the new Museum Building for the University of Toronto. At present the authorities of the institution are carrying out only that portion of the scheme shown in the above illustration, which represents less than a fourth part of the total undertaking. When completed the new Museum Building will be a valuable acquisition to the University and will rank as one of the finest educational buildings of its kind on the continent. The dimensions of the west wing shown above will be 400 feet by 66 feet. The building will be four storeys high, of brick construction, with stone trimmings.

The tenders submitted in this connection indicated keen rivalry on the part of the contractors. The successful bidders for the mason work were Messrs. R. Robertson & Sons, masonry and general contractors, Toronto. This firm has already executed a considerable amount of creditable work for the University. Among the structures they have built may be mentioned the Convocation Hall, Thermo-Dynamics Building, Physics Building, Chemistry Building, Gymnasium, Residences, Observatory, Forestry Building, and, most recent of all, a large addition to the Library.

Winnipeg's Municipal Asphalt Plant

Winnipeg has a municipal asphalt plant, established in 1899 at a cost of \$14,000. The first asphalt was laid in 1897 by contract—7,814 square yards, at \$2.85 per square yard, Trinidad lake asphalt being stipulated. In October, 1898, tenders were asked for paving 17,801 yards on Portage avenue, one of the city's principal thoroughfares. About that time the civic authorities deemed it desirable to establish a municipal plant, and the plant of the local company was purchased.

Experimenting showed that the best mixture for wearing surface of an asphalt pavement was 10 to 12 per cent. bitumen; 78 to 85 per cent. sand, and 5 to 10 per cent. pulverized limestone. The various kinds of asphalt used have been Ventura, Alcatraz (small quantity), Obispo, Acme, Los Angeles, Trinidad Lake, Trinidad Land, Venezuela, and Bermudez. Trinidad Land, it is said, was found to be the least satisfactory. The asphalt for 1907-8 was bought from Venezuela, for 1909 from Mexico.

The preparation for an asphalt pavement in Winnipeg is thoroughly made. The street is excavated 11 inches. Soft and spongy places are dug out and refilled with good earth, well rammed. Curbing is laid on grades and lines given by the engineer in trenches of the required depth, filled with broken, coarse, macadam stone. Upon

the subgrade is laid a bed of Portland cement concrete $4\frac{1}{2}$ inches thick, made by first mixing dry and then making into a mortar, one measure of cement equal to the best quality of Portland cement and three of sharp, clean sand. The binder course consists of broken stone and asphaltic cement, about 15 gallons of cement to 1 cubic yard of stone, the stone broken to $\frac{3}{4}$ -inch. The stone is heated by passing it through revolving heaters, and thoroughly mixed with the asphaltic cement.

The average cost of paving the streets of Winnipeg with asphalt is about \$2.30 per square yard. There are 58 miles of asphalt-paved streets in the city. During 1908 and 1909 extensive paving operations necessitated the maintenance of 125 men at the plant and 75 men on the street during the busy season. Conditions in Winnipeg are a particularly severe test of asphalt pavements; but, notwithstanding this, the cracks made by frost and disintegrations from other causes are few and small, and rarely show on the surface.

An Important C.P.R. Contract

One of the largest contracts of the kind ever awarded in this section was that for the extension of the Canadian Pacific Railway Company's irrigation system into the eastern section of the irrigation block in the Province of Alberta. This contract calls for the moving of some 28,000,000 cubic yards of earth. The contract price was about \$5,230,000, which was practically \$250,000 under the company's estimate. The work is to be started at once and is to be completed in five years. The system will provide for the irrigation of some 540,000 acres and will require a reservoir with a storage capacity of 300,000 acre feet. The successful bidder for the work was James McDonnell & Company, with whom are associated Winter, Boomer & Hughes and Grant Smith & Company, all of Spokane, Wash.

Business Openings in Western Canada

The Land Department of the C.P.R. at Winnipeg, Man., has entered upon the publication of a breezy little booklet, entitled, "Western Progress." As implied by the name, "Western Progress" is devoted to setting forth the advantages of western Canada and to helping those interested in this field. Among the business openings mentioned in this number are the following: Asquith, Sask., brick plant and rural telephones; Cowley, Alta., lighting plant; Chin, Alta., lumber yard; Dubuc, Sask., brick plant; Govan, Sask., sash and door factory, brick plant; Rouleau, Sask., light and water company; Redvers, Sask., light, water and telephone plant; Swift Current, Sask., brick plant.

Purification of Public Water Supplies

An Interesting Resume of Recent Developements in this Field— Selection of Method should be Governed Mainly by Local Conditions[†]

BY R. S. LEA

Recent practice in slow sand filter design does not show much variation from the old. The excessive depths of sand and gravel, particularly of the latter, common in many of the earlier filters now, seldom exceeds four feet, and much greater uniformity is apparent in this respect. More attention is given to the grade of sand used, and in general a sand of lower "uniformity coefficient" is now called for. The maximum loss of head provided for in many modern plants is much greater than previously allowed.

Probably the most notable advance of recent years in connection with slow sand filters has been the introduction of much improved machinery and methods for washing and preparing filter sand and for handling it cheaply.

The earlier method consisted in scraping the bed and removing the sand by manual labor; crude appliances were used for washing.

As a result of these improved appliances for handling and washing sand it is now possible to secure a much better grade of filter sand in localities where it does not naturally exist, while the cost of cleaning filters has been reduced in some instances from two and three dollars to 50 and 60 cents per million gallons filtered. This reduction in operating charges has been accompanied by some economy in first cost effected by keeping the total depth of the basin, that is, of filtering medium and head room, within reasonable minimum limits. The recently constructed Queen Lane filters at Philadelphia present a novel feature from the point of view of economy of space required. In this plant the filters are placed over the clear water basin, the floors forming the roof of the latter. The applied water is here subjected to preliminary filtration; which has permitted the adoption in the final filters of a sand layer, only 20 inches deep, covering 16 inches of gravel.

Mechanical Filters*

About the year 1884 the late J. W. Hyatt patented a process for the purification of water known to the present day as Mechanical Filtration. The essential feature of this system as distinctive from its forerunner, the continuous or English method, is in the use of some soluble chemical salt as alum, sulphate of iron, but usually sulphate of alumina, to coagulate the raw water before reaching the sand filters. The sub-drains were so arranged and connected that the beds could be washed quickly and easily by a reverse current of water aided by appliances for stirring the sand.

By coagulation is meant the formation of an inorganic precipitate in the water, the presence of which has a physical action on suspended matters, facilitating their removal by subsidence or filtration; where sulphate of alumina is used, the chemical reactions result in the formation of hydrate of alumina, an insoluble gelatinous compound of greater specific gravity than the matters in suspension, which along with the bacteria, it draws together and surrounds, forming a flaky precipitate in the settling basin, and to a lesser degree on the surface of the filter beds, where this spread of entangled suspended impurities, adhering to the sand grains, has through its absorption of dissolved organic matter, a marked effect in reducing the color, and accomplishing the chemical purification of the water, besides increasing the efficiency of the straining action of the filter, by offering to the flowing treated water a closer and more compact surface.

It is to be noted that the complete decomposition of the alumina salt will only take place in the presence of an excess

of calcium carbonate, and in the absence of sufficient natural alkalinity it must be artificially added to the raw water by the introduction of some such alkali as soda ash. The effect of this treatment on the water is a slight change in the nature of the lime salts, owing to an increase in the proportion of sulphate of lime, while the carbonate acid displaced, passes off or is absorbed by the water.

There are two varieties of mechanical filters, known as gravity and pressure filters. In the latter the filtering medium and the drainage system are placed in an enclosed steel tank, through which the water is forced under pressure, directly from its source, to the mains, and thus it has the distinct advantage that it can be easily connected into existing systems without requiring additional pumping machinery. It is a cheap installation, and has been extensively used for industrial plants requiring a clear water. It is further claimed to give good results in the treatment of domestic supplies, which it probably does under favorable conditions; but for obvious reasons it cannot be expected to compare in efficiency with gravity or open filters. The open wooden tank contains the filter sand overlying a subdrainage system through which the water passes to a rate controller. When clogged the filter is quickly and easily cleaned by a reverse flow of water under pressure overflowing to waste above the beds. This washing is accompanied or preceded by a loosening of the bed through the operation of mechanical agitators. The coagulant was mixed with the raw water in advance of its admission to the bed with more or less preliminary sedimentation.

These filters met with some success in the decade that followed their introduction, and quite a number of small plants were installed. The conditions of successful operation were not, however, clearly understood at that time and, consequently, while some of these earlier installations undoubtedly gave good service, there were many instances of failure to accomplish desired results. In 1895, experiments were commenced at Louisville with the excessively turbid water of the Ohio river; where at times the clay in suspension is in a very finely divided state, smaller even than the bacteria. The tests here carried out served to show the inadequacy of slow sand filtration when applied to such a water, the physical characteristics of which, like many American waters, presented a problem in water purification which had not been encountered to any extent in European practice.

The next five years witnessed a great development in the process of mechanical filtration; in fact, the scientific basis for the working of this system may be said to date from the inception of these investigations. It was only another example of "necessity being the mother of invention." Experiments were later undertaken by Pittsburg, Cincinnati and other interested corporations. A free interchange of experiences soon resulted in the development of methods of treatment capable of purifying a great range of waters. The mechanical filters installed since that time show a marked improvement over the earlier plants. Better appliances for the application and control of the chemical were devised. The importance of regulating the period of coagulation to suit the condition of the raw water was now understood, and led in many cases to the use of larger coagulation basins to allow

* Type proposed for Montreal Water & Power Co.'s Plant.

[†]Extracted from paper read before the General Section of the Canadian Society of Civil Engineers.

the chemical changes to become complete before the water passed to the filters.

The Part of Oxidizing Agents

As has been already stated, no material change has taken place during the last decade in the established methods of filtration. The past 18 months, however, has witnessed what promises to merit recognition as a very decided advance in the science of water purification. This advance may be described as a demonstration of the feasibility of accomplishing the bacterial purification of water at a low cost by treatment with an oxidizing agent, and in such small quantities as to eliminate any apparent risk incidental to its reaction.

Although several oxidizing agents had been previously experimented with or used as temporary expedients for this purpose, it was not until after the disinfecting plant of the East Jersey Water Company was put into commission in September, 1908, that the actual capabilities of the process were fully appreciated and understood. The oxidizing agent here used was chloride of lime or "bleach." The theory of the process is as follows: when added to the water the bleach splits up into the inert calcium chloride and calcium hypochlorite; the hypochlorite, when acted upon by the carbonic acid in the water, forms calcium carbonate and the oxidizing agent, hypochlorous acid; in the presence of oxidizable matter the oxygen of this compound is released, leaving hydrochloric acid, which displaces the carbonic acid of the carbonates forming an inert chloride, while the atomic oxygen, which is the agent that actually does the work, and accomplishes the bacterial purification, combines with any oxidizable organic matter present. Its effects are said to be practically instantaneous. The treatment removes the color slightly, but not materially, and does not affect suspended matter except the bacteria. From the point of view of bacterial purification, the results obtained in Jersey City, using only five pounds of bleach per million gallons of water treated, would rank this process with the best filtration plant now in operation. To quote from a report of Dr. Leal, who recommended this treatment: "For weeks at a time the water taken three-fourths of a mile below the works has been practically sterile, and the count at Jersey City has been from sterile to an average of 20 or 30 per c.c. with bacillus coli present in 10 c.c. only three times up to April 27th, 1909. The bacteria in the raw water has been from 300 to 20,000 per c.c. with B. Coli frequently present in one-tenth c.c."

Litigation which followed the use of "hypochlorite" in the Jersey City supply, brought the process prominently to public notice, and the bleach treatment has consequently been later applied for purposes of bacterial purification to several large water supplies. The uniform success which has attended its use under varying conditions with respect to the character of the raw water and to the nature of associated purification processes, is really remarkable when we consider that in its application as an adjunct to water filtration it has scarcely passed the experimental stage.

At Nashville, Tenn., a highly turbid river water has been satisfactorily clarified and has shown over 95 per cent. removal of bacteria, by the combined application of sulphate of alumina and bleach, without subsequent filtration. 14,000,000 gallons per day have been there treated in this way since August, 1909.

Success of Hypochlorite Treatment

At about this same time the hypochlorite treatment was introduced at Harrisburg, Pa., in connection with their mechanical filtration plant. The supply from the Susquehanna river had proved a difficult water to secure good results with at all times, owing to great variation in the color, turbidity, and other characteristics of the water. The use of 10 pounds or less of hypochlorite per 1,000,000 gallons has effected a marked improvement in the uniformity of the bacterial purification, besides permitting the reduction of coagulant to

only such quantities as are necessary to remove color and turbidity. The operation of the plant under the combined treatment continues to give the best of satisfaction, as shown by a recent statement of the superintendent of the plant: "The operation of our plant during the months of January and February (1910), ordinarily the worst months of the year, has been made easier; and the results bacterially and in the quantity of chemicals used, are remarkable. The bacteria in the river water averaged 23,117 per c.c., and in the filtered water only 6 in January, while in February the river water contained 9,015 and the filtered 3 bacteria per c.c., both remarkable averages when it is considered that these months are the ones when all the shortcomings of mechanical filters are present."

The use of hypochlorite with the otherwise untreated supplies of Minneapolis, Toronto, Montreal, and Montreal municipalities, as an emergency measure, afforded relief from threatened typhoid epidemics during the past winter. Probably in no instance has the value of "disinfection" as an adjunct to established processes of water filtration been more conspicuously shown than at Poughkeepsie, N.Y. To this city belongs the distinction of building and operating the first filter plant on the continent; in 1896 and in 1905 the works were improved and enlarged, nevertheless it was found expedient to construct a sedimentation basin for preliminary treatment of the water with a coagulant after the manner of mechanical filters. This method of treatment gave good results with the Hudson river water during its turbid stages. The severe drought during the summer of 1908 added to the pollution of the Hudson river supply by concentration in the reduced flow of the river, and in the absence of any turbidity in the raw water, no results were obtained from coagulation and sedimentation. The plant, operating as a slow sand filter, failed to produce a safe effluent. Under these circumstances, which represent in a sense an example of the inability of both types of filters to handle the water, the hypochlorite treatment introduced on February 12th, 1909, has so far overcome the difficulties previously experienced with this plant, and, to quote from a paper by Dr. Otis (Journal New, E.W.W., September, 1909), "they believe that when used in quantities from 8 pounds to 10 pounds per 1,000,000 gallons, it will reduce the bacteria over 99 per cent., and will practically eliminate the B. Coli and presumably the typhoid germs." The bleach used in the cases cited contained about 35 per cent. of available chlorine, and was applied in very small quantities, ranging from five to ten pounds per million gallons. In almost every instance the treated water has shown a bacterial count of an order that is hard to maintain in the effluent from the best filters of either type in practical operation. The cost of the treatment is merely nominal. Fifteen cents to thirty cents per million United States gallons covers the cost of chemicals and operation.

While the value of the "bleach" or any other oxidizing agent as a treatment for water in cases of emergencies, is duly recognized, it is perhaps too early to predict to what degree disinfection will be productive of economy and efficiency in the science of water purification. As a complete treatment in itself, it is applicable to only a special class of waters, but results from its use to date, point strongly to the conclusion that as an adjunct to both types of filters it will permit of the adoption of higher rates and possibly less reserve area with a corresponding reduction in first cost. This would appear to be particularly the case where the rate is governed by the degree of bacterial purification required rather than the physical improvement of the water.

Economy and Certainty of Disinfectants

In the judgment of those who from their experience are best qualified to pronounce on the matter, it is believed that from the point of view of economy and certainty in operation, the use of disinfectants will give the best results as an aid to filters of the mechanical type. Over two years ago

experiments were undertaken at Lawrence, Mass., on the Merrimac river water by mechanical filters, using sulphate of alumina as a coagulant, and bleach as a disinfectant. Soda was used when the alkalinity of the water demanded it. The following extract from a paper on these tests is of interest in this connection. "When bleach is used in combination with sulphate of alumina in mechanical filtration, a satisfactory bacterial removal may be obtained at much less expense for chemicals than when sulphate of alumina is used alone. In such a process the disinfection occurs in the coagulation basin before the water reaches the filter and subsequent filtration introduces a factor of safety which greatly adds to the effective purification of the water and greatly reduces the chances of the occasional failure of the process. In the experiments quoted, an effluent of better quality bacterially was obtained by the use of about 0.9 grain sulphate of alumina and about 0.7 grain of soda per gallon in combination with bleaching powder equivalent to 0.11 part per 100,000 available chlorine, than when nearly double the amounts of sulphate of alumina and soda were used without disinfectant."

The first cost of purification plants will depend primarily on the quality of the water to be dealt with. When the appropriate method of purification has been decided upon the cost will depend for each case on the price of materials and the local conditions which usually affect the cost of engineering works. Manifestly, then, it is impossible to make any statement as to cost which would be generally applicable; but, speaking broadly, it may be said that for plants of from one to four or five million gallons per day capacity, the first cost will range from \$15,000 to \$30,000 per million gallons for filtration alone. In some cases where the circumstances are unusual, the cost may be higher than this. For large plants the cost will range from \$12,000 to \$25,000 per million gallons. As has been stated above, each case should be separately studied so that both economy and efficiency may be advantageously combined. Generally speaking, what have been referred to as mechanical filtration plants will cost less to install than slow sand filters; but with a water which can be handled by either system, the reverse is usually the case, when the initial, operating, and maintenance costs are jointly considered.

It may be said that with present methods of purification the total cost, including interest, sinking fund, operation and maintenance for treating water of average turbidity, will not often be greater than one cent per thousand gallons of water purified. This means that for a consumption of 100 gallons per capita per day the cost to each consumer will be less than 40 cents per year.

Relative Merits of Slow Sand and Mechanical Filters

It may not be out of place to add a word concerning the relative merits of slow sand and mechanical filters. It is a question that has received considerable unprofitable and not entirely disinterested and fair discussion; as a result, both systems have been the subject of some unmerited claims and much unjustifiable criticism.

Such a controversy is neither necessary nor desirable; the two systems do not, in fact, admit of a rational comparison in the abstract. Both are wonderfully efficient machines in the accomplishment of the work legitimately required of them; and the varying conditions encountered in the field of water purification presents a variety of problems in the solution of which both systems are a necessity.

The distinguishing feature of mechanical filtration does not commend this system to the popular mind, which is disposed to regard with suspicion the use of a chemical in a drinking water; to those who hold strong convictions on this subject, it may be well to point out that after twenty years of experience, the indictment against coagulants with respect to effects prejudicial to the potability of the water, has never yet taken any more definite form than a suspicion.

Coagulants are, moreover, a necessity in the efficient and

economical treatment of many turbid and highly colored supplies.

The waters to which slow sand filters are inapplicable as a complete treatment are the most costly to handle, and the cost of operations of systems using a coagulant, considered as a class, is naturally higher than in the case of slow sand filters.

The installation of rapid coarse grained filters for preliminary treatment has permitted the adoption of final filters of the slow sand type in some recently constructed plants; these preliminary filters, known as "roughing filters," effect the clarification of the water in some cases as at Philadelphia, without the aid of coagulants. A description of some of the largest plants recently put in operation on this continent has lately appeared in the daily press; and it has no doubt been noted with regard to these plants, that scarcely any two of them follow the same course of treatment; this is perhaps one of the reasons why all are giving such splendid results. Novel features and methods have been introduced to meet varying conditions arising from the characteristics of the raw water, the availability of space and structural material, and any peculiar circumstances anticipated in the operation of the plants.

The success of these installations from the point of view of both economy and efficiency, is in no small measure to be attributed to the thoroughness of preliminary investigations.

Study Carefully Local Conditions Before Choosing Method

An interesting and remarkable example of the value of careful study of local conditions, in advance of the selection of a method for the purification of a water supply, is to be found in the small plant put in operation in September, 1908, for the treatment of the Susquehanna river water at Steelton, Pa.

Here the designer had the benefit of an experience gained in the design and operation of the Harrisburg filters on the same river. Some idea of the difficulties presented may be gathered from the following description given of the river water at Steelton:

"High bacterial counts sometimes accompany very low, as well as very high, turbidities, and similarly relatively low turbidities are sometimes found at the very high stages of the river; further, the color of the turbidity is no indication of its total amount, as a comparison of the records of ten samples of water, each with a turbidity of one thousand parts per million, collected at different times, and at different parts of the river, shows all gradations of colors between bright yellow, red, dark brown, and black. As a result of these complex conditions, the water in the river may change quickly from a moderately hard, clear water to a soft water carrying several thousand parts per million of turbidity, which, on occasions, may intermittently come down coagulated to a more or less limy or flocculent condition with hydrated oxide or iron and hydrate of alumina. On the other hand, the river from bank to bank may be carrying its maximum load of yellow clay from the Conodoguinet and Juniata, or reddish brown mud from the west branch. During a general flood from the entire watershed, all these conditions may prevail at the same time.

The plant here installed has a nominal capacity of 3,000,000 gallons per day; and consists of preliminary coarse grained filters working at a rate of 170,000,000 gallons per acre per day. These filters are operated both as simple roughing filters and also as mechanical filters, using a coagulant when it is found necessary to produce an effluent which can be handled by final filters of the slow sand type.

As a result of careful control of the preliminary filters, it is estimated that the final filters will have a capacity of 9,000,000 gallons per acre per day.

This plant has been most efficient in accomplishing the bacterial and physical improvement of the water.

The initial cost, exclusive of exterior conduits, was less

than \$60,000, that is, about \$20,000 per million gallons estimated capacity. The cost of operation is in the vicinity of \$3 per million gallons, so that, placing interest and depreciation at 10 per cent. on the cost of the plant, it will be seen that the total cost is within \$10 per million gallons filtered.

This is a remarkable performance under such unusual circumstances, and the moral points forcibly to the expediency of giving ample opportunities and facilities for familiarizing themselves with all local conditions.

Conclusion

It will not be necessary to refer in detail to the many advantages possessed by filtered water when used for drinking and other domestic purposes. One of the most serious and at the same time unnecessary diseases which affect humanity is typhoid fever. This is a disease of the human intestines, and is now generally admitted to be caused only by the specific germ of typhoid, the typhoid bacillus. This germ is found in enormous numbers in the urine and feces of persons afflicted with typhoid fever. Hence it is that sewage is at all times liable to contain large numbers of these germs, and is of all impurities in water the one most to be feared. The water courses of a country, the rivers and streams, are the natural drainage channels, and it is, therefore, practically impossible, when their watersheds are inhabited, to prevent sewage in some form or other from entering them; so that it may be generally stated that, except for the smaller streams whose watersheds may be thoroughly protected, no river water is safe to drink without purification. This statement must, of course, be greatly modified as to degree. Large streams and sparsely inhabited watersheds constitute safer conditions because of a high dilution; but the universal and constant use of water demands that its purity should be jealously guarded at all times and under all circumstances. If, for example, it was known that a public water supply was rarely liable to contain a poisonous substance like lead, in such quantities as to be sufficient to cause serious disease and sometimes death, there would be no hesitation in condemning it. Rivers flowing through populous districts will always receive a certain proportion of sewage which will occasionally contain that which will cause disease and death just as surely as if they were contaminated with a deadly poison in some other form. We do not need examinations of the water to tell us this. As a matter of fact no analysis has as yet been able to furnish positive evidence of infection. In all the thousands of sanitary analyses of water which have been made the typhoid bacillus has been identified less than a dozen times, so that a favorable analysis of a surface water is no guarantee as to its safety for drinking purposes.

The important fact is that rivers have other uses than furnishing supplies of drinking water, and even if all our sewerage systems were equipped with efficient disposal plants, which they are not now, and will not be for a long time, there are still many ways that impurities may enter. Fortunately the tendency is for typhoid germs to die rapidly in water; but the hardy forms at least, which are probably the dangerous ones, can live in river water for days.

Typhoid can be transmitted by other media than water, but a large proportion of the deaths from this disease is caused by water-borne germs, as is shown by the records of places whose water supplies have been improved either by filtration or the substitution of a purer source; and also by a comparison of the typhoid death rates of different cities with supplies of varying degrees of purity. An illustration of this is given by the typhoid rate of Jersey City, which, under the change to a purer supply, decreased from 84 deaths per 100,000 in 1896 to 10 in 1908.

It is now considered that with purification plants properly designed and operated the typhoid rate should be kept down to from 15 to 20 per 100,000, and probably in many cases to less than this. The water supply of Montreal is

taken from a large river where the dilution is unusually great, yet the average typhoid fever rate for the last 30 years has been over 40; and for the last ten years about 35. Probably half of these might have been prevented by properly purifying the water. This means, on the basis of the population of Greater Montreal, the prevention of 100 deaths a year, and at least 1,000 other cases. Last year 40 lives were lost in the whole Dominion by accidents at railway crossings, towards the prevention of which the Federal Government is itself devoting \$200,000 per year for the next five years. Probably from two to three times as many lives are lost by typhoid fever in the city of Montreal alone.

From a financial standpoint, the average value of a human life is generally given by statisticians as \$5,000, which will give some idea of the actual preventable loss to the community from this disease alone, particularly when we remember that the victims of typhoid fever are largely of the age when their life value is greatest. Considering, however, only the cases which recover, with the loss of time and incidental expense, we would probably be underestimating the average cost as at least \$100 per patient. This in itself means a loss of \$100,000 a year to this community, which somebody has to pay for. But it is from the point of view of the individual that the cost of placing water beyond suspicion appears in its real relation to the results obtained. When the facts of the case are clearly realized no one would risk his health or life, or those of the members of his family, for the sake of an expenditure of less than one cent per week, and this will cover the entire cost of purifying most water supplies.

Cost of Sewage Disposal

In a recent report to the city of Rochester, Mr. Emil Kuichling has collected some data concerning the cost of sewage disposal by different methods and in different cities. He states that in Worcester, Mass., during the six years of 1900 to 1905, inclusive, the average annual cost of operating the sand filter beds varied from \$6.79 to \$13.12, with a mean of about \$8.50 per million gallons of sewage filtered. This is operating expenses only, and does not include interest and taxes on the cost of land and construction of beds. This cost in 1905 had amounted to \$176,240, or at the rate of \$4,900 per acre, for the whole 36 acres. Assuming interest and taxes at 5 per cent. and taking the amount of sewage treated at 1,029,000,000 gallons, the amount for 1905, the fixed charge was found to amount to \$8.56 per million gallons, making the total cost about \$17 per million gallons. (This sewage has been previously clarified.)

The cost of chemical precipitation of sewage and disposal of the resulting sludge at Worcester was \$11.89 per million gallons in 1905. At Providence, R.I., it was \$6.60 in 1906. These figures are the operating expenses only. These two works are the largest of their kind in the United States. Providence discharges the effluent into a large tidal bay, while Worcester's effluent receives only slight dilution in a small stream, which probably accounts for the difference in cost of treatment. The average fixed charges for these would probably approximate \$5.75, making the total cost (the average of the two plants) about \$15 per million gallons.

For the cost of disposal by sprinkling filters he takes the figures of the Columbus, Ohio, plant, in which the cost of the beds, gate house and piping immediately connected with the filters was about \$150,000 for ten acres, or about \$7,500 per million gallons treated. Including the large sedimentation tanks and the land, and the two small settling basins for clarifying the effluent, the total cost was about \$493,100, or about \$24,655 per million gallons treated per day. If interest, depreciation and taxes on this be taken at 6 per cent. this will amount to \$4.05 per million gallons treated. Concerning

operation expenses, he states that no data are yet available, but that this probably will not exceed \$2 per million gallons, which would be increased by about \$3 if the sludge had to be disposed of in some more expensive way than by discharging into the river during flood, making the total cost about \$9 per million gallons treated.

Based on these and other data and on preliminary designs for treating the sewage of Rochester in various ways, Mr. Kuichling estimates that the cost per million gallons of sewage treated would be represented by the following figures, both operating and fixed expenses being included in each case:

(a) Clarification by grit chambers and fine screens, 55 cents per million gallons.

(b) Intermittent filtration of screened sewage, as supplementary to (a), \$16.92 per million gallons.

(c) Chemical precipitation, including coarse screening, \$14.88.

(d) Sprinkling filters preceded by coarse screening and sedimentation tanks, \$9.03 per million gallons.

(e) Plain sedimentation of the effluent from (a), \$1.05 in addition to the cost of (a).

(f) Sewage farming. No estimate was made of this.

(g) Disinfection of effluent from (a) by ozone, \$10 additional.

(h) Disinfection of effluent from (a) by chlorine, at 25 parts available chlorine per million, \$10 additional.

(i) Same as (h), but with only 10 parts available chlorine per million, \$3.75 additional.

(j) Disinfection of effluent from (a) and sedimentation tanks with chlorine at the rate of 6 parts available chlorine per million, \$2.42 additional.

These estimates, especially those for filtration and chemical precipitation, may seem excessive to many who are unfamiliar with the details of sewage filtration, but we believe they are no more than conservatively high, on the assumption that as high a degree of purification is being obtained as is consistent with the method used.

Street Paving in London, Eng.

In the borough of Hampstead there are now about nine miles of wood-paved streets, those sustaining the heaviest traffic being paved with Australian hardwood sectional block, which, including concrete foundation, costs about \$3.40 per superficial yard. On roads where traffic is not so heavy, creosoted Baltic timber blocks are used, the cost of concrete foundation being about \$2.68 per yard. The average life of the wood paving in Hampstead is about ten years, and the borough engineer states it has given general satisfaction, as the road gradients in that section vary considerably and wood paving gives excellent foothold for horses on gradients up to 1 in 20.

There are about 15 miles of wood-block roads in the populous borough of St. Marylebone. In the construction of these roads the macadam or other previous paving material is excavated, the ground properly graded, a 6 to 9-inch Portland cement concrete foundation put down with a perfectly smooth surface, and when thoroughly set, paved over with creosoted deal blocks 5 inches deep, grouted with bituminous composition. The average life of this paving is 10 to 15 years, according to the amount and nature of traffic. The cost per square yard is \$3.28 for 5-inch creosoted deal blocks placed on an 8-inch concrete foundation. The borough engineer states that this paving is very advantageous because it is comparatively noiseless, much more economical to structurally maintain than macadam, and affords a fair foothold for horses, but, owing to its smooth surface and impervious nature, requires more cleaning than macadam.

In our issue of May 4th we inadvertently omitted to credit the "Engineering Review" for the article relating to a piping system for steam heating.

Some Causes of Leaky Slate Roofs and their Remedies

A writer who has had an experience of many years chiefly in connection with slated roofs, describes some of the causes of roofs leaking and points out remedies for the trouble in a recent issue of our London contemporary, "The Illustrated Carpenter and Builder." He intimates that there are few, if any, roofs that do not at some time or another allow water to enter the interior of a building, staining the ceiling and doing other damage. He states that the two leading principles in connection with roof work are the pitch of the roof and the mode of covering it. He points out that the flatter the pitch, the larger the slates and proportionately increase of lap, while the steeper the pitch the smaller the slates and less the lap. What he further says on the subject is of such general interest that we present it herewith.

On more than one occasion when the writer has had to repair a roof that looked perfectly sound, he has been told by the tenant that the leak appeared only after very heavy rains, and on removing a few slates over the defective part he has not found any broken or cracked slates to cause the leak. In other words, the roof is flat pitched, the slates are small, and the lap insufficient.

To remedy the defect, and where appearance is no object, an easy way out of the difficulty, and one that does not involve stripping the roof, is as follows: Remove about a dozen slates centrally over the spot where the rain has soaked through. If the existing slates are 16-inch by 8-inch or 20-inch by 10-inch, procure some larger slates, trim down to the same width as existing slates, but not the length, so that the extra length will give an extra lap to that portion of the roof affected. If, however, through weakness of roof timbers, a part of the roof has become concave on the surface, the rafters should be fired up and the slates refixed.

Another and very frequent cause of leakage is where the roof abuts against the walls. It should be remembered that a great safeguard against leakage at this point is the insertion of a tilting fillet at the time of constructing the roof previous to covering in. It helps to keep the rain from percolating beneath the slates or flashings. The tilting fillets, though very essential, are in a good many cases omitted. They should be fixed at the junctions of walls and roofs as well as at the undereaves. There can be little doubt that flashings make the best finish at these points. Cement fillets do not, generally speaking, last long. The vibration of the roof in stormy weather causes the cement to become detached from the slates, leaving a gap for rain to enter, as the fillet has a better key and adheres firmer to the brickwork than the smooth slates. It would be better for the fillet to be oblong rather than angular in section, so that the greater part is on the roof. Were the fillet composed of lime and hair gauged with cement, it would be an advantage over the usual cement and sand.

The bond of slating should be regular throughout, as any variation has a tendency to allow rain to enter the roof, especially during heavy storms.

In order to economize slates, sometimes the undereaves are composed of small pieces of slates just sufficient to break the joint, etc., but this should not be allowed. Rain falling on a roof increases in volume as it gets nearer the gutters, and consequently the undereaves course should be composed of full width slates as well as any other part of the roof, for if not so constructed it is liable to allow the rain to find its way to the interior of the building.

A good sound slated roof requires:

(a) Tilting fillets at gutters and at junction of walls.

(b) No cement fillets but proper flashings wedged and pointed to the brickwork or stonework.

(c) The bond properly kept throughout.

(d) The lap regulated according to the pitch of the roof.

The Installation of Contractors' Plants

Value of Detailed Records Showing Cost, Arrangement and Condition of Machinery — Installation of Plant an Important Consideration

BY DANIEL J. HAUER

In cost records a great many important features are frequently ignored. This is especially so in regard to the great item of plant or outfit. We can find few records giving detailed costs, the exact arrangement of the plant used, the great item of repairs and renewals, and whether or not the plant installed was in constant use.

Such charges are frequently put down as a certain per cent. of the total cost of the work, or as a general or fixed charge in the cost of construction. It is really one of the most difficult things for every contractor and engineer to handle. The charge can be a varying one, according to the methods used. The size of the gang, likewise, can affect the plant charge, also the condition of the labor market. If wages are high and men scarce, it is often necessary to have a larger plant than when men are anxious to secure work.

Records of plant charges, broken up into its various details, are very scarce. For instance, but little data can be obtained on the labor cost of the installation of plants. On the installation of cable ways but little is in print. Even in simpler things, as the setting up of a derrick, or even the moving of a derrick, but few records have been published. On some jobs these items alone may mean the consuming of all prospective profits.

The item of plant charge should always include installation. It is true that when the plant is small and the work located close to some railroad station, this item may be an insignificant one, but on extensive jobs, or even small jobs at some distance from a railroad, the item of installation may run into many thousands of dollars. In most cases this cost is nearly always under-estimated by the engineer and contractor.

Plant charges are too frequently guessed at, being estimated, as a rule, as being from five to ten per cent. of the total cost of doing the work. These percentages have evidently been obtained from the few accurate records that have been published. Some large contracting firms have an arbitrary charge for plant, varying with the different classes of machinery used by contractors. In some cases these arbitrary charges are meant only to be used for depreciation on the plant.

On certain classes of work it is absolutely necessary to charge the entire cost of the plant against such work. This is where plant must be of a special design, or where there is absolutely no salvage on the plant at the end of the job. This does not always apply to the entire plant, but frequently to parts of the contractor's outfit or apparatus, he may need. This is always so in regard to small tools, such as picks, shovels, wrenches, etc. Such tools should never be charged against the plant or outfit, but should be a direct charge against the expense of the job. Few engineers seem willing to have contractors charge an entire plant against one job, even when there is no salvage to the plant. As a general rule, this should not be done, but, as previously stated, there are cases when it is absolutely necessary to do so if the contractor is to come out whole. In building the new Croton Dam, steel towers were erected to hold the derricks. As the masonry was built up these towers were embedded in the structure. Thus, there could be no salvage on them; and as these towers were apparatus used in constructing the dam, it should be a direct charge against the work. On other large jobs the same things occur; and this is especially so on heavy canal work. Gantry cranes and large steel tower systems are often built to carry on excavation, and there is very

little salvage to them after some four or five years' use. Naturally, the cost of installing such special pieces of apparatus is extremely large, and a rough guess on such work will generally mean a decided money loss.

All this shows the great importance of the installation of plant and various apparatus for constructing purposes, especially on large jobs. Even on small contracts this can be important; such as the erection of a derrick for a small box culvert on a railroad. The wasting of a day in setting up and taking down a 30-foot boom derrick may mean the eating up of all the profits on the mason work. This also calls attention to the moving of plant from one part of a job to the other. Records should be kept of this class of work, as well as of the original installation.

Interesting Cases in Point

Last summer a contractor working in the Northwest used scrapers for putting up an embankment of 170,000 cubic yards. He was compelled to carry the plant for this work, consisting of traction engines, scrapers and horses, over rough mountain roads. The cost of moving this plant and installing it on the job, and of taking it away, amounted to 1.2 cents per cubic yard of material handled. This was 9 per cent. of the total cost of doing the work. For carrying such an easily transported outfit across the country and also for interest and depreciation, one would hardly imagine that the plant charge would exceed 5 or 6 per cent. of the total cost of doing the work, but in this case the cost of installation and taking away the plant exceeded this percentage.

In installing a No. 2 gyratory stone crusher, the total costs for labor and transporting were \$420. The crusher had to be unloaded from the cars, transported on its own wheels six miles, during the winter time, over rough mountain roads, set up in place, engines set, elevator and screens put in place, and a large bin built. A platform had to be constructed to feed the crusher, and a shed built over the engine and boiler. The cost of installation in this case was 33½ per cent. of the cost of the crusher. This machine, from this one set up, had to crush about 3,000 cubic yards of rock.

In moving a steam shovel 5½ miles through the mountains, in some cases the grades being very steep, varying from 3 to 15 per cent., several snowstorms occurring during the progress of the work, the cost amounted to about \$4,300, inclusive of raising the boom and setting the jack arms in place. The work was done under adverse conditions, and the cost of moving the boom, alone, was about \$1,000. The shovel was a 70-ton Bucyrus. Contrast this with putting a shovel of about the same size to work on a cut alongside of a railroad track. Here the track was cut, a switch put in, boom erected and jack arms placed, for a little less than \$100.

Upon another occasion the writer had a large shovel, just before being put to work, to fall over. This shovel was picked up by means of locomotives and hydraulic jacks, a few parts repaired and the shovel put to work, the total cost being a little less than \$1,000. Upon another occasion a Model 20 Marion shovel was taken apart, hauled nine miles over rough mountain roads, and assembled again at a cost of about \$2,500. One item, though, that cannot be set down in this case, is the great amount of time consumed in dismantling the shovel, hauling it, and putting it together again. As the job had to be done quickly, this delay was an important item.

In moving two dinkys a distance of five miles over mountain road the cost was \$600. It is of interest to note that

one dinkey cost \$400 to move, while the second one cost but \$200, the difference being, to a great extent, due to weather conditions, and the fact that in moving the first one the gang of men became familiar with the road and the difficulties that had to be overcome to prevent accident.

Even small dump cars are sometimes expensive to move and to place on the job. Four-yard cars have cost the writer \$11 per car to haul $5\frac{1}{2}$ miles and place them on the track.

Installing the Plant

Installation of plant is often done in a haphazard manner. The job being new, tends to make confusion, and the forces are often inadequate. Trained men for moving and installing plant cannot always be obtained, and frequently the contractor has not the time to give the necessary thought to plan his work. The installation of the contractor's plant can be likened, to a great extent, to that of a factory. Every manufacturer has been made to realize that the cost of installing the machinery has to be kept down, and much thought has to be given to the placing of his machinery. Output always depends upon the arrangement of the plant. Contractors should plan their work well ahead, as not only will the cost of installation thus be kept down, but much money can also be saved in carrying on the work. Wherever possible, drawings should be made and instructions for doing the work be written out, as in this manner many mistakes can be eliminated. Then, too, the pitfalls encountered on previous jobs can be recorded and the plans changed to overcome such difficulties. Every contractor should have kept close costs on the installation of machines, and, in connection with such costs, there should be diagrams showing the location of various parts of his plant, otherwise his costs will not possess the value that they should have. Likewise, detailed records should be kept of repairs and renewals of all his various machines and tools.

In former days such details as these played an unimportant part in the contracting business, but to-day we find contractors purchasing and installing plant costing from a half million to a million dollars, so that the installation of plants is a very important and live topic for discussion.—The Contractor.

Use of Asphalt in Germany

United States Consul-General Robert P. Skinner, of Hamburg, gives information as to the quantity, grades, and manner of using asphalt in Germany:

Large quantities of asphalt are imported into Germany, of which a very inconsiderable proportion is received from the United States. The total importations in 1909 were 98,377 tons, and in 1908, 130,062 tons; of which Italy supplied 61,828 tons and 83,778 tons, respectively; Switzerland, 10,538 and 16,687 tons; British America, 17,315 and 18,802 tons, and the United States, 3,753 and 3,639 tons.

Asphalt is on the German free list as respects duty, when the specific gravity of the material is not less than 0.96 at a temperature of 15 degrees Centigrade, and when imported for the purpose of mixing with natural asphalt or tar for use in the manufacture of asphalt or tar board.

Soft, medium, and hard asphalts are in demand, present prices ranging from 90 to 120 marks (\$21.42 to \$28.56) per ton, according to grade. The largest manufacturers of paving mixtures in this city claim that prices now fluctuate between 75 and 90 marks (\$17.85 and \$21.42) only for the grades they require.

The total length of the paved streets in Hamburg is 443 kilometres (275 miles), of which 6 per cent. are paved with asphalt, 6 per cent. with square stone blocks on concrete foundation, 15 per cent. with square stone blocks without concrete foundation, and 0.6 per cent. with wooden blocks. In all of the classes of pavement just mentioned asphalt is used to a greater or less extent. The interstices between

the large square blocks, used so extensively in the centre of the city, are filled with a mixture called Stampfasphalt, the formula for which has been prescribed by the Hamburg government. Upon many of the pavements of wooden blocks an asphalt coating is applied, producing a surface exactly like that of a solid asphalt pavement.

Modern Requirements of A Public Water Supply

The opinion of sanitary engineers, sanitarians, and in general those who are familiar with the proper development of water supply interests, has now become fairly well crystallized with respect to the requirements which a water supply should fulfill. These requirements are sanitary, æsthetic, commercial and protective in their nature. The writer has summarized them as follows:

(a) Requirement of Quality—

(1) Primarily the water supply must be free from pathogenic or disease-producing organisms. More than this, it should be free from those allied organic forms which may not as yet be recognized as accompanying disease, but which may, nevertheless, not be conducive to health. This condition of safety must prevail continuously and the supply must not be subject to what may be termed "accidental" contamination.

(2) The water must be uniformly clear and free from turbidity, both that which may be produced by suspended mineral matters, and also that which may be due to suspended organic (vegetable and animal) growths or impurities.

(3) The water must not be discolored by dissolved vegetable matters to such an extent that it may be objectionably apparent when employed for table use or in the arts.

(4) The water must at all times be free from both tastes and odors, either those produced by dissolved gases or those which may be due to the growth and decay of micro-organisms (minute plants and animals frequenting lakes, reservoirs and rivers, but usually prevailing to the least extent in the last named source.)

(5) As far as possible the water should be cool and palatable.

(b) Requirement of Quantity—

(6) The Supply must be abundant and unfailing, but for economic reasons must be conserved in such manner that all preventable waste shall be eliminated.

(c) Requirement of Physical Safety and Dependableness—

(7) The pressure under which the water shall continuously act in the distribution pipes must be ample to serve the various districts according to their specific character and needs.

(8) The system of works must be one in which design and construction may be executed in such a way that they will successfully meet conditions imposed by the natural phenomena occurring or likely to occur within the region in question.

(9) The various structures in connection with these waters should be so located, arranged, built and protected that they may not be unduly exposed to fires or other accidents befalling neighboring structures.—Charles Gillman Hyde, in the California Journal of Technography.

A paper read before a recent gathering of concrete workers contained this statement: "No greater mistake can be made by the contractor than to attempt to make money on concrete work by slighting or skimping a job." While this is not a startling statement, it is an eminently true one, and one which will bear repetition until it has been adopted as a working principle by the entire fraternity of concrete constructors. The time is soon coming when such a thing will be practically impossible. It will not be long before owners will insist on good work as a prime requisite rather than on low cost, and the very best class of work will be necessary in order to secure any business at all.

Trade News from Montreal

Plenty of Work for Contractors in the Eastern Metropolis — Supply Market Healthy — No Labor Troubles at Present

Montreal Office of the "Contract Record."
May 28th, 1910.

Montreal continues to evidence signs of a prosperous building year. The May returns, showing the extent of permits issued during the month, are not yet completed at the city building inspector's office, but these undoubtedly will show a substantial increase over the same period in 1909. That contractors generally have plenty of work on hand is a matter which architects are learning to understand more fully day by day. Calls for tenders on the part of the latter often do not interest more than 50 per cent. of those asked to submit a figure—truly an odd state of affairs.

Permits are still being issued at a good average rate from the city Building Department, and the surrounding districts are apparently enjoying a like prosperous season. Take Maisonneuve, for instance. In this busy little centre alone permits have been taken out since the first of the year aggregating approximately \$300,000, and Inspector Reeves believes that building operations will be extensive during the coming summer. In Outremont and St. Lambert also, permits are being steadily issued and the present outlook is favorably regarded by those in a position to form an estimate. The fact that May has practically passed without any active disturbance from labor circles is a good sign and will undoubtedly give interested parties courage to proceed with their building plans, held in abeyance until all prospects of labor strikes should disappear from the horizon.

Supply Market

With common grades of brick contractors are experiencing no difficulties in obtaining all their requirements for immediate delivery, and plenty of this class of stock is in evidence on the local market. Pressed brick, on the other hand, are not so readily obtainable, the figures quoted being fairly stiff. No. 1 reds are worth 18.50, with buffs placed at \$20 f.o.b. cars Montreal. This year the season for pressed brick was somewhat delayed owing to weather conditions, and as a result the orders have poured in with a rush to such an extent that American and Ontario markets, where our supply is chiefly drawn from, have been kept busy coping with the rush demand. Crushed stone is also actively inquired for, and while there is an abundance of this material in the surrounding neighborhood to meet all demands, the lack of cartage facilities is responsible for the present limitations to the available stock. 2-inch to 2½-inch stone is quoted at 90 cents per ton of 2,000 pounds f.o.b. quarries, with ¾-inch worth \$1.25 and ½-inch, \$1.50 per ton.

Cement is moving freely and there have been no alterations in prices since the quotations given at the first of the year. In painting circles an almost unparalleled season is being encountered. A buoyant and optimistic feeling permeates the whole trade, and conditions were never better. Turpentine is quoted at 84 cents in single gallon lots. Linseed oil is worth 92 cents raw, and 95 cents boiled. White lead is quoted at \$5.50 to \$6, according to brand, and red lead \$4.75 to \$5.25, both f.o.b. Montreal.

Architects' Law Amendment

The bill introduced to amend the law respecting architectural examinations and providing that only one trial be held during the year, instead of two, was defeated recently in the Quebec Legislature.

Among the recent tenders received by the Board of Control for street and sidewalk improvements, were several from American firms. These were accompanied by certified checks issued upon United States banks, and as this method of pro-

cedure did not conform with the practice of the city, the committee was compelled to set them aside temporarily. The tenderers threatened to take out injunctions to force the city to consider their tenders.

Montreal Harbor Plans Approved

The Ottawa authorities have finally approved of the Harbor Commissioners' plans for improvements to the Montreal harbor. This year's outlay will be approximately \$2,000,000, chiefly to be spent in the elevation of tracks and embankment from Victoria pier to the sugar refinery, a distance of three miles. This work has been under way since the first of May, and already with their large staff of men considerable work has been done by the commissioners.

Extensive Dam Construction

The Ambursen Hydraulic Construction Company of Canada, Limited, 405 Dorchester street west, is erecting an extensive dam for the A. E. Reed & Company, Bishop's Falls, Newfoundland. The dam is being built for the purpose of obtaining power for the operation of the company's pulp and paper mills on the Exploit river at this point. It will have a height above the water line of 45 feet, with a total length of approximately 700 feet.

The Boston Ambursen Company has entered into a contract with the Puget Sound Bridge & Dredging Company for the erection of a dam on the Clackamas river, Oregon, for the Portland Railway, Light & Power Company. This dam will be 680 feet long. The contract also involves the construction of a large power house.

This company is also doing considerable work in the south and west for irrigation and power projects.

To Federate With Royal Architectural Institute

A special general meeting of the Province of Quebec Architects' Association is being held on Tuesday, May 31, to consider the question of the federation of the various Provincial associations of architects with the Royal Architectural Institute of Canada. In the opinion of this association a scheme for the federation of the present legally incorporated architectural associations throughout the Dominion would be of great general advantage.

Foundation Company, Limited, in Montreal

The Foundation Company, Limited, has opened an office at 76 Bank of Ottawa Building, with Mr. Alexander Allaire in charge. This company was associated with the Bishop Construction Company in the construction of the foundation for the new Canadian Pacific Railway Windsor street station. They are at present acting as engineers on the foundation work for the new addition to the General Hospital on Dorchester street east. The Foundation Company makes a specialty of pneumatic work of all kinds, heavy building foundation construction, the construction of bridge piers, mining shafts, tunnels, water power and power plant construction, sea walls, wharves, quays, dams and lighthouses.

Blumenthal Work Started

The work of tearing down the old buildings on the site of the new Blumenthal Building, corner Balmoral and St. Catherine streets, preparatory to commencing the foundation work, has been placed well under way by the contractors, Messrs. D. G. Loomis & Son. The building is to be of reinforced concrete, eight storeys in height, and will be erected according to the Kahn system, material and plans supplied by the Trussed Concrete Steel Company of Canada, Limited. Mr. G. B. Reynolds, sales agent and engineer.

New Coal Storage and Distribution Plant

The Montreal Light, Heat & Power Company have awarded the contract to Messrs. D. G. Loomis & Sons for the erection of a new coal storage and distribution plant, which

will be approximately 485 feet by 190 feet, and 45 feet high. The structure, which is to be built in the east end of the city close to the company's gas plant, will be of reinforced concrete and of a special design supplied by Mr. G. B. Reynolds, engineer for the Trussed Concrete Steel Company of Canada, Limited. Kahn bars and rib-metal are specified and the construction will include columns 40 feet in height. The roof beams are designed to carry an electric traveller of 12 tons, which will be suspended from tracks attached to roof beams.

Builders' Exchange Luncheon

The officers of the Montreal Builders' Exchange are planning an informal luncheon for the members of the association, to be held at an early date. Mr. Wm. H. Sayward, of Boston, Mass., a well known figure in American building circles, is expected to be present and to deliver an interesting address.

St. Timothee Construction Work

The Canadian Light & Power Company have awarded the contract for the reinforcing of sidings, partitions and roof of the new power house in course of erection at St. Timothee to the Trussed Concrete Steel Company of Canada, Limited. Mr. G. B. Reynolds, engineer and salesman. Kahn Hy-rib metal will be used for the walls, sidings and partitions, and rib-metal for the roof. Messrs. J. G. White & Company, New York, are the supervising and consulting engineers.

Mr. P. C. McGovern, general contractor on the construction of the Montreal Lateral Conduit, has sent the Board of Control a bill for \$15,000, extras supplied on this job.

Mr. Sidney P. Howard, for a number of years general freight agent Eastern Division, Canadian Pacific Railway Company, has resigned, to engage in a real estate business with Mr. John Findlay, of Montreal. The new firm will be known as Messrs. Findlay & Howard.

The Ambursen Hydraulic Construction Company of Canada, Limited, are prepared to furnish insurance of the highest responsibility on the Ambursen dam. This may be secured for the construction period only, or as a permanent insurance to be renewed from year to year. It is effected at a reasonable premium rate and also carries with it in each case the inspection and approval of the consulting engineers of the insuring company, both as regards sufficiency of plans and excellence of subsequent construction. This entirely new departure in hydro-electric developments serves to emphasize the character of the work which this company designs and constructs.

The work of constructing the viaduct at Outlook, Alta., for the Canadian Pacific Railway Company has just been commenced, and the Raymond Concrete Pile Company will shortly have a plant in operation on the premises to carry out this work.

The assignment of Mr. Thos. Wand is recorded. In order to facilitate the winding up of the estate this move was considered advisable by a number of the creditors. If, however, the estate produces 30 cents on the dollar, Mr. Wand will be given a release in full.

From the Federal Capital

Ottawa city has more paving contracts on hand than it seems possible to accomplish this season. The longest are mile stretches on St. Patrick street and Bank street. City Engineer Ker is endeavoring to have the latter done without

fail by September, as it is on the route to the Central Canada Fair Grounds.

The corporation's notice to persons served by a new sanitary sewer in the western portion of the city, costing altogether \$52,532, shows that the cost per lineal foot was \$4.73. The work was chiefly through rock.

City Engineer Ker has ascertained that the consumption of water in Ottawa is 16,000,000 gallons a day, or 198 gallons per head of population. The greatest consumption in any other city is found to be 120 gallons per capita and in Toronto only 80 gallons. The enormous use of water in the capital is partly attributable to building operations, but the people must be wasting or the consumption would not reach so remarkable a figure. Letting taps run continually in houses and wasting water on lawns, are important sources of loss, according to the engineer. Despite the loss, the city engineer says it would not pay to install meters in all the houses to control the consumption.

John O'Leary, one of the best known municipal and government contractors of Ottawa, died from a stroke of paralysis on May 20. Many of the city's pavements were laid by him. He was 69 years of age, and came to Ottawa from his birthplace in Wexford, Ireland, when 22 years of age. For many years he was alderman for St. George ward.

Mayor Hopewell, of Ottawa, and President Peter Whelen, of the Ottawa Board of Trade, and the Mayor of Smith's Falls, have all taken a strong stand against allowing the C.P.R. to use the present bed of the Rideau canal for an entrance to the city, as proposed in their new project to run a tunnel from the Central to the Union depot.

Ottawa architects are divided as to the wisdom of the proposed building by-law to limit structures to eight storeys. This and other features of the measure are so contentious that it will be some time before it is disposed of. A by-law governing the inspection of electrical wiring has also been laid aside temporarily.

Permission has been granted the Canadian Pacific Railway to appeal to the Supreme Court against the decision of the Railway Commission ordering them to run their Pontiac and Gatineau trains to the Central station. The applicants for the service of the Central contended that it was a hardship to compel the public to go from the centre of the city to the Union depot to take a train for the Gatineau summer resorts. The railway company claims that it would be impracticable to make the change, as it means backing trains over the new interprovincial bridge spanning the Ottawa river.

Personal News and Notes

Building permits issued to date at Winnipeg, Man., total over \$7,000,000, an advance of \$2,000,000 over the same period of last year.

At the recent convocation at Queen's University, the degree of Doctor of Science was conferred upon Professor Herdt, of Montreal, Que.

Mr. J. Howard Bridge, the English sanitary expert and inventor of the Bridge system of water purification by the ozone process, left Montreal last week for Ogdensburg, N.Y.

Mr. W. B. Boyd, chief engineer of the Toronto Power Company, has gone to Winnipeg to consult with Dr. Herdt, Montreal, as to the best remedy for the electrolysis troubles experienced in that city.

Mr. R. E. W. Hagarty, secretary of the Canadian Cement and Concrete Association, who has been abroad for the past month or so studying European methods of engineering organization, left Liverpool for Toronto on the 21st ult.

Mr. D. P. Roberts, electrical engineer, of London, Ont., has resigned. He is stated to have received a tempting offer from a large manufacturing concern about to locate in Can-



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Summary of Classified List of Jobs

No.	JOBS	1st. Quality	and Quality
104	Public Office Bldgs. Banks, Libraries, Halls and Theatres.....	3,540,991	412,545
50	Private Residences.....	1,023,050	70,300
38	United States Government.....	613,639	119,115
17	Cemeteries, Vaults, Tombs and Green-houses.....	43,049	5,500
111	Athletic Clubs, Clubs, Universities, Col-lege and School Buildings.....	872,822	1,274,580
58	Hotels, Apartments, Restaurants and Sup-ply Stores (Markets and Refrig'g Plants).....	1,547,162	251,707
70	Pumping Stations and Power Houses.....	1,779,271	935,622
25	Natatorium Swimming Pools and Comfort Stations.....	281,682	59,923
41	Hospitals, Asylums, Homes.....	1,062,571	116,400
37	Private Stables.....	460,320	124,242
32	Railroad Stations and Subways.....	838,501	192,192
56	Mills and Factories.....	609,549	1,075,713
17	Police Stations and Fire Houses.....	208,664	28,837
656		Total 1st 12,800,281	4,660,766
		Total and 4,660,766	
61	Bake Oven Jobs.....	7,461,047	101,694
717		17,562,741	

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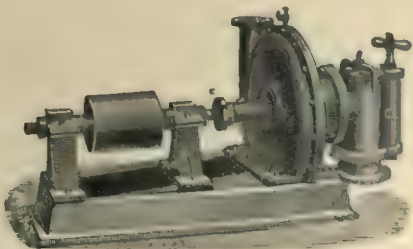
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ada. Mr. Roberts was appointed assistant electrical engineer at London about a year ago, and only succeeded to the higher position a couple of months since.

Mr. A. P. Forde has been appointed superintendent of construction in British Columbia for the C.N.R. For many years Mr. Forde was resident engineer for the C.P.R. at Revelstoke, B.C.

Mr. J. C. A. Heriot, of the firm of Messrs. MacVicar & Heriot, architects, Montreal, was unfortunate enough to be thrown from his carriage recently, thereby sustaining a broken shoulder bone.

At a meeting of the Manitoba Good Roads' Association, held last week at Winnipeg, it was decided to ask the Provincial Government to assist in the holding of a Good Roads' convention at Winnipeg during the Exhibition. A committee was appointed to interview the Premier.

The Phoenix Bridge Company have entered upon the removal of the Quebec bridge and its approaches, in order to make way for the new structure. The work is in charge of Mr. Milliken, chief of construction for the company. The greatest care will be exercised in this work, with a view to utilizing the material on government railroad construction.

Mr. R. A. Thompson, city engineer of Seattle, Wash., and



Warehouse of Mussens, Limited, Montreal

City Engineers Clement, of Vancouver, B.C., and Hanes, of North Vancouver, have been appointed a commission to bring in recommendations for the establishment of permanent grades in the last named city. A unique feature of the situation is that Mr. Thompson's services are gratis—with the compliments of the city of Seattle.

A recent arrival at Montreal was Mr. A. K. Robertson, C.E., a member of an English railroad contracting firm, the McAlpine-Robertson Construction Company, of London and Glasgow. Mr. Robertson will remain in Canada for two or three months, making observations with a view to locating a Canadian branch for his firm. The McAlpine-Robertson Company are reinforced concrete specialists and employ on an average about 6,000 men in the old country.

The death occurred at Ottawa last week of Mr. James Bruce Spence, chief draughtsman of the Department of Railways and Canals. The late Mr. Spence was born at Balmande, Scotland, in 1832 and came to Canada at 25 years of age. He was associated with the Department of Railways and Canals for 34 years. One of his most notable works was the designing of the "Soo" canal. Deceased left three sons, of whom Mr. A. W. Spence, engineer-in-charge on the Trent canal, will be known to many of our readers.

New Head Offices of Mussens, Limited

Mussens, Limited, Montreal, dealers in railway and contractors' supplies, have removed from their old offices on the corner of Victoria Square to a large five storey building on the opposite side of St. James street.

Increases to the staff, caused by the expansion of business, had rendered the old offices too congested, and the show space for machinery and supplies was entirely inadequate. By the new move they have been enabled not only to lay out more commodious offices but also to reserve two floors for exhibition purposes. We illustrate the new offices and show-rooms and also the warehouses, which are excellently equipped for handling heavy machinery. The warehouses have a capacity of about 100 carloads of stock, and have a wide driveway running clear through the building from end to end,



The new Headquarters of Mussens, Limited, Montreal

opening on two streets. They are excellently located near the railroads and navigation companies.

Mussens, Limited, now have branch offices and warehouses in Cobalt, Winnipeg and Vancouver. They also have offices in Toronto and Calgary. From a small beginning this firm has become the largest of its kind in the Dominion of Canada. Their principal lines are machinery and supplies for railways, mines, contractors, municipalities and machine shops. They have a well equipped engineering department which looks after the designing, supplying and erecting of complete plants for various purposes, such as quarrying, mining, and so on.

Their latest move is another indication of the rapid and steady growth of this firm, which, since its inception, has attained a reputation for reliable and efficient business methods.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Burlington, Ont.

Tenders are required for building cement walks until June 15th. O. T. Springer, clerk.

Brampton, Ont.

Tenders addressed to T. J. Blain, town clerk, will be received until June 13th for grading about 7,200 square yards of roadway; 5,000 feet concrete curb and gutter combined; 2,500 feet of macadam road 26 feet wide. Plans, etc., at office of town engineer. T. Thauburn, mayor.

Cobourg, Ont.

The town of Cobourg will receive tenders until June 13th for the construction of \$2,500 worth of concrete walks. For further particulars see "Tenders and For Sale Department" of this issue.

Chilliwack, B.C.

A by-law to authorize the expenditure of \$70,000 for drainage system will be submitted to the ratepayers shortly.

Colwater, Ont.

Tenders addressed to J. R. Russell, clerk, will be received until June 18th for the following: A, cast iron supply main and distributing system; B, ground reservoir, collecting pipes and drains. Plans, etc., at office of the consulting engineers, the John Galt Engineering Company, Toronto, and at the office of the Canadian Engineer, Board of Trade Building, Montreal.

Dauphin, Man.

Tenders will be received until June 15th for the purchase of \$75,000 5 per cent. 20-year waterworks and sewerage debentures. J. W. Johnston, secretary-treasurer.

Fairville, N.B.

Ratepayers of Fairville will vote on a sewerage system.

Leamington, Ont.

Tenders addressed to A. Baird, C. E., will be received until June 20th for dredging work, supplying and placing in new pumps, etc., new steam boiler, new engine, etc. Plans, etc., at office of above.

Lachine, Que.

The ratepayers authorized the council to negotiate a loan of \$125,000 by the issue of debentures for the purpose of laying pavements and roadways within the city limits. A total of \$128,000 will now be raised for this purpose.

Lethbridge, Alta.

Tenders are being received until June 10th for grading, etc., amounting to about 130,000 cubic yards. C. M. Arnold city engineer.

Montreal, Que.

The City Surveyor contemplates an extension of the waterworks system on Queslin street from Dominion to Fulford street.

New Westminster, B.C.

Tenders are required for the laying and jointing of about 14 miles of 25 inch riveted steel watermain and about 7,780 feet of

12 inch and 7,500 feet of 13 inch lap-welded pipe. Plans, etc., with City Engineer. W. A. Duncan, City Clerk.

North Toronto, Ont.

The by-law to expend \$25,000 for enlarging the town's water supply was defeated.

Nanaimo, B.C.

Lowest tender received for construction of concrete walks; W. H. Worswick, Victoria, B.C. Retaining walls, per yard cub., \$4.50; filling, per yard, cub., 45 cents; cement concrete sidewalks, 1 in. crete sidewalks, 3-4 in. finish, per yard super., \$1.24; ordinary excavation, per yard cub., 20 cents; rock excavation, per yard cub., \$1.50; laying and jointing 4 in. vitrified pipes, per foot lin., 30 cents (up to 4 feet in depth, but not in rock); laying 4 in. tile drains, per foot lin., 10 cents.

Ottawa, Ont.

Plans are being prepared at the Department of Public Works for the new plaza between the Dufferin and Sappers' bridges and tenders are to be called for this summer. The designs now being prepared provide for work of a most ornate appearance.

N. H. H. Lett, secretary, writes that the Board of Control has awarded contracts for paving Bank and St. Patrick streets to the Barber Asphalt Paving Company, for \$37,565 and \$45,750 respectively, subject to council's approval. List of tenders received:—Bank street—The Barber Asphalt Paving Company, \$37,565; Ottawa construction Company, \$37,989; Union Construction Company, \$41,764.55; City Engineer, \$47,673. St. Patrick street—The Barber Asphalt Paving Company, \$45,750; Ottawa Construction Company, \$49,495; Union Construction Company, \$50,750; City Engineer, \$59,522.70.

Point Grey, B.C.

The council is calling for tenders until June 15th for grading Chaldecott road to the North Arm of the Fraser river. Specifications on application. H. Floyd, C. M. C., Municipal Hall, Kerrisdale.

Red Deer, Alta.

On June 20th, the ratepayers will vote on the following by-laws: \$4,000. new pump; \$500, fire hose; \$2,500, concrete sidewalks.

St. John, N.B.

The Board of Works decided to instruct the engineer to call for tenders immediately for the laying of an asphalt pavement in Germain street, between Princess and Queen streets.

Saskatoon, Sask.

A by-law will be voted on to issue \$62,000 4½ per cent. 30-years sewer and waterworks construction, and \$15,000 5½ per cent. 10-years concrete sidewalks debentures. J. H. Trusdale, returning officer.

Toronto, Ont.

The Waterworks Department requires meters estimated to cost \$20,000.

Tenders will be received until June 14th for construction of asphalt, bitulithic,

treated wooden block, and brick pavements, concrete curbs and walks; and sewers. G. R. Geary, chairman, Board of Control.

The city will extend the water mains and provide additional hydrants for improving the fire protection in the vicinity of the Parliament Buildings. The cost, \$7,000, will be paid by the province.

Uxbridge, Ont.

M. H. Crosby, town clerk, will receive tenders up to June 15th for the laying of 25,000 feet of cement sidewalk. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Victoria, B.C.

It was decided to call for tenders for the execution of the work of laying cement sidewalks on five streets at a cost of \$40,000. A. Smith, city engineer.

The following tenders for paving have been submitted: The Warwick Company, Cook street, \$30,850.07; St. Charles, \$12,904.50; Southgate, \$5,681.20; Linden avenue, \$42,566.72. Albert Pike tendered on but one street, St. Charles, at \$20,558.60. The Pacific Paving Company did not submit a tender in bulk sum, but worked out the specifications in quantities. The city engineer's tenders were as follows: Cook, \$34,312; St. Charles, \$16,997.50; Southgate, \$7,330.60; Linden, \$45,475.

Walkerville, Ont.

Tenders will be received by the town clerk, C. H. Robinson, until June 14th for the construction of about 2,000 square yards of sidewalk. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

AWARDED.

Beith, Que.

The contract for 8 miles of macadam roads has been awarded to O'Connor Bros., of Huntingdon, Que., for \$23,800.

Montreal, Que.

The Board of Control have awarded contracts as follows for general supplies: Tile and sewer pipes, W. McNally & Company; lumber requirements, J. T. Marchand & Company; bricks, J. Bourdin.

The Board of Control have awarded contracts for a 4,000 ton supply of cast iron pipe, lowest tender being accepted in each case: Mr. Beverley Robinson, representing Stanton Iron Works Company, Limited, Nottingham, England, 4 inch pipe \$29.50, 12 inch pipe \$27.50; Robert McLaren & Company, Glasgow, represented by L. H. Gaudry & Company, Quebec and Montreal, 6 inch pipe \$29, 8 inch pipe \$27.90, 10 inch pipe \$27.70, 16 inch pipe \$27.35, 20 inch pipe \$27; Canada Iron Corporation Company, Three Rivers, Que., 24 inch pipe \$27, 30 inch pipe \$27.50.

North Vancouver, B.C.

J. O'Connor was awarded the contract for laying water mains throughout D. L. 553 for the sum of \$705.

Outremont, Que.

Mr. W. Duquette has been awarded the construction of sewer from Van Horne

street to Durocher street, to Pacific avenue, at \$29,664. Messrs. R. T. Smith & Company were awarded contract for the construction of 2 inch x 3 inch brick sewer on Maplewood avenue at \$4,829, and also for sewer on De L'Epee avenue at \$8,044.

Ottawa, Ont.

The contract for supplying ten joints for water pipes has been awarded to Gordon Law, whose price of \$1,650 was the lowest. The highest tender, that of the Canada Foundry Company, \$3,300.

Prince Albert, Sask.

C. O. Davidson, city clerk, writes that the contract for construction of extensions to the water and sewerage systems, etc., has been awarded to John Craig at \$18,960. Only one tender was received.

Richmond, B.C.

Tenders for the wood pipes, steel pipes, valves and special castings for the new waterworks were awarded as follows: The Pacific Coast Pipe Company, \$69,931.86 for wood pipe; Evans, Coleman & Evans, \$16,216.12 for steel pipes; Forsyth & Company, a sum of \$480 for cast iron pipes; Forsyth & Company, \$765 for valves; Terminal City Iron Works, \$760 for special castings.

Regina, Sask.

Following are particulars of recent tenders and awards for city paving and sidewalk construction: For pavement complete—National Paving & Construction Company, sheet asphalt, \$3.00 per square yard; total \$106,140. Bitulithic & Construction Company, bitulithic pavement, \$3.05 per sq. yd., total \$109,385; Creosote block pavement, 3-inch 16-lb., \$3.45 per sq. yd., total \$122,225; R. Blome & Company, granitoid, \$2.99 per sq. yd., total \$107,459; R. Banghom, 3-inch asphalt block, \$3.72 per sq. yd., total \$130,074; R. Banghom, 2½-inch asphalt block, \$3.39 per sq. yd., total \$119,481; Kettle River Quarries Company, creosote block, 3-inch, 16-lbs., \$3.60 per sq. yd., total \$127,860; Forest City Paving Company, creosote block, mortar cushion, 3-in. 16 lbs., \$3.32 per sq. yd., total \$117,234; mortar cushion, 3-inch, 16 lbs., \$3.24 per sq. yd., total \$114,666; City Engineer, creosote block, sand cushion, 3-in. 16 lbs. \$3.20, total \$115,020. The council decided to accept the tenders of R. Blome & Company for granitoid pavement, 27.40 sq. yds., and of the National Paving & Construction Company for sheet asphalt pavement, 4,700 square yards. Forest City Paving Company, for sidewalk, 17 1-3 cents per foot; excavation in excess of 8 inches, 70 cents per cubic yard; total \$8,972.60. Western Pavers, Limited, sidewalk, 18 cents per foot; excavation in excess of 8 inches, 70 cents per cubic yard; total \$9,000.00. City Engineer, sidewalk, 20 cents per foot; excavation in excess of 8 inches, 45 cents per cubic yard; total \$10,197.00. The council decided to accept the tenders of the Western Pavers, Limited. The total quantity of sidewalk is 50,000 square feet. The total approximate quantity of excavation is 438 cubic yards.

St. John, N.B.

The contract for cast iron pipes have been awarded as follows: Watson Jack & Company, Montreal, \$28.20 per ton; other tenders, Staveland Coal & Iron Company, \$29.15 per ton; W. Beverly Robinson, \$29.80; D. Y. Stewart & Company, \$30.30 per ton; H. A. Drury Company, Limited, \$31.55 per ton. Tenders for terra cotta sewerage pipes were received from C. H. Peters Sons, Limited, J. Willard Smith and Jas. Robinson Company, Limited. The contract was awarded to Messrs. Peters, whose tender was the lowest, as follows: 300 feet 15 inch, 52 cents per foot; 1,200 feet 12 inch,

33 cents per foot; 800 feet 9 inch, 22 cents per foot; 22 feet 6 inch, 13 cents per foot; 30 feet 12 x 6 junctions, \$1.40 each; 30 feet 9 x 6 junctions, \$1 each; 30 feet 6 x 6 junctions, 75 cents each.

The following tenders for permanent paving were received: Smythe street, B. Mooney & Sons, \$15,040.40; McDonald & McLeod, \$18,075.50; Hassam Paving Company, \$14,752.50. Nelson street, E. R. Reid, \$13,758.50; McDonald & McLeod, \$12,833.50; B. Mooney & Sons, \$10,440.42; Hassam Paving Company, \$10,266.90. Main street, McDonald & McLeod, \$31,182.35; Hassam Paving Company, \$19,682.75. Water street, E. R. Reid, \$10,151.50; McDonald & McLeod, \$9,445.50; B. Mooney & Sons, \$7,652.50; Hassam Paving Company, \$7,512.50. Pond street, McDonald & McLeod, \$40,444; B. Mooney & Sons, \$34,400.20; Hassam Paving Company, \$33,558.40. The tender of Hassam Company was recommended for acceptance. Their total estimate amounted to \$85,772.15; the engineer's estimate, \$86,000. Under the terms of the contract work must be commenced June 15th, and completed September 1.

Toronto, Ont.

The Board recommends, subject to the approval of council, the acceptance of tender from the William Hamilton Company, of Peterborough, for the supply of hand-operated travelling crane for the waterworks filtration plant at the Island, at \$1,035, the lowest.

The Board awarded the contract to the M. W. Kellogg Company, of New York, for the erection of a brick chimney at the Water Works filtration plant at the Island, at \$1,400. One other tender, \$1,557.

Contracts for the construction of the following sewers were awarded as follows:—Boston avenue, \$1,775; Don Mills road, \$3,344; Gerrard street, \$620; Hammersmith and Isleworth avenues, \$499; Herbert avenue, \$927; all to City Engineer, to be constructed by day labor. Also Hurndale avenue, Ellerbeck street to Jackman avenue, to the Forcott Contracting Company, \$1,007; Hutchinson street, etc., Forcott Contracting Company, \$867; Logan avenue, etc., to the Excelsior Construction & Paving Company, \$2,977; Paton road, etc., city engineer; Playter Boulevard, etc., to the Forcott Contracting Company, \$893; Playter Crescent, etc., to the Forcott Contracting Company, \$1,227, all the lowest tenderers.

The Board awarded the contract for the asphalt block pavement, John street, King street to Wellington street, to the Grant Contracting Company, at \$4,595, the lowest. The City Engineer was awarded the contracts for bitulithic pavements on Balmoral avenue, Indian road, Manning avenue at \$3,488, \$4,317, and \$5,578 respectively, the lowest in each case; also the vitrified block pavement on Lane, first east of Bay street, at \$667.

Victoria, B.C.

On the recommendation of Angus Smith, city engineer, the contract to lay asphalt pavements on Linden avenue, Cooke street, Southgate street and St. Charles street, at a cost of \$92,002.49 was awarded to the Worswick Paving Company. The Pacific Paving Company's figure for the entire work is \$111,725.25, and the Barber Asphalt Company, \$116,340.60.

Vancouver, B.C.

Evans, Coleman & Evans were awarded a contract for 1,600 feet of water pipe. The tenders were as follows: Evans, Coleman & Evans, for July delivery, \$51.25 per ton; September delivery, \$42.60. Robertson-Godson Company, July delivery, \$52.60;

September, \$42.25. C. Gardiner, Johnson & Company, September delivery, \$42.95.

Burnaby council accepted the tender of the Dominion Wood Pipe Company for the laying of pipe and the construction of a water tower for Edmond's waterworks system, the price being as follows: Supplying and laying 6 inch wood pipe, 45 cents per foot; 4 inch pipe, 32¼ cents per foot. Tank and tower on foundation to be built by council, \$3,715.

Railroads, Bridges and Wharves

Armow, Ont.

Tenders will be received until June 15th for building cement concrete abutments and wing walls of bridge in the Township of Kincardine. Plans, etc., with R. B. Campbell, clerk.

Cornwall, Ont.

Tenders addressed to John Mullin, clerk of Cornwall Township, will be received until the 20th of June for the immediate construction of five reinforced structures on the South Branch Drainage scheme. Plans, etc., at office of Jas. A. Milden, C.E., Cornwall.

Chatham, Ont.

Tenders are being called until June 15th for the construction of two iron and concrete bridges. T. R. Clark, Commissioner, North Buxton.

Dublin Shore, N.S.

Tenders will be received until June 17th for the construction of a breakwater here. N. Tessier, secretary, Public Works Department.

Hawkesbury, Ont.

Tenders for the construction work of the C. N. R. from here to Montreal are now being called.

Liscomb, N.S.

Tenders are being called until June 24th for extension to the wharf. N. Tessier, secretary, Department of Public Works, Ottawa.

Lethbridge, Alta.

A line of railway from Cassils on C. P. R. main line to Bow City will be located. R. E. McArthur, consulting engineer.

Levis, Que.

Tenders are being called by the Department of Public Works, Ottawa, until July 5th for the construction of a deep water wharf here. N. Tessier, secretary.

Newmarket, Ont.

Following is a list of tenders received for the construction of a reinforced arch bridge of 60-foot span over the Holland river: Fraser & Clemens, New Hamburg, \$3,300; John A. Watson, Laskey, \$3,453; Rutherford & Patten, St. Catharines, \$3,720; E. C. Lewis, Toronto, \$3,996; Cement Products, Toronto, \$4,190. Town council decided to do the work by day labor. Barber & Young, of Toronto, are the consulting engineers.

Ottawa, Ont.

The plans for the entrance of the C. N. R. from Toronto here have been filed with the Railway Commissioners for approval.

Salem, Ont.

Tenders are being called for materials for flat top bridge, township of Pilkington, etc., until June 17th. G. F. Cromar, clerk.

Stewart, B.C.

Tenders addressed to the Cassier Construction Company, Limited (W. H. Grant, general manager), will be received until June 10th for clearing, etc., of about 15 miles for the Portland Canal Short Line Railway.

Tadousac, Que.

Tenders are being called until June 29th by the Department of Public Works for the construction of wharf and approach here. N. Tessier, secretary.

Vancouver, B.C.

Tenders are being called by the head office, C. N. R., Toronto, until June 15th for the first sixty miles of the transcontinental line into British Columbia.

AWARDED.**Brockville, Ont.**

The following tenders for six bridges were received:—Concrete throughout: (1) Hagerty & Company, \$15,950; (2) W. M. Leacy, \$16,790; (3) Elliott & Riley, \$17,330; (4) Helmer & Wenstonley, \$17,220; (5) J. E. Hayes, \$18,180; (6) R. McManus & Company, \$18,610; (7) Oakville Construction Company, \$22,240. For concrete abutments, steel superstructures, the firms tendered in the same order as follows: (1), \$15,950; (2), \$16,760; (3) \$17,200; (4), \$17,600; (6), \$18,750; (7), \$21,590. Hagerty & Company were awarded the contract.

London, Ont.

Two reinforced concrete bridges on the Curry road, Adelaide, have been let for \$445 to McLean, of Lucan. W. J. Harris, Kerwood, got the contract for culverts on the Strathroy road for \$320. County Engineer Talbot has awarded the contract for steel superstructures for three bridges in London township to the Hunter Bridge & Boiler Works, of Kincardine, at \$2,430.

Mount Hamilton, Ont.

F. Taylor & Bros., of Hamilton, were given a contract by this township for the construction of concrete bridges. Tenders were: F. Taylor & Bros., \$6,405; Chas. Brayley, \$6,855; Thos. Barnes, \$7,000.

Montreal, Que.

The Grand Trunk Railway Company have awarded the contracts for a new rolling stock to the value of approximately \$2,000,000 to the Canada Car Company, the Silliker Car Company, Halifax, N.S., while a portion of the work will be completed at their own shops, Point St. Charles. The order includes six first-class coaches, twenty baggage cars, one motor car, three buffet parlor cars, fifteen Richmond consolidated freight engines, twenty-five mogul locomotives, one thousand hopper bottom steel coal cars, capacity 100,000 pounds each, and five hundred steel under frame box cars, 60,000 pounds capacity each.

Oshawa, Ont.

W. G. Gibson, of Port Hope, was awarded a contract by East Whithy Township for the construction of two reinforced concrete bridges of 32 and 22 foot spans. Contract prices were \$1,055 and \$1,045. Bowman & Connor, consulting engineers, Toronto.

Tuscarora, Ont.

S. J. McKelvey, township clerk, Onondaga, writes that the contract for the construction of concrete abutments for steel bridge has been awarded to Wenger & Wenger, Springvale, at \$7.15 per cubic yard. Other tenderers: Smith & Smith, Hartford, \$8.50 per cubic yard; J. General, Cainsville, lump sum, \$660.

Victoria, B.C.

The Pacific Construction Company secured the award for wharf extension work in this city at \$4,333. Other tenders were: J. D. McDonald & Son, \$4,497; W. McDonald, \$4,673; Sheppard & Jones, \$5,750.

Winnipeg, Man.

A contract has been let to Foley, Welch & Stewart for filling two miles of Rainy

Lake with solid rock, bank wide, enough to carry double tracks, doing away with the old wooden trestle bridge. Several million dollars are involved.

Public Buildings, Churches, Schools, etc.**Brandon, Man.**

The plans for the new fire hall, prepared by Architect W. A. Elliott, have been submitted to the council for approval. Plans call for solid pressed brick structure to cost \$17,000.

The site for the new theatre, it is stated, has been purchased at corner of Tenth street and Princess avenue. Noted in last issue.

Brantford, Ont.

Tenders addressed to J. C. Walker, chairman of building, etc., committee of the Brantford Separate School Board, will be received until June 20th for the erection of a 6-roomed separate school to be erected corner of Pearl and Palace streets. Plans, etc., at office of Champman & McGiffin, architects, 201 Colborne street, Brantford.

Calgary, Alta.

Tenders are invited for the completion of city hall. Estimated expenditure, \$126,000. J. T. Child, city engineer.

Canning, N.S.

Tenders are being received until June 20th for construction of church building. Plans, etc., with Rev. G. Crowell. E. M. Beckwith, secretary building committee.

Chilliwack, B.C.

It has been made necessary for the city to secure a site and erect a city hall and jail. A committee of citizens has been selected to secure plans and site for the new building.

Outlook, Sask.

Tenders were received until June 8th for the erection of 6-roomed brick school here. Plans, etc., at office of H. Mortimer Nelson, secretary, school board. R. G. Bunyard, architect, Moose Jaw.

Edmonton, Alta.

Tenders for ventilation and other mechanical equipment for Asylum Building, Ponoka, are being received until June 30th by the Department of Public Works. John Stocks, Deputy Minister of Public Works.

Fergus, Ont.

Sealed tenders will be received until 11th June for painting outside of high and public schools. J. A. Wilson, secretary, Board of Education.

Tenders for new post offices for Elora and Fergus will be called for in a week or so.

Guelph, Ont.

W. A. Mahoney is preparing plans and specifications for the remodelling of No. 5 school house. A new heating and ventilating system will be installed and other changes effected.

Hamilton, Ont.

The returns so far indicate that the by-law to spend \$40,000 for House of Refuge for the County of Wentworth has been defeated.

Montreal, Que.

Plans and specifications have been prepared and tenders will be received until June 10th for the erection of a church building in the parish of St. Gotique, St. Henri. Messrs. MacDuff & Lemieux, architects.

Tenders were received up till June 6th for the construction of the First Presbyterian Church. Messrs. Hutchison, Wood, & Miller, architects. (Previously mentioned.)

Tenders have been received for the erection of additions to the Church of the Ascension, Park avenue and St. Viateur street, but no awards have as yet been made. Mr. H. C. Stone, architect.

Plans and specifications are being prepared for the erection of a convent, sister's residence, on St. Urbain street, for the Hochelaga School Commissioners. Mr. Dalbe Vian, architect.

New Hamburg, Ont.

Plans are now being prepared for a new Lutheran Church here. J. S. Russell, of Stratford, is the architect.

Newmarket, Ont.

The ratepayers carried a by-law to spend \$15,000 in enlarging the high school. The board will ask for tenders at once and will proceed with the enlargement this summer.

Oneida Indian Reserve, Ont.

J. D. McLean, secretary, Department Indian Affairs, will receive tenders until June 25th for the erection of a brick school house. For further particulars see "Tenders and For Sale Department" of this issue.

Ottawa, Ont.

Mayor Hopewell has received word that the Provincial Government is prepared to make a substantial grant towards the erection of a new dairy building for the Central Canada Exhibition. The building will cost \$6,000, and at least \$4,000 of this amount will be supplied by the province.

Weeks & Keefer, of Ottawa, have been appointed architects for the new Cumberland street fire station, which is to cost \$15,000 in construction.

Tenders for supplying the civic corporation with an incinerator and garbage destroyer were submitted to the Board of Control and were referred to the Mayor, City Engineer and Controller Davidson for report. They were as follows: C. L. Trimmingham, Montreal, quoted \$40,000 for a 75 ton a day incinerator of the Hughes and Sterling type. The General Supply Company, Ottawa, put in eight bids for a 75 ton Horsfall incinerator. The prices varying according to the style of feed, etc., were, \$63,792, \$72,503, \$41,401, \$44,044, \$53,484, \$30,429 and \$39,869. Laurier & Lamb, Montreal, for the Heenan Froude style offered to furnish incinerators, 50 ton capacity, at \$27,400 and \$29,900 and 75 ton capacity at \$32,150 and \$34,660. Also one from the firm of Meldrum Bros., of Timperley, near Manchester, Eng., who offer to supply the incinerator for \$29,935.

Plans, etc., for the erection of eastern departmental building addition can be seen, etc., at office of T. A. Hastings, clerk of works, Postal Station "F," Toronto, as well as at places previously mentioned in advertisement. N. Tessier, secretary, Department of Public Works.

Saskatoon, Sask.

A by-law will be voted on to issue \$15,000 4½ 30-year debentures for the improvement and extension of the Exhibition grounds.

Competitive plans addressed to J. H. Trusdale, city clerk, will be received until June 30th for additions to present city hospital, erection of a nurses' home and isolation hospital. Full particulars at office of above W. Hopkins, mayor.

St. Catharines, Ont.

Tenders addressed to J. B. McIntyre, secretary, will be received until June 15th

for the construction of a new wing to the St. Catharines General and Marine Hospital. Plans, etc., at offices of Langley & Howland, Toronto, or John G. Moore, 22 Queen street, St. Catharines.

Toronto, Ont.

Tenders are being called until June 10th by the Board of Education for enlargement of York Street School and alterations to Coleman Avenue and George Street Schools and for repairs, etc.; also until June 13th for the enlargement of Earls court, Norway and Brown Schools and for iron stairs, etc. See advertisement in this issue.

A building permit has been issued to Howard Park Methodist Church for a 2-storey brick Sunday school; also to Law Society of Upper Canada for a 3-storey addition to Osgoode Hall.

The congregation of St. Jude's Church, Roncesvalles avenue, has decided to erect a larger church. A new grey stone church is proposed, of Gothic architecture, to cost about \$50,000. Rector, Rev. J. L. P. Roberts.

The management of the First Reformed Presbyterian Church, now on Carleton street, have purchased a building site on Bloor east.

The Baraca Club is to put up a new building on Orchard street, at a cost of about \$13,000. This is a club of young men, in affiliation with Gresvener Street Presbyterian Church.

Vancouver, B.C.

The city council has decided to call for competitive plans for a steel frame office building on the site of the present city hall, costing about \$750,000.

Victoria, B.C.

Tenders are being called until June 11th by the Department of Public Works for steel fittings for vaults, etc. F. C. Gamble, Public Works Engineer.

Virden, Man.

Tenders addressed to A. W. H. Smith, secretary-treasurer, S. D. No. 144, Virden, will be received until July 2nd for the purchase of \$25,000 school debentures, etc.

West Toronto, Ont.

Tenders are being received by W. H. Cross, box 156, West Toronto, for completing two rooms and hall of school, on Alexander street.

Winnipeg, Man.

The 1914 centennial exposition by-law granting half a million dollars was carried. The voters defeated the by-law to grant \$400,000 to the General Hospital, but carried a vote of \$100,000 towards a tuberculosis hospital and \$75,000 towards a hospital for infectious diseases.

Woodstock, Ont.

Over \$10,000 has been subscribed for the erection of the new Chalmers Church, and a building site selected.

AWARDED.

Brantford, Ont.

We are informed that the contract for addition to Ryerson School was awarded to J. Faulkner, this city, and that for King Edward School to P. H. Secord & Sons, this city. Plans, etc., are being prepared for heating and plumbing.

Cayuga, Ont.

J. & J. Large, of Listowel, have received the contract for building a brick church for the Methodist Church here. W. E. Binning, of Listowel, furnished the plan and specifications.

Fredericton, N.B.

A contract has been let to M. Ryan & Sons for the erection of a new Catholic

school building, brick and stone, in this city, to cost about \$35,000.

Headingley, Man.

We are informed that the contract for the new school here has been awarded to J. B. Morrisson, Winnipeg, at \$5,700.

London, Ont.

London Health Association have awarded the contracts for the physician's residence, the recreation and workshop, the laundry and pumphouse. Mr. John Nutkins was given the brick and cement work, Mr. John Purdom the carpenter work, and Sutherland Bros. the galvanizing and heating.

Montreal, Que.

The contracts for alterations to the Montreal Racket Club premises, Concord street, have been awarded as follows:—Masonry and brick work, John Wighton; alterations to sky-light, Geo. W. Reed & Company. Mr. H. C. Stone, architect.

Ottawa, Ont.

Tenders for the furnishing of four vault doors, and the installation of an elevator in the City Hall were as follows:—Vault Doors: Eadie Douglas Company, \$322.50; J. & J. Taylor Company, Toronto, \$340 (accepted); E. C. Arnoldi, \$360. Elevator: The General Supply Company, Turnbull Elevator, \$3,225 (accepted); the Otis-Fensom Company, \$3,900.

Toronto, Ont.

The following tenders were accepted for the enlargement of Roden School:—Masonry, R. Chalkley & Son, \$10,387; carpentry, W. Williamson, \$8,965; reinforced concrete, A. Gardner & Company, \$4,400; roofing and tinsmithing, George M. Bryan, \$975; structural steel work, W. H. Salter, \$995; plastering, T. Blackburn & Sons, \$1,895; painting, Taylor & Company, \$1,100; plumbing, Keith & Fitzsimons, \$1,330; heating and ventilating, Keith & Fitzsimons, \$5,600; heat regulating, Johnston Temperature Company, \$860; electric wiring, Geo. J. Beattie, \$80. The following tenders were also accepted for the erection of the new Elizabeth Street School:—Masonry, R. Chalkley & Son, \$24,948; carpentry, Frank Armstrong, \$9,789; reinforced concrete, W. Gardner & Company, \$4,977; roofing, A. B. Ormsby & Company, \$906; structural steel work, W. H. Salter, \$2,300; plastering, T. Blackburn & Sons, \$2,405; painting, James Phinmore, \$1,615; plumbing, Keith & Fitzsimons, \$1,750; heating and ventilating, Keith & Fitzsimons, \$6,000; heat regulating, Johnston Temperature Company, \$800; electric wiring, Hall & Dollery, \$65.

The Board of Control awarded the contract for plumbing work at St. Lawrence Hall to Fiddes & Hogarth at \$447, the lowest.

The contract for roofing, etc., work on the new wing to Isolation Hospital was awarded to Geo. Sinclair at \$2,950.

Westmount, Que.

Contracts in connection with the proposed extension of the Westmount library building were awarded by the Westmount City Council as follows: Excavation and masonry, Wm. McArthur, \$5,900; carpentry, work, Shearer, Brown & Willis, \$2,306; roofing, Westmount Plumbing & Heating Company, \$345; plastering, Sanitary Tiling Company, \$440; electric lighting, Westmount Plumbing, Heating Company, \$50; tiling, D. R. Locker Company, \$100; structural steel work, Structural Steel Company, \$163; extra electric wiring, Henry Morgan & Company, \$202. Mr. B. Findlay, architect.

Residences

Galt, Ont.

Plans for the changing of opera house into large apartment house have been received by Mr. James Scott, and call for a building of four storeys.

Guelph, Ont.

W. A. Mahoney, architect, is preparing plans for four new houses to be erected on Quebec street for Mr. Thomas Warren, of Toronto.

Hamilton, Ont.

J. Walter Gage has a permit for brick dwelling, corner Main street and Carrick avenue, to cost \$3,600.

London, Ont.

Building permits issued recently include: E. J. Padke, two storey residence, Richmond street north, \$2,500; P. J. Watt, a 2 storey frame on Riverview avenue, \$3,000, and William Ward, King street, an addition to his residence, \$2,000.

Montreal, Que.

Mr. D. Blay is erecting a flat on St. Antoine street by day labor. Cost of permit, \$12,000.

Tenders have been received for the erection of a residence for Senator Gilman. No awards have yet been made. Messrs. Hutchison, Wood & Miller, architects.

Plans and specifications are being prepared for the erection of three flats, Boulevard St. Joseph, for Mr. A. Duramleau. Mr. Dalbe Viau, architect.

Tenders are being received for the erection of a flat on Moreil street for Mr. R. Deschesne. Cost of permit \$12,000. Mr. Dalbe Viau, architect.

Mr. A. Viens is erecting a flat on Ontario avenue for himself by day labor. Cost of permit, \$10,000.

Tenders will be received until June 8th for the construction of a residence, Dorchester and MacKay streets, for Mr. J. B. Stephenson. House of Brown, Limited, architects.

New Waterford, N.S.

Chappell Bros. & Company, Sydney, N.S., have the contract for fifty-six cottages for the Dominion Coal Company.

Outremont, Que.

Recent building permits include: J. C. Walsh, Maplewood avenue, residence, \$10,000; A. E. Fraser, Wiseman avenue, semi-detached cottages, \$12,000; Donald Munro, Bloomfield avenue, cottages, \$32,000; Robt. Ironside, West ward, cottages, \$32,000; M. Drouin, Hutchison street, flats, \$10,000; Delorimier Syndicate, Wiseman avenue, cottages, \$8,000; A. E. Goseelin, McDougall street, residence, \$5,200; G. H. Langridge, McDougall street, residence, \$5,500; R. Neville, Bloomfield avenue, cottages, \$2,100; C. Cousineau, Querbes street, cottages, \$4,000.

Ottawa, Ont.

Mr. P. Labelle, 90 Church street, has purchased a large block of property, corner of Metcalfe and Gilmour streets, on which, it is stated, he will erect an apartment block.

Recent building permits include: A. M. Sutherland, brick apartment house, Bessier street, \$6,000; J. B. Fraser, coachman's house and carriage shed, brick veneer, Frank street, \$4,500; R. McGregor, brick veneer dwelling, Thornton street, \$2,500; Clothier and Smith, brick veneer dwelling, Percy street, \$2,500.

Stellarton, N.S.

Tenders for the erection of fifty double tenement houses for the Acadia Coal Com-

pany, Limited, will be received until June 25th. Plans, etc., at office of above.

Toronto, Ont.

Permit has been issued to G. A. Walton for 4-storey brick apartments on Hazelton avenue, \$22,500.

Vancouver, B.C.

We are informed by the architects, Messrs. Wright, Rushforth & Cahill, that contracts for the modern apartment house to be erected by the Pacific Investment Corporation in this city will be awarded about June 26. Estimated total cost of building complete, \$157,000.

Tenders are required for building stone foundation for Mr. Benjamin Willson's residence, Shaughnessy Heights. Plans and specifications may be seen at Parr & Fee's office, 570 Granville street.

AWARDED.

Montreal, Que.

The following contracts for alterations to the private residence of Mr. Eugene Payette, architect, have been awarded as follows: Masonry and brick work, Filion Freres; concrete, Canada Roofing Company; carpentering and joining, A. Mercure; plumbing, heating and roofing, H. A. Brosseau; wiring, R. Moncel Company; tiling, G. R. Locker Company, Limited. Plastering and painting not let yet. Mr. Eugene Payette, architect.

Contracts have been awarded as follows for the erection of a hall and flats for Mr. J. C. Cassels: Steel work, Dominion Bridge Company, Limited; plumbing, heating, roofing and wiring, Alex. MacKay & Company, Mr. James E. Adamson, architect.

Contracts have been awarded as follows for the erection of four houses to be erected in Outremont for Mr. Donald Munro, and others: Mason, brick and stone work, James Young, carpentering and joining, C. E. Frost; painting and glazing, F. X. Lavelle; plastering, H. Oram; roofing and damp proofing, Campbell-Gilday Company, Limited; plumbing and heating, D. A. Bethune. Mr. James E. Adamson, architect.

Contracts for the erection of a residence for Mr. A. J. Ferguson, Ontario avenue, have been awarded as follows: Painting, J. A. Alexander; masonry and brick work, J. H. Hutchison; carpentering work, U. Pauze & Fils Company; plumbing, A. Campeau. Mr. Kenneth G. Rea, architect.

The general contract for the erection of three houses in Westmount for Mr. W. W. Craig has been awarded to Messrs. Jackson & Company, contractors. Mr. James E. Adamson, architect.

Contracts have been awarded as follows by Mr. James E. Adamson, architect, for the erection of two houses in Outremont for Mr. Donald Munro: Mason and brick work, James Young; carpentering and joining, W. J. Moodie & Son; plumbing and heating, D. A. Bethune; plastering, H. Oram; roofing and damp proofing, Campbell-Gilday Company, Limited; painting and glazing, F. X. Lavelle; electric wiring, McDonald & Willson.

Toronto, Ont.

The Sanitary Flooring Company have been awarded the contract for laying composition flooring, etc., in Mr. Hoare's new apartment house on Maple avenue.

Walkerville, Ont.

Donaldson & Meier, Penobscot Building, Detroit, Mich., have let the general contract for the 3 storey and basement residence, 50 x 78, to be located in Walkerville for Tracey McGregor, 1724 Ford Building, to C. J. Keller & Company, 657 Canfield avenue E., Detroit. Cost \$75,000.

Business Buildings and Industrial Plants

Brandon, Man.

Tenders for excavation for C. N. R. hotel and station building were called until May 30th. M. H. MacLeod, general manager, Winnipeg; local agent, R. Dickson.

Brantford, Ont.

A permit has been issued to the Union Realty Company for the erection of a 3 storey block of brick buildings, \$17,600.

Collingwood, Ont.

The store owned by R. W. O'Brien was damaged on the 31st ult. to the extent of about \$12,000.

Calgary, Alta.

Tenders are being received until June 8th for the construction of Calgary terminal station for Calgary Power Company, Limited. Smith, Kerry & Chace, engineers, Bank of B. N. A. Building.

It is stated that an English firm, to be known in this country as Pryce, Jones, Canada, Limited, have bought a block of land here. Cost of building estimated at \$50,000.

Farnham, Que.

There is every prospect of a large industry being established in Farnham in the near future. It is stated that the Canadian Fairbanks Company and the Canadian Rand Company, Limited, are interested in the formation of a large company, which will utilize the extensive buildings vacated recently by the Canadian Pacific Railway Company. The ratepayers with this in view have authorized a by-law to raise \$100,000 for the purpose of extending the local and municipal electric light system and for other necessary improvements. This work was under consideration some time ago, but was dropped at the time the Canadian Pacific Railway decided to remove their shops from Farnham.

Goderich, Ont.

Capt. Featherstonhaugh, superintendent of the Inland Navigation Company, is reported as having stated that the Company's boats will not land freight here unless proper freight sheds are provided.

Hamilton, Ont.

The National Fireproofing Company of Canada, Limited, will locate in Canada, with headquarters in this city, where 125 acres of land have been secured on which a plant will be erected to cost \$1,000,000.

It is stated that arrangements for the merger of several of the large Canadian steel and iron industries have been completed, and that large additions will be made to the Hamilton Steel & Iron Company's plant here. The corporation will be known as the Canada Steel Corporation, and the capital is stated at \$25,000,000.

Kemptville, Ont.

Buildings here to the value of about \$50,000 were damaged on the 2nd inst. Geo. Ambridge, S. Hartnett and Constantine & Walker are among the losers.

Montreal, Que.

Plans and specifications are being prepared for a store and two dwellings, Ontario avenue, for Mr. Denis Messier. Mr. Dalbe Viau, architect.

The trunk factory of J. E. Fournier, corner of St. Lambert's Hill and Notre Dame streets, was destroyed by fire on the 5th inst. Total estimated loss, \$40,000.

Nanaimo, B.C.

Tenders addressed to Messrs. Mahon, McFarland & Proctor, Limited, Vancouver,

will be received until June 16th for the erection of a brick office building here. Plans at office of the above and of A. E. Planta, Limited, Nanaimo, owners.

North Sydney, N.S.

The machine shops and forge of R. Musgrave & Sons, at North Sydney, were destroyed by fire on the 31st ult. Loss, about \$20,000.

Orillia, Ont.

It is stated that a refinery to cost about \$10,000 will be built here by American capitalists.

Ottawa, Ont.

The National Bag & Paper Company, now being organized, will locate their 3 storey brick factory on Wellington street. Work will start at once. President, J. B. Hennessy; W. H. Dwyer, managing director. Capital, \$500,000.

Pictou, N.S.

The tannery at Lyon's Brook near here was destroyed by fire on the 3rd inst. C. MacDonald, Pictou, manager. Total estimated loss, \$150,000.

Port Arthur, Ont.

The Western Drydock & Shipbuilding Company has under construction a \$1,250,000 drydock and shipbuilding plant, which will necessitate a large amount of machinery, as there will be a complete boiler shop, rolling and punching shops, pattern shop and foundry. James Whalen, of Port Arthur, is the president, and there are large Cleveland interests of an American shipbuilding company in the organization. Noted in issue of March 23rd.

Quebec, Que.

The premises of the Hill Manufacturing Company, 60 St. Valier street, were damaged by fire on the 6th inst. to the extent of about \$18,000.

Red Deer, Alta.

It is stated work will be started on the Bank of Commerce block. Noted in last issue, p. 29.

South Maitland, N.S.

The mills of the Anthony Lumber Company were destroyed by fire on the 5th inst. Total estimated loss, \$90,000. A. S. Horsley, New York City, is chief owner.

Saskatoon, Sask.

Campbell, Wilson Company, Winnipeg, Man., have decided to locate a branch here. It is stated that the intention is to build a block as soon as possible on one of the sites on which Mr. Wilson has secured option. Estimated expenditure, \$40,000.

The Dominion Bank of Canada has purchased a Second avenue site, 30 x 125 feet. It is expected that a start will be made this year with the building, which is to be three storeys.

Sault Ste. Marie, Ont.

The plant of the Northern Foundry & Machine Company was destroyed by fire on the 2nd inst. Total estimated loss, \$30,000.

Toronto, Ont.

The T. Eaton Company have a permit for a five storey warehouse and garage on Albert street, \$63,000.

The Government House property has been purchased by the C. P. R., and it is stated that the company will erect thereon an office building and freight sheds.

The Canadian National Carbon Company has a permit for a one-storey brick factory on Paton road, \$17,000; Bell Telephone Company has permit for a 2-storey brick telephone exchange, Bismarck avenue, \$40,000.

Victoria, B.C.

It is reported that the Moline Pump Company, of Moline, Ill., are negotiating to locate a Canadian branch here.

Vernon, B.C.

Plans for the new C. P. R. station have been approved by the Board of Trade committee and forwarded to Supt. Kilpatrick. Plans call for a station of brick and concrete to cost \$12,000.

Vancouver, B.C.

A new hotel to cost at least \$750,000 may be erected here by Messrs. Charles J. Kleeman and D. Swinhart, president Hotel Financing Company, Seattle. They have been looking into the question of sites.

It is stated that the Hidden Creek Mining Company are completing arrangements for the building of a smelter adjacent to its properties at Goose Bay, Observatory Inlet, Portland Canal District. Construction will likely start this summer. Estimated expenditure, \$50,000. M. K. Rodgers, of Seattle, Wash., president; Mr. Thomas Hodgins, banker, New York, is interested.

It is announced that the C. P. R. has bought the Railway Block on Hastings street, between Homer and Richards streets, on which, on the expiration of the present leases next spring, extensive alterations and additions will be made.

Winnipeg, Man.

McLaren Bros., proprietors of Strathcona Hotel, have purchased property corner of Main and Rupert streets, on which it is stated they will erect a 7 storey hotel. Plans are not yet completed.

The Union Bank of Canada has secured a permit for the erection of a branch bank, southeast corner of Logan and Nena. The Ogilvie Flour Mills Company filed plans and got a permit for a \$6,000 addition to the Higgins avenue mills. M. Lechtzier was given permission to construct a \$15,000 warehouse on the north side of Logan avenue, between Main and King.

The permit for the T. D. J. Farmer office building, to cost \$113,000, has been issued. It will be of steel, cement, stone and brick and absolutely fireproof. The plans show a four storey block with stone front. Architect, W. W. Blair; contractors, C. W. Sharp & Son.

A permit for a \$25,000 addition, 49 x 99, 3 storey, to the warehouse of the A. Macdonald Company, to be erected on Market street between Bertha and Louise streets. It will be constructed of brick, stone and concrete.

AWARDED.**Guelph, Ont.**

W. A. Mahoney, Guelph, was awarded the contract for a butter factory, work on which has been started. It will be 3 storeys high, of solid brick, 40 x 70 feet.

Montreal, Que.

Contract for the reinforced concrete and millwork construction on a new factory for the Holland Varnish Company, Limited, has been awarded to Geo. W. T. Nicholson, general contractor. T. Pringle & Son, Limited, architects.

Mr. E. G. M. Cape has been awarded the contracts for alterations to the premises of the Dougall Varnish Company. Mr. A. F. Dunlop, architect.

Contracts for the erection of the new ten storey Yorkshire building to be erected on St. James street, has been awarded to Messrs. Peter Lyall & Sons. It is to be completed by March 1st, 1911 and will be fireproofed throughout.

Quebec, Que.

Messrs. Bosse & Banks, this city, have the contract for the supply of steel and cement for the new building of the Union Commerciale, the Dominion Fish & Fruit Company's cold storage building and the Kent House extension.

Stratford, Ont.

The tenders for the new Bell Telephone Company's office have been let as follows: Brick work, concrete work and carpentering, Pounder Bros.; painting, A. E. Cash; electric wiring, F. C. Whatmough; plumbing and heating, J. R. Myers; roofing, F. Bloxam; plastering, E. Soeder.

St. John, N.B.

Architect F. Neil Brodie, who has charge of the remodelling of the Montgomery building in King street for W. H. Thorne & Company, has awarded the contract to J. Medley Belyea, of Carleton, who in turn has sub-let the contract for the mason work to R. A. Corbett. The work, it is expected, will be completed about August 18.

Toronto, Ont.

The contract for building the new station of the C. P. R. at North Parkdale has been awarded to Walls & Grey, Limited, of Toronto.

Contract for the roofing and sheet metal work on the Canadian Linseed Oil Mills, Limited, building has been awarded to A. B. Ormsby, Limited.

Winnipeg, Man.

The contract for the Farmer Block, Main street, has been awarded by W. W. Blair, architect, to Charles W. Sharp & Son at \$125,000, and the building to be constructed by November 1.

For the erection of Northern Crown Bank R. Watson has secured the general construction contract and, it is stated, the Dominion Bridge Company, Limited, the erection of the steel and furnishing the same. The contract price is about \$100,000, and the steel contract represents an outlay of \$7,000.

Power Plants, Electricity and Telephones**Bowmanville, Ont.**

The by-law for municipal ownership of the Bowmanville Electric Light Company was carried.

Calgary, Alta.

Tenders are being invited for a telephone conduit system to cost about \$40,000. Smith, Kerry & Chace, engineers, Bank of B. N. A. Building.

Coquitlam, B.C.

An order-in-council has been passed confirming the long-pending agreement between the Minister of the Interior and the Vancouver Power Company for the construction of a dam and plant at Coquitlam for power purposes.

Medicine Hat, Alta.

M. A. Maxwell has reported favorably on the installation of a municipal electric light and power plant, at an approximate cost of \$50,000.

New Hamburg, Ont.

The by-law for the purpose of taking over the local electric plant owned by J. Morley for \$8,000 was carried, and also that to grant the People's Electric Railway a franchise for 25 years.

Ottawa, Ont.

President Jenkins of the Metropolitan Power Company came to Ottawa from Petrolia last week, and had survey work start-

ed on the company's property at the Deschenes rapids, at Britannia village, six miles from this city. The president states that it is the intention to make an early start in the work of constructing a plant for the development of power.

Peterborough, Ont.

J. H. Larmonth, managing director of the Peterborough Light & Power Company, is the authority for the statement that his company has purchased the dam at Auburn, above which a new dam and power house will be constructed to cost about \$125,000.

Quebec, Que.

Tenders addressed to J. F. Guay, consulting engineer, will be received until June 10th for the construction of a concrete dam at St. Alban, on River St. Anne, for the Deschambault Electric Company.

Victoria, B.C.

Tenders will be received until June 13th for supply of lamps, transformers, switchboards, etc., for arc light equipment. W. Northcott, purchasing agent.

Winnipeg, Man.

The Board of Control recommended letting of the contract for the cooling tower in connection with the power plant terminals to Ferdinand Bauer, of St. Louis, at a cost of \$3,380. W. G. Chace, engineer in charge.

AWARDED.**Brantford, Ont.**

Grand Valley Railway Company (Wm. P. Kellett, chief engineer) is stated to have awarded contracts to the Warren Bituminous Paving Company and to P. H. Secord & Sons, Limited, for the construction of 11 miles of single track in Brantford. It is intended to use 80-lb T-rails and white oak ties laid in 12 inches of concrete.

Longueuil, Que.

The corporation of Longueuil have been authorized to raise \$35,000 for municipal improvements, including the installation of an electric lighting plant and installation of an electric water pumping system, at a cost of \$24,000. A steam road roller, stone crusher and motor will be purchased at an approximate cost of \$6,000. City sheds will be erected to cost \$800, while \$3,600 will be invested for quarry supplies.

Winnipeg, Man.

M. Peterson, secretary, Board of Control, confirms the items published in last issue concerning the award of conduit, erection of sub-station, etc., and also states that G. M. Gest, Montreal and New York, has been awarded the contract for construction of conduit runs at the unit prices stated in said tender.

Miscellaneous**Halifax, N.S.**

The Department of Public Works and Mines is calling for tenders until June 18th for supply of paint, etc. Hiram Donkin, road commissioner.

Montreal, Que.

Recent building permits include:—R. Dechesne, 20 St. James, one house containing nine dwellings, \$12,000; E. Desmarais, 287a St. Denis, one house containing three dwellings, \$4,000; H. B. Walker, Bank of Commerce, one residence, \$18,000; N. Depatie, Christopher Columbus, one house containing three dwellings, \$3,500; J. Rovalls, 1642 Cadieux street, one house containing two dwellings, \$3,000; N. Desautels, 48 Demontigny east, four dwellings and two stores, \$4,500; B. Chalut, 715 Fulum, two houses containing six dwellings, \$6,000; A. Viens, 1904 Cartier, four houses

containing twelve dwellings, \$10,000; A. Longon, 1764 Notre Dame west, one house containing three dwellings, \$3,000; A. T. Timmers, 74 Villeneuve, one house containing three dwellings, \$3,500; A. Desmar-teau, 456 Chambord, one house containing three dwellings, \$2,500; H. Pelsdeux, 189 Amherst, one house containing two dwellings, \$5,600; D. Blay, 89 Dagenais street, four houses containing twelve dwellings, \$8,000; E. D. Berthelet, 599 Mount Royal, one house containing three dwellings and one store, \$7,000; M. Signac, 125 St. Edward, one house containing three dwellings, \$3,000; A. Landry, 192 Gauthier, two houses containing six dwellings, \$6,000; C. Bastien, 11 Laurier street, two houses containing six dwellings, \$6,000.

Ottawa, Ont.

Tenders for dredging Mimamichi Bay, N.B., will be received by the Public Works Department until June 9th.

Tenders are being received until July 20th for construction of steel dredge for British Columbia. N. Tessier, secretary, Department of Public Works.

Toronto, Ont.

Recent buildings permits include: J. E. Peterkin, 1 pair semi-detached 2-storey brick dwelling, St. Clarens, \$4,000; Allman & Smith, 1 pair semi-detached 2-storey brick dwelling, Perth, \$4,000; J. S. Hedge, 1 pair semi-detached 2-storey brick stores and dwellings, and one attached 2½-storey brick dwellings, McCormack and Weston road, \$7,000; H. H. Brown, 1 pair semi-detached brick dwelling, Perth, \$4,000; R. W. Burgess, 2-storey brick dwelling, Castle Frank Crescent, \$5,500; W. J. Bennett, 1 pair semi-detached, 2-storey and attic brick dwellings, Kendal avenue, \$5,500; O. P. Playter, 2-storey brick dwelling, 136 Tyndall avenue, \$4,800; Weismiller & Mackenzie Bros., 1 pair semi-detached Pearson & Macdonnell, \$5,000; J. S. Sharpe, 3-storey brick store and dwelling, Roncesvalles, \$5,000; C. J. Powley, 1 pair semi-detached 2-storey brick stores and dwellings, Dundas, \$6,000; L. Moneypenny, 2½-storey brick dwelling, Dunvegan road, \$5,500; W. L. Marshall, 1 pair semi-detached 2½-storey brick dwelling, Gladstone, \$5,000; G. McWilliams, 3 detached 2-storey and attic brick dwellings, Beresford, \$9,000; Wm. Dunseath, 1 pair semi-detached 2-storey brick dwellings, Thorne, \$4,000; J. J. McCaffery, 3-storey brick addition to hotel, Adelaide and Bay, \$10,000; J. L. Havill, 2-storey brick warehouse, on Adelaide W., \$16,000; F. L. Beecroft, 1 pair semi-detached 2-storey and attic brick dwellings, Wilton crescent, \$9,000; Jas. Delworth, 3 attached 2-storey brick dwellings, Adams avenue, \$6,000; Star Publishing Company, 1-storey brick addition, to printing office, King street west, \$13,000; Rev. R. M. Hamilton, 2½-storey brick dwelling, Highland avenue, \$7,500; E. J. Freysing, 2-storey brick dwelling, 90 Roxborough street east, \$6,000; W. H. Carriek, 2½-storey brick dwelling, 9 Crescent road, \$18,000; E. Hudson, 1 pair semi-detached 2-storey brick dwelling, Hallam, \$4,000; J. E. Peterkin, 1 pair semi-detached 2-storey brick dwelling, Leslie, \$4,000; H. E. Simpson, 2 pairs semi-detached 2½-storey brick dwelling, Dufferin, \$8,000; John Houden, 2 detached 2½-storey brick dwelling, Walter street, \$6,000; Mission Building, 1-storey brick addition to Mission, corner Elm and Ter-aulay, \$6,000; W. W. Hiltz, 2½-storey brick dwelling, 41 Hogarth avenue, \$4,500; H. Wright, 2 pairs semi-detached 2½-storey brick dwellings, Pearson and Roncesvalles, \$10,000; C. P. R., 1-storey brick freight shed, on Marlborough avenue, \$9,000; W. H. McDonald, 2-storey and attic

brick dwelling, Glendale, \$4,000; F. H. Bible, 2½-storey brick dwellings, 1 pair, semi-detached, Logan, \$5,000; Mrs. L. B. Hall, 1 pairs semi-detached 2-storey brick dwellings, Dufferin, \$4,000; J. B. McLeod, 3-storey brick dwelling, Russell Hill road, \$6,000; John Boyd, 2½-storey brick dwellings, southeast corner Russell Hill road and Heath street, \$10,000; F. M. Tuckett, 3 detached 2-storey brick dwellings, Woodville avenue, \$7,500; S. J. Gee, 2-storey brick dwelling, Hallam, \$4,000; C. Bulder-ton, 1 pair semi-detached 2½-storey brick dwellings, Sinclair, \$7,000; Sisters of St. Joseph, 1-storey brick boiler house, Bread-albane street, \$8,000; S. R. Dewar, 1 pair semi-detached 2-storey brick dwellings, on Symington, \$4,000; G. Brady & Son, 3 detached 2-storey and attic brick dwellings, on Woodlawn, \$18,000; W. J. Grant, 1 pair semi-detached brick dwellings on north side Virtue street, \$4,000; Jackson & Brooks, 1 pair semi-detached 2-storey and attic brick dwellings, on east side Fairview, \$5,000.

Victoria, B.C.

Recent building permits include: E. B. Jones, for a store and dwelling on North Park street, to cost \$4,200; William Bay-liss for a dwelling on Fairfield road, to cost \$3,200; B. C. Land & Investment Agency, for alterations to the building adjoining the Law Chambers, Langley street, to cost \$2,500; Rev. T. H. and Mrs. Lett, for a frame and concrete eight-room dwelling, on Simcoe street at \$4,000.

Vancouver, B.C.

Recent building permits include: S. A. Stuart, frame dwelling, 962 Eighth avenue west, \$6,000; J. Z. Hall, stone veneer dwelling, 2890 Point Grey road, \$8,000; Archibald York, frame stable, Davie street, \$3,000; B. T. Rogers, stone addition to dwelling, Davie and Nicola street, \$10,000; Adamson & Main, brick building, C. P. R., reserve (foot Davie), \$35,000; W. E. Morrison, frame building, 2555 Third avenue west, \$4,000; A. C. Hirshfield, 1963 Comox street, \$4,675; E. Beam, 941 Semlin drive, \$2,500; Bank of Vancouver, 167 Hastings street, \$2,000; Mrs. J. Boyd, 2705 Second avenue west, \$2,700.

Winnipeg, Man.

Recent building permits include: J. W. Parker, two dwellings, south side Beresford between Nassau street and John street, \$4,000; J. P. Lipp, dwelling, east side Strathcona between Portage avenue and Classic, \$3,100; Forseng & Munsen, two dwellings, east side of Arlington between Portage and Preston avenue, \$4,000; West End Realty Company, dwelling, east side of Aubrey between Bath and Buell, \$3,000; J. Y. Griffin & Company, Limited, boiler house, south side of Vaudreuil, \$2,000; also factory in same location, \$8,000; G. J. Clint, dwelling, south side of Wolseley, between Maryland and Walnut, \$6,800; J. G. Kimmel, southeast corner of Lulu street and Henry avenue, terrace of 6 dwellings, 98 x 32, two stories high, \$10,000; Copping Bros., dwelling, south side Buell avenue, between Maryland and Walnut street, \$5,800; John Granberger, house, south side of Rosser, between Hugo and Helen, \$8,000; W. P. Davidson, two houses, east side of Arlington, between Preston and Bath, \$6,000; Manitoba club, addition, \$3,000.

Ornamental arches to cost not more than \$12,000 will be erected on Armstrong's Point. Col. Rutan is interested.

AWARDED.

Toronto, Ont.

The contract for the supply of lumber required by the Property Dept., City Hall, was awarded to Reid & Company, this city.

Tenders have been received and opened for the construction of concrete work, etc., in connection with the sea wall in front of the Exhibition Grounds, etc., and contract, awarded to Peter Arnot, at \$17.40 per running foot.

Design and Size

A common foible of architects (or perhaps of their clients) is hit by a writer in an American contemporary when he remarks that "it is a very comfortable thing to see a village hospital that does not look like a child's size imitation of a city one." The remark is of fairly general application. In our own country, however, the rural hospital does not usually come under the implied condemnation. The so-called cottage hospital usually has quite a distinctive character of its own, and is by no means a miniature hospital. On the other hand, one has often to deplore the small library, or town hall, or church, or suburban villa that is palpably and grossly out of scale, and miserably fails to please because it so strongly suggests the frog trying to inflate himself to the dimensions of a bull. No doubt the architect often perpetrates these monstrosities at the urgent demand of the client; the former well knowing the important relationship between design and size. Another matter in which the architect of small buildings is often hampered and embarrassed is that of the sizes of materials, mainly decorative. He finds that the particular detail he requires is made in only one size, which may be appropriate for a mansion, but is too large for a villa. Manufacturers should make a note of this. In some instances it might be possible for them to standardize their materials in the same way that printers standardize their types, one size bearing a definite proportional to another, so that, occasionally, the various sizes could be used in conjunction. This, however, is a separate matter from suiting the design to the size—Builders' Journal (Canadian).

Reinforced Concrete Wall Construction

A separate unit type of reinforced concrete wall construction was used last year in building the power house of a small hydro-electric plant to Newton Falls, Ohio. The pilasters are of monolithic concrete, while the walls between them are hollow and are built of inside and outside thin concrete slabs, which were set before the pilasters were poured, so as to be keyed into them. The slabs were reinforced with No. 28 gauge expanded metal and were made in sizes that could be handled conveniently. Their outer surfaces were corrugated by laying 5-8 inch round rods in parallel lines on the surface of the fresh concrete when the slabs were cast and pulling them out after the mixture had taken its initial set. These corrugations were designed to give a good bonding surface for the plaster coat which was applied to the walls after they had been erected. The slabs were allowed to cure and were then placed on edge in proper position. Vertical form boards were placed for the pilasters, extending beyond the surface for the monolithic work, so that the slabs rested against them. The inside faces of the pilasters were moulded against form boards placed in the air space between the wall slabs, and were wired to the outside forms after the pilaster reinforcement had been placed. The inside boards also acted as spacers to keep the slabs the proper distance apart. This distance varied somewhat, but 8 inches was the minimum.

Tenders and For Sale Department

Town of Walkerville

Tenders for Sidewalk

Sealed tenders will be received, addressed to the undersigned, up to noon on TUESDAY, THE 14TH DAY OF JUNE, 1910, for the construction of a granolithic walk on the east side of Lincoln road, south of Niagara (about 2,000 square feet), in the Town of Walkerville.

Plans and specifications may be seen on application to Mr. Owen McKay, C.E., Walkerville.

CECIL H. ROBINSON,
Town Clerk, Walkerville.

23

To Architects Competition Plans

The Board of Management of Knox College, Toronto are desirous of obtaining plans for their proposed new College Buildings to be erected on St. George Street to the westward of the Lawn of the University of Toronto.

Conditions of Competition, with all information, can be had on application to the Rev. John Sommerville, Confederation Life Building, Toronto.

Plans must be sent by the FIRST OF NOVEMBER NEXT.

23



Ottawa—Eastern Departmental Building—Addition

Contractors are hereby notified that the plans and specifications for the above work can be seen and forms of tender obtained at the office of Mr. T. A. Hastings, clerk of works, Postal Station "F" Toronto, as well as at the places mentioned in the advertisement dated May 18, 1910.

By order,
NAPOLEON TESSIER,
Secretary.

Department of Public Works,
Ottawa, June 1, 1910.

23



Tenders Wanted

Sealed tenders addressed to the Secretary, Department of Indian Affairs, Ottawa, and endorsed "Tender for Oneida School-house," will be received up to noon of the 25TH OF JUNE, 1910, for the erection of a brick school-house on concrete foundation for the Oneida Indian Reserve, Ont.

Plans and specifications may be seen at the Post Office, St. Thomas, the Post Office, London, and the Office of the Indian Agent, Delaware.

The successful tenderer will be required to furnish a bond in satisfactory sureties for a sum equal to the amount of the contract.

The lowest or any tender not necessarily accepted. The unauthorized insertion of this advertisement in any paper will not be paid for.

J. D. McLEAN,
Secretary.

Department of Indian Affairs,
Ottawa, May 27, 1910.

24

Tenders for Pavement

Sealed tenders will be received by the City Clerk of the City of Guelph, until 5 p.m., on FRIDAY, JUNE 10TH, 1910, for approximately 11,700 square yards of Bituminous Pavements.

Plans and specifications may be seen, and instructions to bidders and forms of tender obtained at the office of the City Engineer.

Tenders will be received for the concrete base and curbs, and the surfacing, separately.

The lowest or any tender not necessarily accepted.

JAMES HUTCHEON,
City Engineer.

Guelph, May 21st, 1910.

23

Tenders for Concrete Sidewalks, etc.

The Corporation of Port Hope invite tenders for the construction of five lineal miles or thereabouts of Concrete Sidewalks and Crossings, with the necessary works connected therewith, in accordance with detail and specifications prepared therefore, copies of which, with forms of tender, may be obtained on application to the undersigned. A marked cheque equal to five per cent. of the gross amount of the contract to be furnished with each tender, and the lowest or any tender not necessarily accepted. Tenders received to 13TH JUNE, NOON.

J. W. SANDERS,
Town Clerk.

Dated, 25th May, 1910.

23



Notice to Architects

Competitive designs for a Residence for the Lieutenant-Governor of the Province of Ontario, proposed to be erected on Bloor Street, in the City of Toronto, will be received by the undersigned at the Department of Public Works, Parliament Buildings, Queen's Park, Toronto, up to noon on the 15TH DAY OF JULY NEXT,

Information and particulars as to the extent and character of the said designs can be obtained upon application to the office of the Secretary of Public Works.

Subject to such terms, conditions, etc., the following premiums are offered:

For the design most approved. \$1,000.00
For that approved as second in merit. 500.00

The designs for which said premiums will be awarded are to be selected and approved of by the undersigned, and the same are thereupon to become the property of the Province.

J. O. REAUME,
Minister of Public Works.

Department of Public Works, Ontario.
Toronto, May 12th, 1910.

23

Tenders for Sidewalk

Tenders will be received by the undersigned up to JUNE 15TH, 1910, for the laying of 25,000 feet of Cement Sidewalk in the Town of Uxbridge. Specifications may be seen at the Clerk's Office, work to be commenced by the 1st of July, 1910. The lowest or any tender not necessarily accepted.

M. H. CROSBY,
Town Clerk.

23

Tenders for Concrete

The undersigned will receive tenders for the construction of \$2,500 worth of walks and crossings, until MONDAY, THE 13TH JUNE NEXT, at 8 p.m.

For specifications apply to me. The lowest or any tender not necessarily accepted.

D. H. MINAKER,
Town Clerk.

Cobourg, 30th May 1910.

23

Board of Education Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received for the

**Enlargement of York Street School,
Alterations to Coleman Ave and
George Street Schools**

and for

**Midsummer Repairs, Fuel and
Furniture, Window Shades,
Linseed Oil and Turpentine**

until

Friday Noon, June 10th, 1910

and for the enlargement of

Earlscourt, Norway and Brown Schools

also for

Iron Stairs for Several Schools

until

Monday Noon, June 13th 1910.

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, W. C. WILKINSON,
Chairman of Committee. Sec.-Treas.

23

Positions Wanted

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra.

CIVIL ENGINEER, Good Organizer, full control of all grades, and labor. Just completed large Water Power Development six months ahead of time; is open for engagement.—Box 981, CONTRACT RECORD, TORONTO.

23

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—TRAVELLING SALESMAN to represent firm manufacturing bank, office and store fittings. Must be competent to make sketches, etc. Man having experience in architect's office preferred. Apply, Box 974 "Contract Record," Toronto. **TF**

WANTED—FOREMAN BRICKLAYER, must be thoroughly conversant with heavy masonry work, understand plans and details, a pusher, sober, capable of getting a good day's work out of his men. We desire a man who wishes for a permanent position in this city. Salary no object, and assistance in transportation if necessary to the right man, but we want the best man obtainable. Write, enclosing references, to The Edinger-Nesbitt Construction Company, Edmonton, Alberta. **23**

Miscellaneous

Advertisements under this heading two cents a word per insertion.

PINE PILING—Can supply large quantities pine piling, any length up to, say, 70 feet, on cars C. N. O. R. Apply to A. Prentice, 649 Bithurst Street, Phone College 5729, or A. McPHERSON & COMPANY, Longford Mills, Ont.

NINE-ACRE BRICK CLAY PLOT—The very best situation; close to town and a market for all you can make; will sell outright or will take partner with \$3,000; this is a rare chance for anyone wishing a paying business right from the start. Write S. W. Fawcett, P. O. Box 384, Sault Ste. Marie, Ont. **23**

New Companies

Waterproof Products, Limited, Montreal, Que., capital \$250,000. Incorporators, John J. Robson and John H. Brittle, advocates, Montreal, Que.

George B. Prowse Range Company, Limited, Montreal, Que., capital \$50,000. Incorporated to carry on business as plumbers, gas and steamfitters, general contractors, etc. Incorporators, Chas. C. Prowse, superintendent, and Achille Verschuere, foreman, both of Montreal, Que.

The Cobalt Smelter, Limited, Montreal, Que., capital \$2,000,000. Incorporators, Norbert Brunet, student at law, and Joseph J. Bouchard, accountant, both of Montreal, Que.

The Laurentian Chemical Company, Montreal, Que., capital \$590,000, incorporated to produce and dispose of products and by-products obtained by the distillation of wood, etc., and to carry on the lumber industry. Incorporators, A. D. Gall, Westmount, Que., R. Prefontaine, F. E. Lovell, all of Montreal.

The Blaugas Company of Canada, Limited, Montreal, Que., capital \$3,500,000, incorporated to take over the business carried on by Blaugas Company of Canada, and to manufacture, etc., all kinds of gas, electricity. Incorporators, Mortimer Barnett Davis and J. A. Jacobs, gentlemen, R. C. Smith and F. H. Markey, K.C., all of Montreal.

The Granville Power Company, Limited, Ottawa, Ont., incorporated, capital \$1,500,000. Incorporators, F. H. Chrysler, C. J. R. Bethune, N. G. Larmonth and R. V. Sinclair, solicitors, all of Ottawa.

The Enterprise Gas Company, Limited, Delhi, Ont., capital \$100,000. Incorporators, Sherman Stout and Geo. E. Quance, manufacturers, Delhi, Ont.

The Halton Telephone Company, Limited, Hornby, Ont., capital \$10,000. Incorporators, Hiram E. Tuck, farmer, and G. A. Kennedy, graindealer, Hornby, Ont.

The Crown Electrical Manufacturing Company of Brantford, Canada, Limited,

Brantford, Ont., capital \$200,000. Incorporators, Wm. D. Schultz, contractor, and John S. Dowling, insurance broker, both of Brantford, Ont.

United Paper Mills, Limited, Toronto, Ont., capital \$40,000. Incorporators, Morley P. Wilkins, accountant, and R. I. Finlay, merchant, Toronto, Ont.

The Canadian Consolidated Mining, Lumber & Utilities Company, Limited, Toronto, Ont., capital \$4,000,000. Incorporators, W. C. Coleman, accountant, and H. S. Pritchard, barrister-at-law, Toronto, Ont.

J. R. Eaton & Sons, Limited, Orillia, Ont., capital \$100,000, incorporated to carry on the business of lumber and timber merchants, builders and contractors. Incorporators, Jas. R. Eaton and Edwin R. Eaton, manufacturers.

Great Western Cement & Gravel Company, Limited, Toronto, Ont., capital \$250,000. Incorporators, Wm. Gilehirst, solicitors' clerk, and James Stewart, accountant, both of Toronto, Ont.

Miller, Limited, London, Ont., incorporated to manufacture, sell and deal in all kinds of plumbers' supplies, etc. Incorporators, A. E. Somerville, manufacturer, and Thos. Rich, plumber, both of London, Ont.

Canadian Sanitary Manufacturing Company, Limited, Montreal, Que., capital \$1,000,000, incorporated to carry on the business of manufacturers of and dealers in sanitary apparatus, plumbers' supplies, etc. Incorporators, Arthur J. Thomson and Wm. S. Symon, solicitors, both of Toronto, Ont.

The Empire Paper Box Company, Limited, Montreal, Que., capital \$49,000, incorporators, Anthony H. Sims and James R. Gordon, manufacturers, Montreal, Que.

The Canadian Hardwood Company, Limited, Toronto, Ont., capital \$490,000. Incorporators, Strachan Johnston and Reginald Holland, solicitors, Toronto, Ont.

Taylor & Arnold, Limited, Montreal, Que., capital \$50,000, incorporated to carry on business as dealers in railway, mining and contractors' supplies, machinery, etc. Incorporators, Arastus E. Howard and Henry U. Sylmer, advocates, Montreal, Que.

The Empire Construction Company of Canada, Limited, Toronto, Ont., capital \$200,000, incorporators, John C. Sherry, barrister at law, and Norman G. Lindsay, bookkeeper, both of Toronto.

The Durbin Automatic Safety Car Coupler Company of Canada, Limited, Sarnia, Ont., capital \$1,500,000, incorporators, James F. Durbin, Fort Scott, Kansas, and Robt. I. Towers, barrister at law, Sarnia, Ont.

The Toronto Kiln Dried Lumber Company, Limited, Toronto, Ont., capital \$40,000, incorporators, Robt. S. Wilson, merchant, and Wm. D. Wilson, manufacturer, both of Toronto, Ont.

Pleasing the Owner

If the plans are changed in any material way by the builder, there is a recourse, one that can be in a measure a preventive of any great differences, when the work has been gotten under way. Many builders of homes are skeptical about how a plan will work out until they see the same in actual erection or completion, and their ideas are often totally at variance with the plans they had first conceived. It would be well to make an effort to please the home builder, when such is within reason, and this can be done, provided there is

some diplomacy used as the work progresses.

It sometimes happens that the plans are so complicated, to the builder of a structure, that the same will have a very great difference in the completed building, and as the work goes forward the owner should be permitted to make inspections at intervals, so that there will be less cause for differences when the contract has been completed. There is wisdom in sometimes making an effort to please even the crank, and in order to do this there should be taken into consideration in advance of any actual work at least a general conception of what the final outcome will be, so that there can be less opportunity for the builder to make unreasonable demands for changes that are not so specified in the contract.

Reinforced Macadam Pavements

A new system road construction designed to resist the destructive pneumatic effect of automobile tires, has been under test for some time at Gennevilliers, a suburb of Paris. This construction, devised by M. Guet, and described in a recent issue of "Le Genie Civil," consists in part of a foundation of concrete about 2 inches thick. Upon this foundation and along its length are laid No. 6 steel wires and steel strips 1 1/4 inches x No. 14 gauge, set edgewise. The steel strips are spaced 2 feet apart and the No. 4 wires lie at a distance of 8 inches from each side of these strips. At longitudinal intervals of 8 inches each vertically placed steel strip is looped around with a No. 9 steel wire, the ends of which are hooked around the No. 6 wires at each side. Over this reinforcement is spread a thick layer of cement mortar, in which broken stone is carefully imbedded. On its surface the road resembles an irregular stone paving with cement joints. The cost ranges from \$1.25 to \$1.40 per square yard of surface, which, it is thought, is not more than the cost and maintenance of ordinary macadam for a term equal to the life of the reinforced road.

J. N. Laine, painter, Montreal, Que., Mrs. Joseph Laine registered.

Fullerton Bros., plumbers, Toronto, Ont., are stated to be closing their business.

Leblanc & Aquin, contractors, Lachine, Que., are stated to have dissolved.

J. A. Roy & Fils, lumber dealers, Montreal, Que., are stated to have assigned.

Limoges & Freres, lumber dealers, Terrebonne, Que., are stated to have dissolved.

Hodge & Walley, lumber manufacturers, Sherbrooke, Que., Geo. N. Hodge, deceased.

MacQuarrie & McLeod, builders, Winnipeg, Man., have been succeeded by MacQuarrie Bros.

It is reported that **J. C. Tully**, wholesale paper, twine, etc., Ottawa, Ont., has sold out to the National Bag & Paper Company, Limited.

The town of Kincardine, Ont., has recently completed a fine post office building at a cost of \$25,000. It is three stories high, of pressed brick with stone trimmings, 40 x 50 feet, and the interior fittings are of the very best. Mr. W. Nicholson, of Wingham, was the architect.

The Canadian Kellastone Company, Limited, with a capital of \$150,000, had office in Winnipeg. The directors are: C. A. Murray, F. H. Martin, Moose Jaw; P. J. Deardorf, S. McGill and C. P. Fullerton, Winnipeg. The company will carry on business as contractors and builders.

Combinations of Brick and Concrete

There are some very interesting studies in some of the departures of architecture one witnesses these days, some that heretofore have been classified in these pages as vagrant tendencies. One specific instance that was illustrated and described at some length during the year was that of erecting brick buildings and facing them with a plaster made of cement and crushed tile. This, together with the trimmings, made a sort of mission effect that was rather ugly looking in the process of construction, but somewhat refreshing when completed. There are to be seen quite a number of examples of this kind, of brick walls, both new and old, being plastered over with cement preparations of one kind and another.

Then, there is another tendency that might be put in the same class; to use cement or concrete for the body of the structure and do the facing with brick and terra cotta. In some instances, in quite a number we might say, the concrete takes the place of steel construction and of the old brick walls. That is, instead of having a steel frame the framing and girders are made of reinforced concrete. In fact, the general structure is made of concrete and small bars of steel, instead of heavy steel beams, simply covered over and protected. Then the building is faced with brick, sometimes with one kind and sometimes with another; sometimes it embodies the use of quite a lot of terra-cotta. Again, we find stone trimmings quite conspicuous with the brick face and reinforced concrete body.

One of the first points about this that will interest the average brick man is just what effect the general tendency to use reinforced concrete in this way may have on the brick business. There are many instances where concrete practically replaces the steel, and the amount of brick and terra cotta used is substantially the same as in erecting steel buildings, with the exception of the hollow block fireproofing on the inside.

It is not so hard on the facing brick industry, where concrete is used in lieu of steel, but it does curtail some of the use of hollow block fireproofing on the inside.

It is not so hard on the facing brick industry, where concrete is used in lieu of steel, but it does curtail some of the use of hollow blocks for fireproofing. Therefore, we might argue that the injury, or rather the supplanting, has to do more with steel than with brick, and not bother anything more about it as a competitor so long as brick is used in facing. Sometimes, however, the walls that are built of concrete might otherwise be built of brick, and then we have concrete taking the place of common building bricks, which furnishes plenty of room for argument on the matter of cost. It is quite a common practice with the advocates of concrete to take facing bricks, or at least some of the higher grade bricks used in facing work, as a basis for figures in making the comparative cost of concrete construction with brick. So, where concrete replaces merely the common brick, and the fillers and the finer brick are still used for facing, there is quite a difference. The common brick is the cheap item in brickwork, consequently the saving in cost should be on the other side if the figuring is done right—should be in favor of brick instead of concrete on such structures as it is thought advisable to erect with solid walls in lieu of steel frames.—Clayworker.

A reinforced concrete beam, 24-inch wide, 7 feet deep, and of 26 feet $2\frac{1}{2}$ -inch span, centre to centre of supporting columns, was used in the Jacobs Building, Montreal, to support a column carrying a load of 445,000 pounds at a distance of $9\frac{1}{2}$ feet from one of the supports. There is, in addition, a load of 46,400 pounds uniformly dis-

tributed over the span. The reinforcement consists of five $2 \times 3\frac{1}{2}$ -inch Kahn trussed bars placed in the lower element after the usual fashion of tension reinforcement. Ten 1-inch cup bars are placed in three layers between this tension reinforcement and the top of the beam, all these bars being bent up to take the shear. Additional reinforcement of trussed bars was placed at the end of the beam in the top, bending down into the columns.

British Trade Union Figures

Figures respecting the work of British trade unions in 1908 appeared recently in the Board of Trade Labor Gazette. Trade unions, registered and unregistered, numbered 1,165, with a membership of 2,378,248, a decrease of 1.4 per cent. on 1907, but an increase of 12.3 per cent. compared with 1906. For the eighth year in succession the membership of the building trade unions declined. Unions of general laborers declined by 14,000.

A tar macadam road, 30 feet wide and 400 feet long, was put down as an experiment at Kankakee, Ill., to discover whether this form of highway construction will reduce the dust nuisance caused by the wearing away of the top dressing of the shale macadam streets which are used to a great extent in that section. The dust from the limestone was washed into the sewers and formed a sediment which was removable with great difficulty. The street resurfaced had been paved with stone macadam three years before. Ordinary coal gas tar direct from the local works was used, after being allowed to settle for about a month in a large well, heated by a steam coil. It was applied to the road from 10-gallon hand sprinklers, the only method available; upon the hot tar was spread a top covering of crushed limestone, which was compacted by a 20-ton roller. After a period of three days the street was opened to traffic.

The crop of road contracts is said to be plentiful, but the engineers are skimping the specifications so as to get more road for the money, says "Rock Products." That makes a thin film of metal, so a great many of them cannot be called "good roads" by any means. There is no way to cut out the rock base without injuring the quality of the road. Opinions will always differ probably as to the top dressing or finish and its disposal, but there is no doubt about the experience with reference to the base of the road—it must be a compact mass of crushed rock of the three-inch size or larger, and deep enough, according to the character of the soil, to make a firm porous bed that will drain water promptly from the surface layers and pass it into the soil below or to side ditches through the soil. No road having less than a foot of such foundation can properly be designated a "good road."

In accordance with an Act passed at the last session of the Manitoba Legislature a number of architects have been appointed as a Board of Examiners for the province. The members are Messrs. Wm. Fingland, J. H. G. Russell, H. Matthews, W. Percy Over, and Prof. E. Brydon-Jack. In future no one will be able to practise the profession in Manitoba without passing the examination set by this Board.

In a recent communication to this journal, Building Inspector Jarrett, of Vancouver, says: "This city is now in a class by itself. There is every indication that she will be able to maintain the pace for some time."

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Ozone Purification

Whether or no the report on the ozone purification plant at Lindsay, Ont., issued by the Provincial Board of Health of Ontario, constitutes the alpha and the omega of the Howard-Bridge system in Canada, it is certain that we are destined to hear considerably more about ozone purification. Ozone, generated electrically, has been occupying the attention of leading engineers and sanitarians for some time. It has been the subject of discussion at engineering gatherings; municipal authorities have been getting as much information about it as is available; technical publications have been giving it prominence, and during the past year, we are informed, the cities of Paris, St. Petersburg and Madrid, in Europe, and Ann Arbor, Mich., as well as a suburban company of Baltimore, Md., have adopted it for the purification of their supplies. In view of this we venture to think that the article contributed to this issue by Mr. Bridge, the inventor of the Howard-Bridge system, will be of the greatest interest at this time. The publication of the other information relating to the commercial utilization of ozone may also serve a useful purpose. The article is in no sense contributed as an apology or defence of the Howard-Bridge system, but purely and simply to explain certain theoretical parts of the system with which everybody, apparently, is not altogether familiar.

Importance of the Good Roads Movement

It is of interest to note that instruction in the science of road making is being added to the courses of some of the agricultural colleges in the United States. This is a step in the right direction, and one which should expand until every agricultural college, not only in the States but also in Canada, shall have such a department. Good roads affect all concerned. The contractor who waits impatiently for material to be delivered may often

lay a portion of the delay to the bad roads which hamper the material at some stage of its production, either at the beginning of its journey, or at the end. All parts of the country are culpable in the matter of roads, and reformation along this line can be preached in Canada with every assurance of its not being misdirected.

The interests of the "Contract Record" are common with those of municipalities and others concerned with good roads problems. It is our intention to devote increased attention to this field, and we shall be glad to have the practical co-operation of all connected therewith.

A New Record for Canadian Trade

The aggregate trade of Canada for the twelve months ended March 31, 1910, exceeded that of any previous twelve months' period.

For the twelve months ended March 31, 1910, the trade of Canada in merchandise was \$668,530,064, showing a betterment over the same period in 1908, which was the record year in the history of Canadian trade expansion of \$53,336,088, a gain of about 8.7 per cent., but when compared with the figures for the same period in 1909, the betterment was \$120,472,348, a gain of about 22 per cent.

A further analysis of these figures will show that for the twelve months ended March 31, 1910, the imports of merchandise for consumption into Canada were valued at \$369,766,071, showing an increase over the same period in 1908, of \$17,941,047, a gain of about 5.1 per cent., but in comparison with the same period in 1909, it will be seen that the increase was \$81,630,721, a gain of about 28.3 per cent.

The exports of merchandise from Canada during the same period in 1910, were \$298,763,993, showing an increase over the same period in 1908, of \$35,395,041, a gain of about 13.4 per cent., but the increase over the same period in 1909 was \$38,841,627, a gain of about 15 per cent.

An analysis of the export figures of Canadian merchandise will show that the exports of the products of the farm during the same period in 1910, were valued at \$144,360,262, or 51.7 per cent. of the total exports from Canada, while the exports of the mine, the fisheries, the forest and of manufactured goods were valued at \$134,726,114, or \$9,634,148 less than the value of farm products exported.

Architects' Strong Argument

President F. S. Baker, of the Royal Architectural Institute of Canada, has written to the Hon. J. O. Reaume, Minister of Public Works for Ontario, commenting upon the general conditions for the guidance of architects in preparing competitive designs for a new residence for the Lieutenant-Governor of Ontario. On behalf of the Institute, Mr. Baker maintains that no self-respecting architect could conform to the conditions, inasmuch as they provide that a board of professional assessors be appointed to select the designs. Further, the conditions do not guarantee to the author of the winning design the commission of carrying out the work at the regular recognized scale. Nor in face of the printed conditions can the Institute understand the object of the Department in advertising for competitive plans in such a case. If the Government were to ask an individual architect to prepare preliminary plans for a mansion to cost \$225,000, the ordinary commission for

such preliminary drawings, without further work, would be \$2,700. And the Government is apparently asking for this work to be done at a cost of \$1,000!

Mr. Baker also pointed out in his letter that the architects from Halifax to Vancouver are at present protesting to the Federal Government for the unfairness of applying this same principle to the erection of Federal buildings at Ottawa, in which recent competition archi-

tecs had naturally expected that the winning architect would be commissioned to carry out the work.

In conclusion the writer pointed out that if architects were not given both Provincial and Federal Government support, where could they possibly expect to receive it and what would the future appearance of the country be?

Methods of Road Building in Nova Scotia

Sub-Drainage for Wet and Frozen Lands—Road Machine Work—Difficulties Encountered in Repair of Large Iron Bridges

By HIRAM DONKIN, C.E., Halifax.

Stony Roads—At one time the stony roads were thought to be the most difficult to build and maintain, but experience shows that while a greater expenditure may be necessary in the beginning, more lasting results can be obtained than with clay roads, and pains are taken to impress upon the inspectors and foremen that the principal consideration in building a stony road is to get the water off; this is a difficult matter where the ledge comes close to the surface. The next operation is to remove or break up all objectionable boulders. Even if nothing more than this can be done in one year, it prepares the roadbed properly for any repairs that may be afterwards added.

Clay Roads—Clay roads are found to be the most easily set up; and except where there are swamps or low places, they can be built up and graded by machinery—in proper hands. The discouraging part of the working with clay roads is, that while they give the smoothest and most even surface during the dry season, if nothing further is done they are cut up by the heavy traffic as soon as the continued wet weather sets in and left in a worse condition than if they had never been set up. Many efforts have been made in gravelling clay roads, but gravel has been wasted for want of rolling and packing our foundations, as clay loosely set up will not stand the traffic. Few parts of the province, even through the richest farming districts, are not yet in a position to build really durable roads, and economic necessity demands that they shall be of earth or other available material for some years to come, and advantage should be taken of the material within reach, such as brush, common straw, swamp grass, tan bark, sand, sawdust, or wooden fibre of any kind, but none of these mixtures is of any value, unless the material is thoroughly rolled as it is put in place.

It is found that a clay road, set up either by hand or machinery, or by means of material hauled on by carts and left unrolled, cuts up badly the first year, especially in a wet season, but if dressed up a second season, it will, under ordinary traffic, become as firm as the old bed of the same material. Even if the surface is gravelled over, a roadbed of this nature will cut up badly unless it is thoroughly rolled while the clay is being applied, or, if it is dressed with the road drag after the rainy season it will to some extent answer the same purpose, as if it were rolled in the beginning of the season. This, of course, involves additional expense. A clay road, no matter how well built, will not carry a lumber traffic—as a rule, lumbermen with their teams are engaged hauling the logs to their mills during the winter months and when the roads break up in the spring they immediately begin to haul the lumber to market, before the frost is really out of the ground or the spring rains over. They use narrow tired wagons and carry heavy

loads of from two to three tons, and these will cut our best clay roads into lakes of mud in less than one week of continuous hauling. I know of a number of roads that were set up in good condition and carried the farmers' loads successfully with ordinary repairs, but which, after two weeks' hauling with lumber teams, were so badly rutted that they had to be abandoned, the lumbermen not only depriving themselves of two or three months' good hauling during the dry season, but the roads were rendered impassable for the farmers. I am of the opinion that it would pay the lumber companies and relieve the general public of a large amount of road expenditure if they could defer hauling until the wet season of the early spring is over. A greater part of the difficulty would thus be overcome and it would be the means of saving thousands of dollars for the province.

Sub-drainage for Wet and Frozen Lands—Miles of the roads are located on low, level lands and on springy soils, and for many weeks in the year are wet and well nigh impassable. Such roads may be greatly benefitted by sub-drainage. When wet weather sets in or where perennial springs exist in the soil under the road, they should be tapped by blind drains of stone, brick, or clay pipe, leading diagonally to the side ditches. Where side-hill roads are springy, deep open ditches on the higher sides will often suffice, otherwise sub-drainage must be resorted to.

The building and maintenance of the telegraph and telephone lines assist to some extent in cutting out the bushes on each side of the road. With the bushes cut the roads are less subject to damage, and they dry out more quickly when exposed to the sun and wind. These companies, however, cause considerable damage to the roads, owing to the fact that their posts are sometimes set too near the roadway and in a few cases they have actually been set up in the ditches. There is also some carelessness shown in cutting the bushes, and I have noticed one place where the C.P.R. telegraph posts were set up and the bushes and branches either thrown over into the ditches or left on the high side of the road and allowed to blow over.

Recommendations as to Road Machinery

Road Machine Work—From the reports received from the inspectors, it is found that there are about 132 road graders in the province, many of which are damaged and great delay is caused in keeping them in repair, as the parts of the machines are so weak that they are liable to break in operation. At least one grader, one road plough, and one roller are required in each polling district of the province. A trial was made to assist the surveyors of highway labor by providing them with a machine, and, in necessary cases providing an operator,

but when two or three wished to use the machine at the same time as much assistance as desired could not be given. During last winter all the road machines available and not too badly out of repair were repaired, and they have been used to a greater extent than in the past. The Government purchased 11 new machines last year, yet as all the work had to be done about the same time, quite a number of the districts could not be supplied from the fact that there were not enough machines to do the work of the whole province. As labor is not now so easily procured as formerly and the price of same has advanced, it must be conceded that the upkeep of our roads must be worked out by means of road machinery. Already there have been imported one-half dozen four-horse ploughs, which are of great assistance in cleaning out many of the ditches that cannot be reached by means of the road grader. Cases came under my observation where pebbly, boulder roads with broad grass in the ditches could not be cleaned out by means of the grader and had to be left until these road ploughs were procured. With these four-horse ploughs the ditches that could not be reached the previous year were opened up. Although great benefits have resulted from the use of the road grader, a number of roads have been practically destroyed by a careless operation of the machine. There is a growing tendency to simply cut down the berms and pile this material in the centre of the road. On a 12-foot or 14-foot road, care should be taken to widen out the ditches, instead of narrowing the roadbed by cutting out the berms. If a 12-foot or 14-foot roadbed is narrowed to 8 feet or 10 feet and piled up in the centre with sod and rough material like a compost heap, and gravel hauled on, it makes the ditches deep and dangerous; two teams cannot pass in safety and the roadbed is partly destroyed, as the water is drawn to the centre of the road instead of from it. There is no necessity for cutting very deep ditches and throwing up a great mound in the centre. The roads should not be crowned more than enough to draw off the water. In a thoroughly packed roadbed, from one-half to three-quarters of an inch of crown per foot of width is sufficient, and in an unpacked roadbed from one-inch to one and one-half inches. In one or two cases ditches were cut four feet deep and the roadbed so highly crowned that tile piping had to be set in the bottom of the ditch and the ditch filled in to ordinary depth. The road grader is very useful in cleaning out a mucky ditch, but there is no sense in piling up a lot of poor material on a soft foundation. It would be better left alone, for then there would not be such a depth of mud to travel through.

Nova Scotia Makes Steady Progress

Improvements Made—Gravelling has been successfully carried on in a number of sections this year, but I regret to say that the greater portion of our road work is patching, and although patching is not desirable, a large sum of money must yet be expended in such repairs, in order to make the roads passably good. On several roads near the southern shore, where the foundations are largely made up of boulders irregularly set in and projecting above the surface, it has been the custom to haul on material to cover them over. Last year the principal expenditure was in blasting these boulders and this year these roads were set up with the grader and plough and the method of removing objectionable rocks from all our largely travelled roads, before adding more material to the roads, is being carried out. Although the matter of drainage has been fairly well attended to, as much was not done as desirable, owing to lack of funds. It took 100 years to build all the roads of the province, and it cannot be expected, owing to the condition they were in when the Roads Office took them

in hand, to do much more than make a gradual improvement. A number of miles of a better class of road than ordinary have been built and every year the mileage of improved roads will increase, so that after some years the great expenditure on repairs will be reduced to a minimum. The advance in making these more lasting roads must be slow, although good progress has been made so far. All the post roads of the province are at least 40 per cent. better than they were when taken over by the Roads Office two years ago, and up to the first of August even the worst clay roads were in fair condition.

Renewal of Bridges

In renewing the bridges which had been carried out by freshets, I communicated instructions to the inspectors that all these structures should be renewed in a greater span and height. These instructions are being followed out, except in cases where, after freshets, the superstructure carried out is floated back and replaced. It seems to have been the custom for years, as wood became scarce, to narrow up and confine the streams in smaller vents. If it is a fact that the clearing up of the country is the cause of the water running off suddenly in case of heavy downfalls, our bridges must be enlarged to carry the increased streams, and this has been my experience of the past 20 years.

Several diversions of roads around steep hills have been made this year—among others, the Lodge Hill, Lunenburg County, which had been a source of annoyance ever since the road was built some 70 or 80 years ago. It rose to a height of 150 feet, on a grade from 1 in 6 to 1 in 12, and as the ledge rock came to the surface, the side hill was flooded by water from springs during the winter. As the hill sloped abruptly to the sea, a number of serious accidents have occurred. Back drains were cleaned out and by filling in a hollow and diverting the line for 300 feet or 400 feet, the grade was reduced to 1 in 14. The road over Blockhouse Hill, in the same county, over a short steep hill, was carried around practically level. Several surveys have been made in other parts of the province for diversions of a similar nature, but these are not yet completed.

As has already been remarked, it is a question whether it is profitable to roll clay or gravel which has been put on to fill in a new road, or repair an old one in the early spring or summer, when one season's travel and redressing will accomplish the same results, as the additional cost of rolling is at least one-third. I think when good material is used on a road it should be thoroughly rolled. Several short pieces of road have been rolled this year wherever a horse roller could be obtained.

Methods of Improvement

A section of road in Falmouth, from Lewis Armstrong's to D. A. Railway crossing, was put in good shape. This road had been in bad condition, and last spring was practically impassable. On the south side of the road a 4-inch tile was placed four feet below the surface and well packed with straw and about one foot of ordinary field stone put on top, covered with earth. Over this surface drains were cut on either side of the road with the road machine and the road built up, leaving shoulders of about 15 inches. Inside these shoulders a strip of 12 feet in width was thoroughly packed with stone to a depth of one foot, and rolled in layers and a heavy layer of gravel put on top and rolled in with a 5-ton roller. Several springs of water were found in the centre of the road, which accounted for the bad holes. Tile pipes were laid in these places, leading into the sub-drains on the sides. This is now looked upon as a piece of road that will last for some time, in a section

where there is a large amount of heavy travel. Several other places throughout the province have been repaired in the same manner, but were not rolled.

Two portable crushers were last year made over to this department—one in the county of Queens, which is in good repair, and one in the county of Halifax. The latter crusher was operated on the road from Dartmouth town to the Nova Scotia Hospital. The work was performed in accordance with the directions given in the Bulletin on Broken Stone Roads. The officer expending the highway labor in connection with the sugar refinery and vicinity, wished to continue the broken stone road beyond their works, on the road toward Cow Bay, and agreed to pay for all labor in connection with the work and also to subscribe a certain sum, on condition that the Government would expend a like sum in providing and crushing the material. This agreement was made and carried out and the work is still in progress. The work done last year shows good results. The road stood well the frosts of last winter and was as dry and firm in the spring as when first rolled.

The Main Post Road leading from Dartmouth to Musquodoboit, carrying all the travel of Lower Musquodoboit and the eastern shore to Guysboro, has been put in good repair, but in several places for the first ten miles out from Dartmouth, the material at hand is of such a poor quality that it is not durable, and as there are large quantities of stone on each side of the road, I would recommend that a portable crusher and roller combined, of the latest improved design, be purchased, and crushed stone be put on the places above mentioned. A mile of good road near a large town is subjected to more wear than a number of miles of similar road in thinly settled districts, as there are 100 travellers in the former case to one in the latter. If metal roads can be afforded, these are first to be attended to. Road makers acquainted with the heavy travel leading to our principal coal mines, will all agree that the roads in these sections cannot be kept up with the clay material to be had from the coal formation, and if only one-half mile of metal surfaced roads could be built each year in such districts, even if the metal was carried from a distance and cost more than material near at hand, I believe it would be the means of saving money.

Painting Iron Bridges

I had all the badly corroded bridges attended to, but was compelled to leave about one-half those that simply required painting. I had difficulty in procuring foremen painters who could properly attend to the cleaning of the steel and to the mixing and application of the paint. This is a very important matter, as a coat of paint carelessly applied will not stop corrosion. I had also some difficulty in supplying the foremen with paint. Some of them preferred Sherwin & Williams' mixed paints, as they were accustomed to using them; others wished to use graphite and tar paints, as they were more easily applied. The first lot was purchased from Messrs. Sherwin & Williams, and was a mixed red lead. A few barrels of tar and graphite paint were also purchased, so that work could be started without delay. On July 8th tenders were asked for unmixed red lead and oil, and a number of samples were submitted, which samples were opened and examined by an assayer. Those submitted by Messrs. Melvin & Company, of this city; D. G. Kirk, of Antigonish, and by Messrs. Brandham-Henderson Company, of this city, proved to be of the same quality, and were probably of the same manufacture, and the prices ranged about the same. If there were any choice, it would be for that submitted by Messrs. Melvin & Company. Prices were asked by letter for mixed paints of the same quality, and Messrs. Melvin

& Company quoted the lowest, and the balance of the paint required was purchased from them. I painted iron bars with each of the samples received, and have them exposed to the weather. Many of them show rust right through. We have four samples of red lead, three of black paint, and one of grey, which so far show no signs of rust. I have found that to clean and apply one coat of paint to a 100-foot span averages a cost of \$50, and the average quantity of red lead required for such is about 11 gallons, and I think it is poor economy to apply a cheap paint when for a few cents additional in price it is possible to procure the best paint on the market.

Factories and their Fire Protection

The enormous aggregate of the American fire waste, which contrasts so unfavorably with European prudence, is beginning to cripple and impoverish us as the natural resources of the country, once believed to be inexhaustible, are ceasing to respond to the demands of our habitual extravagance, says the "Architectural Record." The common notion that the insurance companies pay the cost of the fires is gradually giving way to an intelligent understanding of the fact that they are merely the collectors and distributors of the fire tax. They must recover from the public the sums they pay out in losses, plus the cost of conducting their business and a reasonable interest upon their capital. Fire protection engineering is coming to be a profession by itself, but, after all, its chief distinguishing quality is common sense.

Experience in fire protection engineering suggests three points to be kept in mind in planning a factory: There should be as little combustible material as possible used in its construction and equipment. Each floor should be absolutely cut off from every other floor, and each section from every other section, so that fire may not communicate. Every part of the factory should be equipped with extinguishing apparatus. It is obvious that a factory of reinforced concrete will present certain advantages respecting the fire hazard over the slow-burning or "mill-construction" type; although the latter is preferred by many manufacturers as presenting more convenient surfaces for the attachment of pulleys, shafting and machinery. Slow-burning construction is not undesirable if properly safeguarded and protected. The advantages of the use of reinforced concrete appear when we consider that with such construction every floor may by avoidance of vertical openings through it, be made practically a fire wall. The floors being incombustible, a fire in any storey may generally be confined to it.

Inspection and Repairing of Wooden Bridges

The following directions for the inspection and repairing of wooden bridges are taken from a bulletin recently issued by the Bureau of Town Highways of the New York Department of Highways for the guidance of county and town superintendents:

The timbers of wooden bridges should be inspected by boring with a $\frac{3}{4}$ -inch auger into the main members. This boring should be done in such a way that rain water cannot enter the hole; i.e., the hole should enter the timber from the under side. The holes should afterward be plugged with wood. The iron hangers should be equally strained. This condition can be determined by striking adjacent rods with a piece of hard wood or iron and noting the tone or pitch. The rod having the lower tone can be tightened until the pitch is the same as that of the rod having the higher tone. In case a nut is rusted fast and cannot be moved by a wrench, it

can be very readily loosened by heating it quickly with a gasoline torch. Care should be exercised to avoid heating the rod, as the idea is to expand the nut and thus loosen it.

If a wooden bridge is in such good condition that it will probably not be renewed for some years, the covering (roof or weather boarding) should be very carefully watched, as a heavy wooden bridge might last for years if properly covered, while a small leak in the roof, if neglected, might be the cause of the bridge decaying in a few seasons. Splices and keys in the bottom chord should be watched to see that there is no crushing of the wood back of the splice bolts.

The floor beams should be large enough to get a bearing over the entire width of the bottom chord and the planking should be laid with openings to clear the deck of water and dirt. The planking in all cases should be spiked to the floor joist to prevent undue vibration and noise. The mud sills and corbels should be renewed as fast as decay becomes apparent. There should be an apron of wood or stone between the bridge deck and the roadway dirt. This apron should be renewed from time to time as the necessity becomes apparent.

If the trusses become weak they should be made safe in the following manner: There should be placed on the ground under the bridge or in the bed of the stream a mud sill of wood about 10 inches square and about 3 feet longer than the width of the bridge. A corresponding cap of like dimensions should be attached under the bridge and in contact with the trusses at a panel point. Two vertical pieces about 8 by 8 or 10 by 10 and a little longer than the distance between the mud sill and cap, should be provided and should be placed by blocking the upper ends under the cap piece and then driving the lower ends until they are perfectly rigid. The lower ends should be retained by blocks spiked to the mud sills. These trestle bents should always be put up in pairs at an equal number of panel points from each end.

Dull Finish for Rough Plastered Walls

A contractor who had several rooms in a school building to paint where the walls were rough plastered and the finish was to be a dull one, wrote to the "Painters' Magazine" to know what size to use on the walls and how to mix the paint in order to obtain the result desired. The journal in question replied as follows.

For cheap work, size the walls with a wall or suction varnish, then apply one coat of oil paint, a mixture of equal parts pure lead and pure zinc in oil, thinned with three parts raw linseed oil and one part turpentine and dryer in equal portions. Have this mixture tinted with oil colors, same as the finish desired.

For the finish use zinc white ground in oil, tinted to suit, and thin with one part raw oil and three parts turpentine with sufficient japan dryer. Have this paint stout and stipple it, as in this way you will have the best, most uniform effect.

Another method is to thin down pure white lead in oil with raw oil, not over ten pounds lead to one gallon of oil, adding a trifle japan, applying this direct to the plaster. When dry, apply a coat of glue size prepared as follows: One pound good white glue dissolved in one-half gallon of boiling water, one pound good bar soap dissolved in one quart boiling water, and two pounds of alum dissolved in one quart of boiling water. Add these solutions, while still warm, together, stirring in the meantime. The alum water should be added last, and slowly. When all is smooth add enough cold water to make it of the consistency of heavy varnish.

Apply the size with a large wall brush, and, if it does not work free enough, warm it some. Follow this with two coats of paint, as described above for the first method.

Creed and Contract Matters

Ottawa, June 1, 1910.

Editor, "Contract Record":

Referring to your article, "Should Creed Enter into Contract Matters?" published in your issue of May 18, your comments are timely and to the point. The Ottawa Exchange, fortunately, was not compelled to act, as the School Board, at another meeting, rescinded the previous motion and awarded the contract to the company comprised of one public school and one separate school supporter. The various Builders' Exchanges throughout Canada are opposed to such discrimination as was at first threatened. They stand for the awarding of contracts in a broad-minded, equitable manner, without reference to creed or denomination.

Thanking you for your attitude in this matter,

Yours very truly,

D. J. MacKenzie,

Secretary, Ottawa Builders' Exchange.

The city of Winnipeg is experimenting with a new kind of paving material which is said to be better than macadam and cheaper than asphalt. This is a layer of small stone mixed with bitumen placed directly on a macadam base, without any intermediate concrete base. This pavement is said to be \$1.25 cheaper than asphalt. It is to be used on residential streets where there is a fair amount of traffic. A special mixing machine will have to be purchased at a cost of \$8,000.

The Dominion Government is taking steps to compel contractors to pay the wages stipulated in their contracts, and also to enforce the payment of damages for injuries. The Minister of Labor lays down his policy in the following terms:

"Where contractors in such cases remain indifferent to the just claims of their employees injured on public works, the Government would be justified in using its influence to secure a settlement of outstanding claims, failing which contractors should be given to understand that their future tenders will not receive consideration."

Those at the head of railway enterprises in British Columbia regard the present scarcity of labor in that province as a grave crisis. It is said that the C.P.R. and C.N.R. programmes of work are being considerably cut down for this reason, and that the G.T.P. is finding the greatest difficulty in securing men for the Prince Rupert section. The only remedy, apparently, is to introduce Chinese on a large scale, but this plan the labor unions strenuously oppose.

A Builders' Exchange has been organized at Regina, Sask. The following officers have been elected for the ensuing year: President, R. J. Leckie, of Messrs. Peter Lyall & Sons; Vice-president, Gordon Bishop, of the Saskatchewan Construction Company; Treasurer, W. Martin; Directors, D. Smith, H. Potts, F. Crapper and J. M. Taylor.

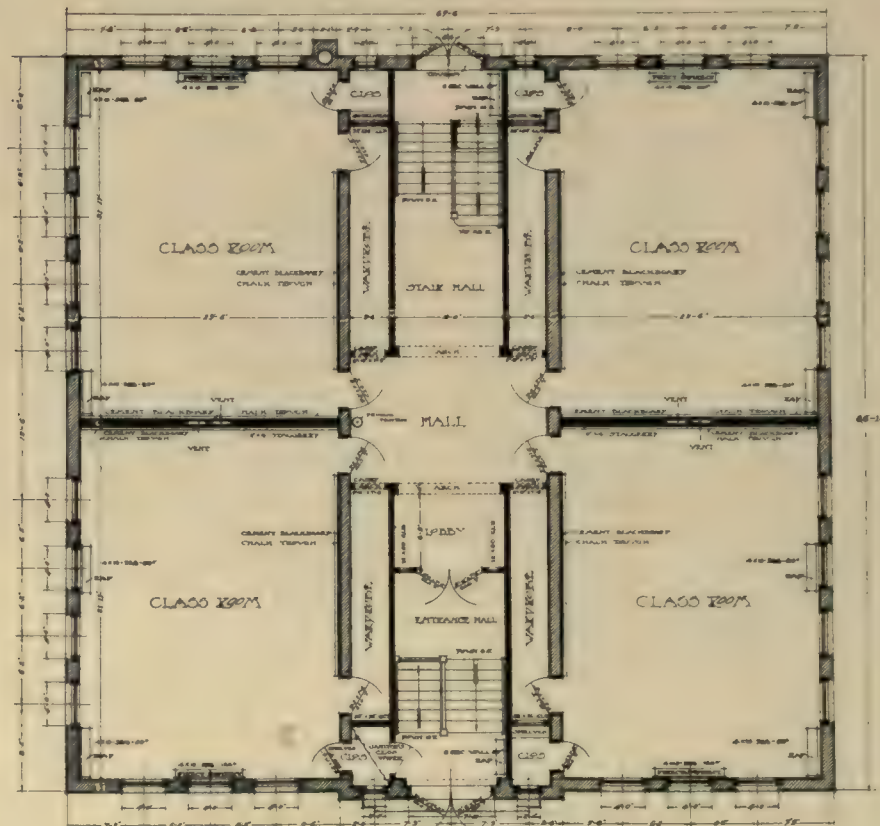
In a recent communication, Mr. J. W. McCurdy, city clerk of Fredericton, N.B., informs us that there is great activity in all the building trades at Fredericton. There is a scarcity of both mechanics and laborers and wages are correspondingly high in consequence.

Design for 8-Room School at Amherstburg, Ont.

LIST OF MATERIALS			
SECTION	QUANTITY	UNIT	REMARKS
1. BRICK	100,000	sq. ft.	2.5" thick
2. PLASTER	10,000	sq. ft.	1/2" thick
3. LATH	10,000	sq. ft.	1/2" thick
4. ROOFING	10,000	sq. ft.	1/2" thick
5. GUTTER	10,000	sq. ft.	1/2" thick
6. DOWNSPOUT	10,000	sq. ft.	1/2" thick
7. FLOORING	10,000	sq. ft.	1/2" thick
8. CEILING	10,000	sq. ft.	1/2" thick
9. PAINT	10,000	sq. ft.	1/2" thick
10. GLASS	10,000	sq. ft.	1/2" thick
11. DOORS	10,000	sq. ft.	1/2" thick
12. WINDOWS	10,000	sq. ft.	1/2" thick
13. STAIRS	10,000	sq. ft.	1/2" thick
14. HALLS	10,000	sq. ft.	1/2" thick
15. RESTROOMS	10,000	sq. ft.	1/2" thick
16. OFFICES	10,000	sq. ft.	1/2" thick
17. KITCHEN	10,000	sq. ft.	1/2" thick
18. DORMITORIES	10,000	sq. ft.	1/2" thick
19. GYMNASIUM	10,000	sq. ft.	1/2" thick
20. AUDITORIUM	10,000	sq. ft.	1/2" thick



Front Elevation.



First Floor Plan.

Plans for 8-Room School Building

The plans reproduced on these pages are those for an 8-room school at Amherstburg, Ont.

The building, from the grade course up, is constructed of brick with stone trimmings. The basement walls are of stone with concrete footings and tile drains inside and out. The roof is covered with XXX British Columbia shingles.

The basement provides for boiler and fuel room, and separate play rooms, lunch rooms and toilets for both sexes.

Maple is being used for the first and second floors and Georgia pine for inside finish.

The school is heated by steam, the Pease heating and ventilating system being used. Modern plumbing fixtures are installed, these including Ideal automatic closets and Standard lavatories in toilet rooms. Drinking

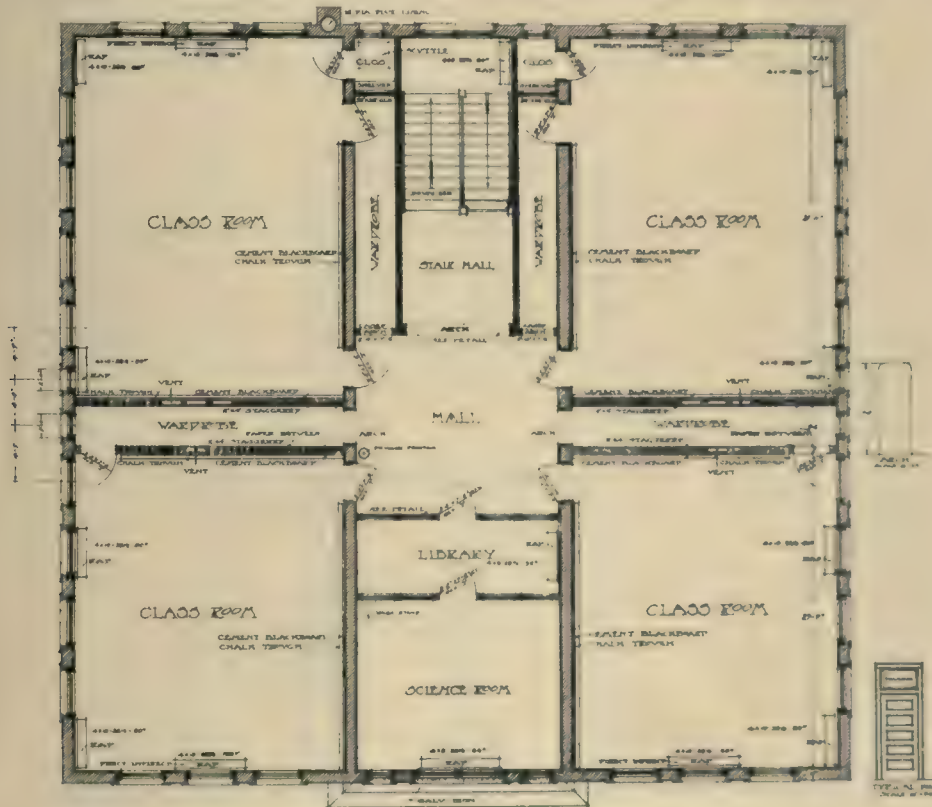
residences and smaller business buildings of all kinds under way. An important work in prospect is the addition to the departmental buildings, for which tenders will be called in July.

Construction of Concrete Walls

The first thing to consider in the building of a walk is the character of the soil to be covered. Sometimes when the soil is heavy and holds water, a sub-base or foundation of gravel or cinders is necessary to prevent heaving from frost, but when the soil has good natural drainage, the sub-base may be omitted. In building a walk, if a sub-base or foundation is required, dig a trench six inches wider than the proposed walk and to a depth which will permit of 8 inches of gravel or cinders beneath the walk. The gravel or cinders should be packed well by wetting thoroughly and tamping. Forms in which to build the walk must be provided and should be built of lumber two inches thick. One-inch stuff is sometimes used, but will require more stakes and the line of the walk will not be as good, for it is impossible to keep light material in good alignment. Only two-inch stuff should be selected if new lumber has to be purchased for use as forms. Generally speaking, the width of the material for forms should equal the thickness of the walk. For instance, 2 x 4-inch stuff would be used for a 4-inch walk, and 2 x 5-inch stuff for a 5-inch walk. The thickness of a walk may be varied somewhat from the width of the lumber used for forms by raising or lowering the forms above or below the surface of the ground upon which they would otherwise rest.

The thickness of the standard walk is 4 1/4 inches, therefore lumber 2 x 5 inches surfaced, will make a form which will be about right. Lumber 2 x 6 inches, surfaced, will usually be easiest to obtain and can be used very nicely.

Wherever a curved line is wanted in the walk, 1/4-inch stuff or strips of sheet metal the width desired should be provided, as such material can be bent easily and held in the proper position by stakes. If the walk is to look well when completed care must be taken to place and keep the forms straight and even and they also should be carefully levelled. If the walk is being built on an incline, have the grade uniform. The walk should be made a little higher on one side than on the other, for the purpose of providing drainage; a 1/4-inch to the foot of width will be ample, and this may easily be accomplished by having the forms on one side a little higher than on the other. The side forms should be held in place by stakes set about three feet apart on the outside with an occasional temporary stake on the inside to hold them in an upright position. A cross form which consists of a piece the length of which is the same as the width of the walk, is placed between the side forms at the point where the joint in the finished walk is to occur, and is held in place by two stakes on the outside of the form. When the concrete is being placed, pack a little against the inside of the cross form



First Floor Plan.—Amherstburg School

fountains are provided in halls on first and second floors. Water is connected to the science room.

This school, which is 66 feet 10 inches x 69 feet 6 inches complete, including grading, is costing \$16,500. Watt, Jacques & Williamson, Boug Building, Windsor, Ont., and 216 Masonic Temple, London, Ont., are the architects.

According to Mr. Chas. W. Eliot, president of Harvard University, labor unions, by reason of the manner in which they supplant individualism and regulate output, undoubtedly degrade human character.

Ottawa contractors, like their confreres at Montreal, are fairly inundated with work. The activity in the Federal capital this year is stated to be greater than ever before. The G.T.R. buildings, views of which were shown in our issue of February 9th, are going up with remarkable rapidity, while the Hope and Rosenthal buildings are nearly completed. There are dozens of

The Ozone System of Water Purification

An Explanation of its Theory and Operation, with Special Reference to the Lindsay Plant*—The Commercial Utilization of Ozone

By J. HOWARD BRIDGE

In a sentence, the ozone purification of water consists in very rough filtration followed by aeration—aeration by electrified atmospheric air.

The filtration practised is of the crudest sort. It is just enough to remove the grosser particles of suspended matter, and it aims at no biological effect. The theory of it is simply to remove the mud, and leave the bacteria for the ozone to destroy. It is thus possible to run these scrubbers at a rate never attempted in any simple filtration system. At Baltimore, for instance, a five million gallon pre-filter is only 20 feet by 20 feet; so that its rate of operation is 500 times as rapid as that of slow sand filters. At Ann Arbor, the filter is 30 feet square, and is capable of passing four and a half million gallons a day. These filters are cleaned by simply reversing the current, under a pressure of 40 to 60 pounds, and the operation occupies less than five minutes. A few hundred dollars will build such a filter, and its cost of operation is simply the cost of pumping and purifying the water used for washing.

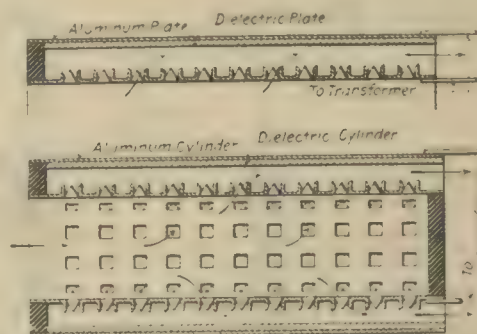
In the Howard-Bridge system of ozone purification, which is the only one in use on this continent for the treatment of municipal supplies, the ozonized air is brought into contact with the water to be purified, by the flow of the water itself. The law of gravitation, which needs no lubricant, never gets out of order and calls for no skilled attendance, does most of the work. The water under treatment falls down a series of earthenware pipes embedded in the concrete lining of a well, and in doing so sucks in the air needed for its purification. The mixture of air and water is projected by its own weight into the bottom of the well, and then it passes across a series of baffles designed to keep the air from passing too rapidly from the water. At Lindsay, the sterilizing well has a capacity of 5,000 gallons; so that when the pumps are working at 1,000 gallons a minute, which is their normal rate, the ozone is kept in contact with the water for five minutes. As the air rises faster than the water, it follows that every particle of water is repeatedly brought into contact with fresh bubbles of ozone. The result is that the water comes out of the well thoroughly aerated, bright and sparkling, and free from the objectionable color, taste and smell of the swampy streams from which the supply is taken. The official test of the plant, upon which its acceptance by the town was based, showed a reduction of bacteria from 1,500 per c.c. to 12, with complete elimination of all noxious organisms and, as has been said with the removal of swampy color, taste and smell.

The way in which this result is accomplished is very simple. Ozone is simply a very active form of oxygen. When it comes into contact with any oxidizable matter, the latter is transformed into a gas, which passes off into the air. There is therefore no residuum left to filter out. Bacteria are like all organic bodies: they consist mainly of water—about 84 per cent. Of the solids remaining, more than half are carbon, and this carbon combines chemically with the ozone to form CO_2 , carbonic acid gas, which is inert in water. In like manner the dissolved matter, which gives the swamp water its vegetable stain, is oxidized into gaseous or other innocuous forms. Nitrites, for instance, become nitrates, which mark the last and stable form into which organic bodies undergoing dissolution pass in nature. And, of course, nitrates,

unlike nitrites, are a sign that the purification process is complete.

Ozone is formed by passing atmospheric air into a space across which an electric brush discharge is passing. It is not known for certain how this is accomplished. The latest theory is that the negative ions or corpuscles present in the air-space are projected by the electric discharge across this air-space with inconceivable rapidity, and, coming into violent collision with the oxygen molecules, break them up. The atoms forming these molecules then re-combine, some in clusters of three, some in clusters of two. It is the three-atom molecule which is ozone. In physics ordinary oxygen is written O_2 ; ozone, its allotropic form, is O_3 . Much new light is being thrown on these mysterious transformations by discoveries in radio-activity; and with knowledge of the causation of ozone will come increasing ability to produce it cheaply.

However scientifically interesting ozonization may be, and however efficient it may prove in water purification, the conclusive test of its commerciability is its cost. And this, after many years of experiment and improvement, seems to have been finally determined in favor of the new process. At Lindsay, for example, the entire cost of operation is less than 50 cents per million gallons, which is only about one-tenth that of slow sand filtration. In first cost, too, the new process



The Plate and Tubular Ozone Generators of the Bridge System

appears to have the advantage over older methods of water purification. At Lindsay, the ozone plant, including pre-filters, cost the town \$8,200. At Lawrence, Mass., a slow filter of like capacity, cost \$53,000 to build. At Ann Arbor the cost of the plant, including filter, was somewhere about \$5,000 a million gallons daily capacity. Slow sand filters average \$25,000 to \$35,000 per million. Allowing for possible favorable conditions of construction and operation at the two places mentioned, it looks as if ozonization has now reached a development that puts it, as far as concerns the cost of construction and operation, into very active competition with either slow sand or mechanical filtration.

Commercial Utilization of Ozone

Concerning the commercial utilization of ozone for water purification, the "Engineering News" has this to say:

There is now no question as to how ozone acts and no doubt as to its great efficacy as a destroyer of bacteria and organic matter contained in water. This objectionable organic matter is literally burned up—converted to carbon dioxide. Ozone is frequently called a "sterilizing" agent. Its use can be carried to such an extreme that it will actually

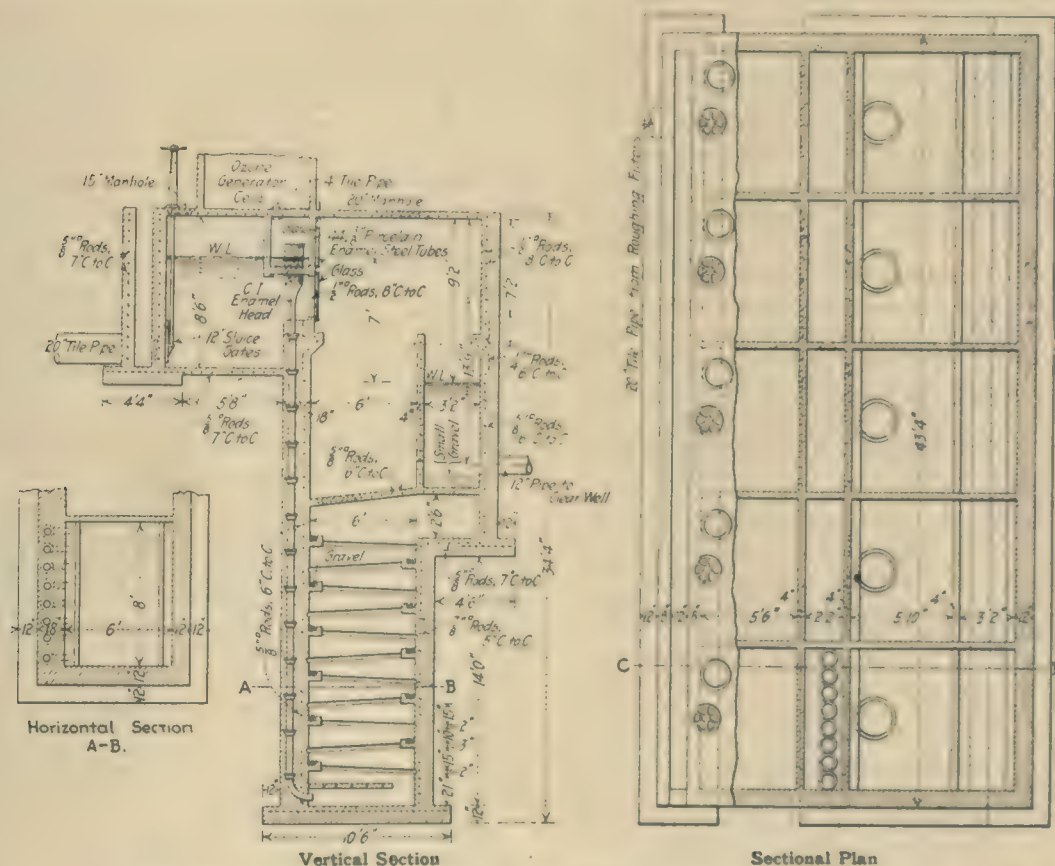
*A description of the Lindsay plant was published in our issue of May 26th, 1909.

sterilize as effectively as any other process, but, in plants for purifying city water supplies, however, it is unnecessary and uneconomical to carry the treatment so far. As ozone, or ozonized air rather, is but very slightly soluble in water and as the bacteria and organic matter are thoroughly disseminated, the ozone works under a great handicap in its attack. Anything that contributes to the intimate mixture of the water and the ozone promotes that attack; but it is obviously difficult, at least with our present knowledge, to secure and keep this intimate mixture of liquid and gas. The wonder is that ozone can be as efficacious as it is.

Experiments Demonstrate Efficacy

The oxidizing power of ozone seems to be particularly effective against pathogenic bacteria. As an illustration of the activity of ozone, it may be interesting to quote a few

water treated, reduced the bacteria count from 60,000 to 400. A second treatment with ozone at a concentration of 1C and a consumption of 0.77 grams more cu. m. of water, reduced the count to 40, with the probable removal of all *B. coli*. The bactericidal efficiency of the first treatment was then 99.333 per cent., and of the two treatments 99.933 per cent. A sample of settled sewage was similarly experimented upon with ozonized air in saturation bottles at a concentration of 12 grams. The first treatment reduced the bacterial count from 12,000,000 to 15,000, with a consumption of 9 grams per cu. m. of water. A second treatment, in which 5 grams per cu. m. additional was absorbed, reduced the count to 750. A third treatment with an absorption of 3 grams per cu. m. of water, reduced it to 200 cu. m., and a fourth treatment with an absorption of only 1 gram cu. m. brought the count down to 40. The total consumption of 13 grams in



Arrangement of Sterilizing Wells, Bridge process as installed at Lindsay, Ont.

figures secured recently in American laboratory investigations. By spraying a water containing 100,000 to 300,000 colon bacilli per cu. cm. into an atmosphere of ozone, having a concentration of 2.5 grams per cu. m., the bacteria count was reduced to 1 per 5 cu. cm. With a river water, containing from 1,000 to 3,000 bacteria per cu. cm., treated under similar conditions and in the same apparatus, a concentration of 6 grams per cu. m. of air was needed for the absolute destruction of *B. coli*, but with 2.25 grams concentration, only 1 *B. coli* was left per 5 cu. cm. However, while only 1 colon bacillus was noted in 5 cu. cm., 150 bacteria were counted per cu. cm., but they were shown to be spore-bearing types. Even with as high a concentration as 6.5 grams of ozone per cu. m. of air, 40 of these spore-bearers were left in each centimeter.

In another series of experiments on a highly contaminated water, approximately 1 per cent. sewage, a single treatment with ozone having a concentration of 12 grams per cu. m., and with a consumption of 1.25 grams of ozone per cu. m. of

four treatments, then, brought the count from 12,000,000 to 40.

These figures are very interesting as showing what can be done by an imperfect mechanical mixture of ozone and water, but they do not throw the least light, of course, on the commercial practicability of such sterilizing processes.

Misapprehension as to Treatment

There is much misapprehension of what the field of ozone treatment of water really is and what it has to recommend it over other processes. We believe that one of the elements of greatest value to its exploitation is its inherent characteristic appeal to the public. It must be admitted that there is something very attractive to the public mind in the proposition to pass bubbles of ozonized or "electrified" air through a contaminated water. On the other hand, the public is more or less suspicious of the addition of chemicals to water, and there are always plenty to aver that the water so treated has "a queer taste." Even with a filtered water supply the public is apt to be suspicious of holes in the filters, even though

long years of experience with both mechanical and slow sand filtration has shown that such fears and suspicions are practically groundless.

A second element of great value in the ozone process lies in the ease and quickness of removing color (stain as distinguished from turbidity), taste and odor in cases where filtration and chemical disinfection can do this imperfectly or at heavy expense. It is well, however, to recognize from the start that ozone is effective in disposing of organic matter only, having practically no effect on other impurities except metallic salts.

It has been claimed by promoters of ozone processes that removal of screening of the coarsest suspended matter, followed by ozone contact will be cheaper than any other process of water treatment. It remains to be demonstrated, however, just where preliminary treatment plus ozone contact will be more economical than sedimentation or coagulation and filtration.

It should be remembered in this connection that, with any filtration of suspended matter which is more than a mere screening, a reduction of the number of bacteria in the water always takes place. Therefore, when something more than screening is needed to remove finely divided objectionable matter, previous to ozone treatment, the other contamination would be removed during that process (extended, perhaps) and the ozone contact would seem more or less superfluous.

Possibilities and Limitations Not Yet Determined

For determining whether or not an ozone water-purification system is desirable in a given location, no general rules can be made—even laying aside public prejudices for or against any system. There can hardly be a clear definition of either the possibilities or the limitations of ozone processes until many complete series of studies have been made by independent engineers of repute.

The average costs of the several kinds of water-purification plants would be highly interesting if obtainable. In the present state of the art, however, only the most general comparisons can be made. By examination of the records of a few plants it appears probable that where a plant for treating a clear but contaminated water with ozone has cost \$3,000 per million gallons capacity, a slow-sand filter would cost something like \$20,000 for the same capacity, a mechanical filter would cost some \$10,000, and a plant for dosing with hypochlorite of lime would cost only about \$120.

A plant for rough filtration followed by ozone treatment has cost about \$5,500 per million gallons capacity. From recent installations it is probable that if hypochlorite dosing were substituted for the ozone treatment the plant would have cost about \$2,700 for the same capacity. But this figure is yet to be determined by the operation of commercial plants on a large scale. Theoretically, of course, there is a great advantage in operating a filter at a very high rate and relying on an ozone treatment to dispose of such bacteria as are carried through the filter. Practically the additional complication of a double treatment system is a serious handicap to any such system.

Cases for Which Ozone Seems Best Adapted

So far as can be seen at present, the ozone treatment is best suited for waters which are already satisfactory as regards color, taste, odor, etc., but are dangerous because of sewage contamination. There are many water supplies taken from the lakes or the St. Lawrence to which this description applies. There are also some underground supplies and supplies from large storage reservoirs which need no treatment except the destruction of possible pathogenic bacteria.

Of course, no hard and fast rules can be laid down as to what ozone is or is not adapted, until the commercial position of the ozone process is better established. The situation in this respect resembles that which many engineers will recall in the early days of mechanical filtration. The likeness is

further carried out in the existence of at least five competing companies exploiting different processes of ozone treatment.

At the present rather unsettled stage of development of ozone water-treating systems, it is not safe to say that the apparatus will take care of itself, like the alternating current transformer, for instance. On the other hand, an ozone plant should be as reliable, successful and economical in operation as any other water-treating system if well installed under competent advice and if well cared for and maintained. The ozone generators are hardly to be classed as delicate machinery, although they seem to be put out of service with greater or less ease. The auxiliary machinery—pumps, coolers, etc.—can be made as reliable for use here as anywhere. Of course, if continuity and reliability of operations is to be assured, there must be a skilled mechanic in charge and a supply of duplicate parts, as with any other system involving the use of fine machinery.

The processes and apparatus for making and using ozone are still far from fixed. Too many avenues are open for progress to permit great rigidity in design or operating method. Were all the useful patents brought under a single control and were all the ozone-generator designs made available for a competent designer to select the best features from each, an ozone generator of high economy would result. Were all the methods for forcing contact of ozone and water similarly combined, we might get a system with which this could be done, with a slight loss of head. Each successive inventor has devised one or more good features about which he has built up his system. Such a consolidation as is suggested above has taken place in many other mechanical fields, and a similar result may eventually be reached here.

Mr. Bridge Replies to the Provincial Board of Health

While the above article has been in type a report has been issued by the Provincial Board of Health of Ontario, demonstrating with much detail that the Lindsay plant is a failure, owing to the fact that the ozone is not brought into efficient contact with the water. The inventor of the system has replied to this report as follows:

With much travail, a mountain has again been delivered of a mouse.

After seven months the Provincial Board of Health of Ontario has brought forth a report on the Lindsay ozone plant. And its twenty odd printed pages and dozen photographs, diagrams and tablets may be summarized in one sentence and explained in another:

1. The ozonizers produce more ozone than is necessary to purify the water; but

2. Owing to the low level of the water in the river—necessitated by the rebuilding of the dam and locks below—there was, at the time of the tests, not enough fall to suck this ozone into intimate contact with the water.

To quote from the report (page 14), "there was sufficient ozone produced, therefore, assuming 500,000 gallons (equivalent to 2,272 cubic metres) as the maximum capacity of the Lindsay plant, to yield 1.08 grams of ozone for every cubic metre of water to be pumped. At Paderborn, where the water is very pure chemically, 1.3 grams of ozone per cubic metre of water are used, while at St. Maur, Paris, the amount is only .658 grams of ozone per cubic metre."

In other words, the Lindsay plant produces nearly twice as much ozone per unit of water as is successfully used in Paris, and, it may be added, nearly four times as much as at Breda, Holland.

But—and here is the explanation of everything found faulty by the Provincial Board of Health—"the ozone which was being generated was not being drawn into the water. The greater the head of water, of course, the greater the efficiency of any aspirator. The greatest possible head in the well at Lindsay is 3 feet, which is the difference between the surface of the water over the aspirators and the surface of the water in the sterilizing water well." (Page 13.)

In other words, the river was abnormally low: a head of 3 feet was not fall enough for the water to pull the ozone down the sterilizing well.

These tests were conducted in secret, by the appointees

of an official who had condemned the plant even before it was completed. They had never seen an ozone plant before, and we read in the report that one of them "was nearly ozonized into another sphere" while opening a pipe which ought not to have been tampered with only under expert guidance. Had the investigation been intended to be fair and impartial there would have been no need of secrecy nor of the hostility with which my first suggestion concerning the tests were received. As I pointed out at the time, in a protest to the Provincial Board of Health, this secrecy would vitiate and make valueless the report; and but for this secrecy a remedy for all the failures which it took three months to tabulate could have been applied in two days.

As already quoted, the report states that during these tests "the greatest possible head in the (sterilizing) well is 3 feet." Normally it is nearly double this; which means that the part of the plant was reduced almost four-fold in action and probably forty-fold in efficiency. The entire question of the efficacy of the system is dependent upon this matter of available working head; but a larger blower could have been installed in two days, so as to overcome this temporary defect. The defect was made apparent to the investigators by their very first tests; and had I been allowed to see the results of these tests, I should have indicated the remedy, and the succeeding weeks and months of purposeless accumulation of error would have been saved by the simple expedient of increasing the strength of the blower.

Unreliability of Report.

To indicate the unreliability of the report, a single technical example can be taken from page 12, where it is stated that the concentration of ozone with the aspirators and blower working was only .275; but when a plug was removed so the blower could readily drive the air out of the pipe, the concentration was nearly three times as great, viz., .66. This is an absurdity. If more air passed through the ozonizers because of the removal of the plug, the concentration of ozone in that air would necessarily be lower than it would be when less air was passed through the ozonizers. This would seem to be a self-evident fact; but it is one which the inexperienced laboratory experts were incompetent to recognize. There are numerous other errors of fact and judgment, due to the inexperience of the men who at Lindsay there saw on ozone plant for the first time in their lives.

When Dr. Archibald tested the plant and found it efficient, the available working head was greater than it was during the Provincial Board's investigation; and this alone, without investigation, is sufficient to explain the difference in results obtained. The unfriendly animus of the report just issued is traceable on almost every page; but nowhere is it so salient as in the offensive suggestions on page 17, that "there must have been some other (than mechanical) reason for the difference in the results," and that the "problem might well be worth investigation by the Water Commissioners of Lindsay." The "difference in results" is due to difference in conditions—chiefly water level in the river, and the changes in apparatus necessitated by it. The report states (page 17) that "the mechanism for mixing the ozone and water and the sand filters were exactly the same then as now." This is not so. The aspirators had all been replaced by others of a different shape. Further, the valves which automatically regulated the supply of water to the sterilizers had been removed, the intention being to replace them when the new locks and dam are finished and the river allowed to rise to its normal level. The attitude of secrecy, suspicion and hostility adopted by the Provincial Board's representatives—under instructions, no doubt, from Toronto—was inevitably bound to lead to errors and misjudgments; but it is surprising that they should lead to covert charges like that quoted. This offensive innuendo is a gratuitous insult to the gentleman employed by Lindsay to make the test, which the Provincial Board itself at that time refused to make—a gentleman whose character and standing as a conscientious and skilful bacteriologist are too well known in Ontario to need defending here.

On December 9, 1909, I wrote to the Provincial Board of Health, to protest against the manner in which the investigation was being conducted, giving reasons therefor; and I demanded in the name of common fairness to be allowed to witness the tests. This reasonable request was refused, and I notified the Board that I should hold their report as of no value. This was half a year before it was published; and I find no justification in its pages for reversing my attitude concerning it. I have knowledge that nearly every citizen of Lindsay shares my distrust of this series of tests; and the increased use of the public water supply and the improved health of the town's people since the installation of the ozone plant are emphatic endorsements of the correctness

of the popular belief that Lindsay's water is now wholesome, thoroughly sanitary and as agreeable to the palate as it had previously been offensive.

As I intimated in my protest of December, I shall return to Lindsay, and, with the town's consent, institute a fresh series of tests, in which there will be no secrecy and no semi-asphyxiation of inexperienced operators.

J. HOWARD BRIDGE.

Philadelphia, Pa., June 1, 1910.

C. P. R. Extensions in the Northwest

According to an official programme of the Canadian Pacific Railway, 621 miles of new road are under construction this year, according to the following summary:

A large portion will be "colonization" lines—extensions of existing branches in recently settled sections. It is estimated that 346 miles of new road will be built in Saskatchewan, 45 in Alberta, 174 in British Columbia, and 56 in Manitoba. The new construction in Manitoba will include double-tracking the line from Winnipeg to Portage la Prairie (and eventually to Brandon), which will give a double track 518 miles from Portage la Prairie to Fort William, a section which has often been congested during grain movements.

The city of Guelph is laying a tar macadam roadway on Norfolk street by the flushing method, which has proved very successful in the past.

Dr. C. A. Hodgetts, Toronto, has been awarded a fellowship in the Royal Sanitary Institute of London, Eng., in recognition of his work for the Provincial Board of Health.

In a recent movement for good roads in Buckeye county, Arizona, one of the speakers made the following statement: "The relation of public roads to education has been largely overlooked. The long continued condition of the roads of a community reflect the degree of intelligence and enterprise of its people; the fertility of the soil and nearly every other matter pertaining to an agricultural district may be judged from the condition of the roads."

The town council of Berlin, Ont., are at present paving their principal thoroughfare, King street. They are also double tracking the street railway, which is a municipal-owned enterprise, using for the purpose 76-pound rails, laid on oak ties, with 6 inches of concrete underneath ties. The track allowance is paved with vitrified brick, bitulithic driveways at sides and concrete gutters. The Warren Bituminous Paving Company are the contractors.

The appointment by the Dominion Government of a Royal Commission on Industrial Training and Technical Education should be very gratifying to the building trades. The personnel of the commission is particularly strong and practical results are sure to be forthcoming. The Minister of Labor states that the commission will start work early in July by touring the Dominion, from the Atlantic to the Pacific, with a view to ascertaining the needs of employers and employees as regards industrial training. Afterwards, a thorough investigation will be made of the conditions that obtain in the United States and Europe.

A surface finish for concrete, whereby a sand coating is applied, may be secured by the following method, outlined by Mr. Albert Moyer, of the Vulcanite Portland Cement Company. Eiect forms of rough boards in courses of three feet or less and plaster the insides with wet clay, worked to a plastic consistency. While the clay is wet apply evenly loose buff, red or other colored sand, and then pour in the concrete. After removing the forms, wash off the clay with water and, if necessary, scrub lightly with a brush. The sand, Mr. Moyer states, will adhere to the concrete and give a surface of pleasing color and texture.

Toronto's Investigation of Subway Question

The information on the subway question gathered at New York by the Toronto delegation, may be stated briefly. New York built 25 miles of double-track subway for \$50,000,000. This included all stations, ballasting, and rails. The equipment cost \$25,000,000. Upon this investment the traffic has paid from the beginning. The city found the money for the work. It was carried out by the operating company, who afterwards leased the road for 50 years. They pay a rental of $3\frac{1}{8}$ per cent. of the cost, which represents the city's liability, and one per cent. additional to provide a sinking fund which will retire the bonds in 43 years. The company has a right to a renewal of agreement for a second period of 25 years. It is found that the average haul on the subways is five miles. The longest distance for five cents is 17 miles. The cost of carrying a passenger is $2\frac{1}{2}$ cents. In greater New York, covering 6,600,000 population, the number of car rides per inhabitant is just as many as in Toronto, where, on a basis of 350,000 population, the 98,000,000 passengers carried by the Toronto Railway Company last year figure out exactly at 280 rides per head.

A City Plan Commission

In the recent conference on city planning held at Rochester, N.Y., Mr. Frederick L. Ford, city engineer of Hartford, Conn., described the duties and performances of the Hartford commission, known as the Commission on City Planning, which has existed in that city for about three years. This commission consists of the mayor, the president of the board of street commissioners, the president of the board of park commissioners, superintendent of public parks, city engineer, one member of the board of aldermen and one of the common council and two citizens not holding any office under the city government; the last two serving two years, the term of one ending each year. The representatives of the aldermen and common council each serve for one year. This commission considers and reports upon "all questions concerning the location of any public building, esplanade, boulevard, parkway, street, highway, square or park," which must be referred to it by the common council before final action is taken. Council may refer to the commission the construction or carrying out of any public work which is not expressly within the province of some other board or commission of the city. The commission may prepare maps of the city or any portion of it, showing locations proposed for any new street or other highway, park, building, etc., which it may have under consideration, and may employ expert advice in making the maps and plans. The commission has retained Messrs. Carrere and Hastings, of New York, as expert advisers in planning future developments of the city.

Under the direction of this commission the Department of Engineering is now preparing topographical maps of the outlying sections of the city, preparatory to the laying out of streets over all undeveloped areas. The city intends to prepare a street plan for every undeveloped acre within the city limits, even where there may be no prospect of any development for two or three decades to come. The object will be to have the street plan in these harmonize with the existing streets, both as to alignment and width, these also being adjusted to anticipate so far as possible the uses to which the streets will be subjected. Like most cities, Hartford has suffered from the unwise division of areas in accordance with private aims at maximum profits rather than maximum public convenience. To avoid this an ordinance has been passed providing that "No street plotted or opened by any private person, firm or corporation shall hereafter be accepted by the court of common council until the petition for same, with plot or plan showing proposed location of such street or highway and its width, shall have been referred to and approved by the Commission on City Plan."

One of the most interesting sections of the charter amendment creating this commission is the one providing that the city "acting through said commission, or otherwise, shall have power to appropriate, enter upon and hold in fee real estate within its corporate limits for establishing esplanades, boulevards, parkways, park grounds, streets, highways, squares, sites for public buildings, and reservations in and about and along and leading to any or all of the same; and, after the establishment, layout and completion of such improvements, may convey any real estate thus acquired and not necessary for such improvements, with or without reservations concerning the future use and occupation of such real estate so as to protect such public works and improvements and their environs, and to preserve the view, appearance, light, air and usefulness of such public works."

Annual Conventions

June 6-8—Canadian Electrical Association, at the Royal Muskoka Hotel, Muskoka, Ont. (Secretary, T. S. Young, Toronto.)

June 21-24—American Society of Civil Engineers, at Chicago. (Secretary, C. W. Hunt, New York City.)

August 24-27—Royal Architectural Institute of Canada, at Winnipeg, Man. (Secretary, Alcide Chausse, Montreal.)

June 28-July 2—American Society for Testing Materials, at Atlantic City, N.J. (Secretary, E. Marburg, Philadelphia, Pa.)

Fire-Resisting Paints for Interior Woodwork

In discussing the question as to what sort of a paint is best adapted for use upon interior woodwork in order to render it as fire-resisting as possible, the "Painters' Magazine" presents the following: Experience has shown that paints consisting mainly of linseed oil, driers and pigment are not fire-resisting, let alone fireproof. However, repeated coatings of water glass (silicate of soda) will serve the purpose. Apply to the wood three coats of silicate of soda 33 deg. Beaume, and before the last coat has set hard, apply a thin lime wash, which unites with the silicate of soda, forming silicate of lime, which is an insoluble substance.

Another fire-resisting paint is made as follows: Eighty pounds powdered silex, 40 pounds bolted china clay, and 20 pounds air-slacked lime are mixed intimately with 60 pounds liquid silicate of soda, 33 deg. Beaume, and then thinned to painting consistency. It may be colored with any earth color, such as ochre, umber, sienna or red oxide, but not with chemical colors. Two coats are necessary. If the paint is to be pure white, add in place of any color sufficient dry zinc white, using additional silicate of soda in the first mixing.

The disastrous effect of delay in finishing work on the part of a contractor was shown recently. The case was one in which the contractor undertook to lay concrete foundation for pavement, to be completed by September 22. The work was not completed until sometime later, however, running the work into the winter, when some of the concrete froze and was rejected as defective. The court did not hold the city liable for payment of this work, even though the city inspectors were on the job and allowed the concrete to be put in.

The Eastern Canadian Steel & Iron Works, Limited, will shortly start operations at Quebec, Que. The company has secured a large tract of land at St. Malo on the line of the C.P.R., and is about to commence the erection of workshops and other buildings. The president of the concern is Mr. Rodolphe Forget, M.P., and the secretary-treasurer, Mr. J. T. Donohue, Montreal.

To Estimate Brickwork

Some practical hints apropos of the above subject are given by the "American Carpenter and Builder" in response to a query received from a correspondent, who writes:

"I would like to know how many bricks per lineal foot (or foot measure) it will take for a 9-inch wall, 13-inch wall, 18-inch wall, 22 and 26-inch wall, using 8½-inch and 9-inch bricks; also the width of the different footings. In superficial measure I have been allowing 7½ bricks for each 4 inches of wall (width of one brick), but have been told that 6 bricks is plenty, using 9-inch brick (or 8¾). Of course, I allow 5 per cent. for breakage, etc."

Answer: There is scarcely any other material used in building about which so many ideas and customs of measuring and estimating prevail as in brickwork, and it is very difficult, if not impossible, to give a rule to fit all localities. The writer has before him a list of nine leading standard makes of American bricks and one well known imported firebrick, and no two sizes are alike. Your rule of allowing 7½ bricks for each superficial foot of wall one brick (4 inches) in thickness is pretty general in all districts where the eastern standard brick is in use (about 8 or 8¾ by 4 by 2¼ inches). But the trouble is that no two brickmakers seem to turn out bricks exactly alike, and thus it may be that with bricks from certain kilns 6 bricks would be sufficient.

Another plan is to cube your walling and estimate 21 bricks per cubic foot, which is a fairly safe method for bricks of the size mentioned above. It is often usual, however, on large jobs of brickwork, for the builder to specify a minimum size for the bricks, so as to guard against losses from estimating that a certain number will build so much walling. Allowance must also be made for the size of joints, which may vary from ⅛-inch for pressed brick up to ½ or even ⅝-inch for common brick. A wall with ⅝-inch joints will take 12 or 15 per cent. less bricks than one with ⅛-inch joints.

The following table of the number of bricks per lineal foot for brick footings with offsets of 2 inches to each course, is in pretty general use, and is fairly reliable, although subject, of course, to the variations noted above, caused by bricks of different localities varying in size:

9-inch wall, footing 2 courses,	10½
13-inch wall, footing 3 courses,	22½
18-inch wall, footing 4 courses,	39
22-inch wall, footing 5 courses,	60
26-inch wall, footing 6 courses,	85½

In Great Britain and some of her colonies which have formally adopted the British system of quantity surveying whereby the quantities of all materials are "taken off," "abstracted" and "billed" from the architect's drawings and specifications by clerks who make a specialty of this work, all brickwork is reduced to rods of 16½ feet by 16½ feet of 1½ bricks in thickness. With the standard English brick of 8¾ inches long by 2¼ inches thick, with ¼-inch joints, this gives 16 bricks for every superficial foot of "reduced brickwork," as it is termed, and forms an excellent basis for estimating prices.

A civil engineer of Vienna, Arthur Schymanski, has invented a novel street cleaning machine, which does not raise the dust and simplifies the work of keeping the streets clean. It consists of an automobile with a revolving brush which sweeps up the dust and throws it into a large funnel, from which it is sucked up by a ventilator and deposited in large metal boxes. The dust is neither left on the street to be collected later, nor can the wind distribute it. The boxes can be removed when full and can be replaced by empty ones. The wagon is driven by a 28-32 horse-power motor, and can sweep at the rate of 11 miles an hour. Simple contrivances permit the removal of the filled boxes and the insertion of the empty cans.

From the Federal Capital

The work of constructing the drainage system in the western section of the city will probably be held up for months through a legal technicality. The city engineer's department had just finished the plans and was preparing to start operations when the city solicitor advised that it would be necessary to secure a special Act of the Legislature fixing the assessment on the property benefited by the improvement, before the work could be proceeded with.

Gangs of men are now at work on most of the toll roads in the Ottawa district making extensive improvements. Many of those thoroughfares were condemned by the provincial authorities and the companies controlling them were ordered to improve them before collecting tolls again.

Members of the Board of Control propose that the minimum wage for corporation laborers should be 21 cents an hour instead of slightly over 19 cents an hour as heretofore. City Engineer Ker says that this will mean an increased expenditure on civic works of over \$22,000 a year. The matter is still under consideration.

Cutting Prices—A Contractor's Soliloquy

(With Apologies to "Hamlet")

To cut or not to cut. That is the question.
Whether it is not better in the end
To let the chap who knows not the worth
Have the business at cut-throat prices, or
To take up arms against his competition,
And by opposing cut for cut, end it.
To cut—and by cutting put the other cutter
Out of business—'tis a consummation
Devoutly to be wished. To cut—to slash
Perchance myself to get it in the neck—
Aye—there's the rub; for when one starts to meet
The other fellow's prices, 'tis like as not
He's up against it good and hard,
To cut and to slash is not to end the confusion
And the many evils the trade is pestered with:
Nay, nay, Pauline; 'tis but the forerunner
Of debt and mortgage such a course portends.
'Tis well to get the prices the goods are worth
And not be bluffed into selling them for what
So-and-so will sell his goods for.
Price cutting doth appear unseemly
And fit only for the man who knows not
What his goods are worth, and who, ere long,
By stress of making vain comparison
'Twixt bank account and liabilities,
Will make his exit from the business.—Anon.

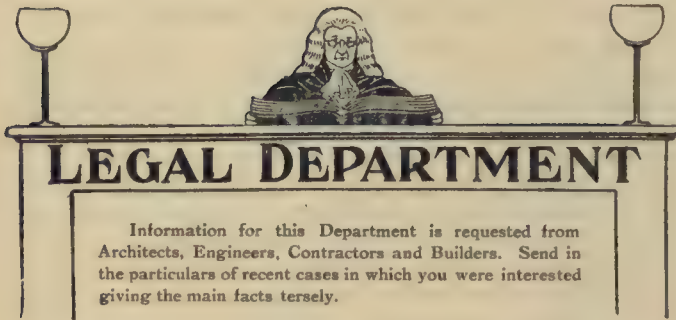
Chimney Draught

In order to have a good draught, a chimney ought to satisfy the following conditions.

The section of the chimney ought not to be larger than is necessary to allow an exit for the products of combustion; otherwise ascending and descending currents are produced in the chimney, which cause it to smoke. It is advantageous to place on the top of the chimney a conical pot narrower than the chimney, so that the smoke may escape with sufficient velocity to resist the action of the wind.

The chimney ought to be sufficiently high; for, as the draught is caused by the excess of the external over the internal pressure, this excess is greater in proportion as the column of heated air is longer.

Carleton county, N.B., has formed a Good Roads Association, of which Mr. Jas. Carr is president, Mr. A. Plummer, vice-president, and Mr. Henry Phillips (Woodstock, N.B.), secretary.



Information for this Department is requested from Architects, Engineers, Contractors and Builders. Send in the particulars of recent cases in which you were interested giving the main facts tersely.

Negligence of Municipal Corporations—In the action, *Joncas v. City of Ottawa*, the plaintiff sued to recover damages for injuries sustained by falling on a slippery sidewalk, the ice from which should have been removed by the defendants. No contributory negligence on the part of plaintiff could be found. Consequently it was held that he was entitled to recover \$600 with costs.

Damages for Actions Threatened and Liens—Small v. Claffin; Court of Appeal. This was an appeal by defendants from a judgment awarded plaintiff of \$8,750 to be paid by defendants as damages for breach of contract. Plaintiff brought action to recover \$15,000 damages, alleged to have been caused plaintiff by reason of actions threatened and liens put upon his property in Hamilton, the Grand Opera House, which had been erected by defendants for him, at an agreed price of \$25,000, and which liens plaintiff had to pay. At the first trial judgment was given for the plaintiff for \$8,750 and costs, and the Divisional Court dismissed defendants' appeal therefrom. The Court of Appeal reversed these judgments and entered judgment for defendants for \$950 on a counterclaim with costs throughout.

Recovery for Work Done Under Verbal Agreement—Campbell v. Community General Hospital; Divisional Court of Ontario. Plaintiffs drilled a well for water, on a farm owned by defendants. Defendants contended that plaintiffs agreed to find water in three or four days, or to get no other pay than board for men and fuel for engine. The jury found this was not a condition and that the agreement was as stated by plaintiffs. Plaintiffs claimed \$308 for drilling and \$6 for pipe supplied. It was held at the first trial that the contract was not valid and binding upon defendants, as it was beyond the scope of the authority of Sister Demers, the procurator-general, who had entered into the contract, and it not being in writing and under the corporate seal of defendants, the action should be dismissed, without costs. The Divisional court reversed this decision and entered judgment for plaintiffs for \$308 and costs.

Liability for Cost of Plans—Chappell Bros. & Company, Limited, v. City of Sydney, N.S.; Supreme Court of Nova Scotia. The library committee appointed by the city proceeded without special authority to call for plans and specifications for a new library building, for the erection of which Mr. Carnegie had offered \$15,000. Chappell Bros. submitted plans which were accepted, and according to which tenders were called. Chappell Bros., who are also building contractors, submitted a bid. The bid, however, was not accepted, or at least was not acted upon, as the building has not been erected. After this the library committee reported on the matter to the city council, which approved the transaction. The court held that the city was liable for a reasonable amount for the plans furnished on implied contract with the committee. The amount sued for was \$426. Judgment was given for \$250. (It is interesting to note that in an appeal brought subsequently by the city judgment was again given for Chappell Bros., the amount of whose recovery was fixed at the amount claimed originally, namely, \$426.)

Injury to Workman; Damages—In the action, *Christie v. Richardson*, the defendant Richardson was the contractor for the carpentry work and the defendant, Webb, the contractor for the brick work on a schoolhouse which was being erected in the neighborhood of Toronto. The plaintiff was a bricklayer in the employment of the defendant Webb. Plaintiff claimed a breach of duty on the part of Webb in neglecting to provide a safe gangway for the men to pass to and from their work in the building; he also alleged the right to recover from Richardson on the ground of interference by the latter with the gangway which contributed to its unsafe condition. Plaintiff was walking up the gangway when the structure collapsed and he was precipitated into the basement sustaining severe injuries. This gangway was constructed of three planks, two of them laid side by side with a small space between them, and the third laid on the top of these two, with its centre over the space, and, as constructed, it was admittedly safe. On the day before the accident, the carpenters had occasion to take into the building some heavy mullions, and in order to enable them to do this it was necessary to widen the gangway, and that was done. The taking in of the mullions was completed shortly before five o'clock in the afternoon of the same day, and the addition that had been made to the gangway was left there when the workmen stopped work for the day, and the plaintiff made use of it in leaving when his day's work was done. The court held that there was nothing to indicate to the plaintiff that the addition was not intended to be used as part of the gangway, and it was the duty of Leitch (Webb's foreman) to see that it might be safely used in its altered state, which could have been readily ascertained by an inspection of it. If it had been inspected the accident would not have happened. That the accident was caused by his negligence in performance of the duty with which he was entrusted by the defendant, Webb, of seeing that the ways, etc., were proper: That the plaintiff was not guilty of contributory negligence, and that he was entitled to judgment against defendant Webb for \$800, the damages assessed by the jury, with costs. The action against the defendant Richardson was dismissed, without costs.

Recovery for Work Done Under Instructions from Government Engineer—E. A. Wallberg v. the King; Dominion Exchequer Court. An appeal from previous action in which plaintiff was awarded \$53,205.62. The action was instituted by Wallberg to recover payment for certain works in connection with the Intercolonial Railway at Morcton. He contracted with the Intercolonial Railway for the erection of buildings costing \$1,000,000. In the preparation of plans for these buildings no provision was made for drainage or water connection. Mr. McKenzie, Chief Engineer of the Intercolonial Railway, who was entrusted by the Government with the supervision of the work, directed Wallberg to carry out the necessary works for water supply, undertaking that the Government should pay him the actual cost of the works and an additional sum of 15 per cent. contractor's profit. No written contract was made. On the completion of the works the contractor had to apply to the Government for payment. The Government agreed to pay him, but considered the amount claimed excessive and directed a reference to the Exchequer Court to ascertain the amount properly due. The trial was proceeded with and the plaintiff was allowed the sum of \$53,205, without interest. The court held that the registrar had not adopted the correct method of dealing with the case. They had proceeded as if the market value of the work had to be ascertained and concluded that the works could have been carried out for less money if a different plan of construction had been adopted. This, however, was unfair to the contractor and the case must be viewed from the standpoint of how much the work was worth according to Mr. McKenzie's plans. Possible incompetency of the engineer could not be argued against the con-

tractor. The court used the following argument: "Now, suppose I instruct a contractor to build me a house of ordinary size, say rentable at about \$400 per annum. A brick wall of the thickness of $1\frac{1}{2}$ bricks would be sufficient for all practicable purposes. There is no written contract. I have a whim that I would like a wall about three feet thick, and I tell the contractor to so build the house. The contractor follows my instructions and gets paid on a 'quantum meruit.' The extra thickness of wall would have little or no effect on the market price, but is not the contractor to be paid for the work?" Judgment was entered for the contractor for the full amount of the cost of the work plus 15 per cent. profit. He was also allowed the costs of the appeal.

Personal Mention

Mr. E. Gardiner, engineer of Grantham township, Ont., has resigned.

Mr. A. W. Ross, Brantford, Ont., has obtained a position as engineer with the Dominion Bridge Company, Montreal.

Mr. J. Hutcheon, city engineer of Guelph, left recently for the west, where for the next three months he will be engaged on Government survey work on Grand Hog river, west of Carhart.

Mr. C. H. Power, of Messrs. Chipman & Power, consulting engineers, Toronto, returned recently from an extended trip through western Canada, undertaken in the interests of his firm.

The report of the appointment of Mr. J. P. Forde as supervising engineer on the construction of the C. N. R. in British Columbia is contradicted. The post was still open at our last hearing.

Mr. R. E. W. Hagarty, Toronto, secretary of the Canadian Cement and Concrete Association, who recently returned from abroad, has become identified with the Trussed Concrete Steel Company, at Detroit, Mich.

Mr. Dosithe Chene has been appointed city engineer of Hull, Que., vice Mr. Farley, resigned. The salary is stated to be \$125 a month. Mr. Chene, like Mr. Farley, is a native of Hull. He graduated quite recently from Laval University.

Mr. Thos. Catterall, of Victoria, B.C., well known in contracting circles in that city, has left Canada for a five months' trip to England and the Continent. Mr. Catterall has earned his holiday by 43 years of continuous work. He has not been in England for 40 years.

Mr. A. O. Powell, who was called in by the city of New Westminster, B.C., to settle a dispute between the city and Herman & Burwell, the engineers who supervised the Coquitlam pipe line, has recommended that the engineers be paid \$4,660 for their services, about half the amount asked for by that firm.

Mr. V. W. Forneret has been appointed superintending engineer of the St. Lawrence ship canal, vice Mr. F. W. Cowie, who has succeeded to the post of chief engineer of the Montreal Harbor. Mr. Forneret was Mr. Cowie's assistant for many years. He graduated from McGill University in 1887, and is a member of the Canadian Society of Civil Engineers.

Mr. Thos. S. Scott, formerly assistant city engineer of Toronto, has been appointed president and general manager of the Bitulithic Pavement Company, of Vancouver. Some interesting tales are heard in connection with Mr. Scott. It is stated that while he was with the G.T.R. as foreman on construction work he changed $9\frac{1}{2}$ miles of track in ten hours with one gang of men working in one direction. This is said to have created a record for North America and incidentally

to have made a particular impression upon General Manager McGuigan.

Mr. A. P. Gillies, of the engineering firm of F. N. Andrews & Company, New York, was in Toronto last week making preliminary arrangements with a view to placing before the City Council a proposition to build a large terminal station. Mr. Gillies will ask the City Council for a franchise. The estimated cost of the work he proposes to carry out is \$25,000,000.

Mr. F. A. Acland, Deputy Minister of Labor, left Ottawa last week for Regina, Sask., to investigate a strike of the building trades in that city, which affects some 400 men. At the time of Mr. Acland's departure the strike had been in progress for three weeks. One of the most important Government works tied up in consequence thereof are the new Parliament Buildings of Saskatchewan.

The resignation is announced of Mr. R. W. Farley, city engineer of Hull, Que., Mr. Farley is 49 years of age. He was first appointed to the city engineership of Hull in 1898. He resigned in 1902 to take up private practice. From this time until 1908 he devoted his attention to municipal engineering problems, making a specialty of waterworks and sewerage construction. He was again appointed city engineer in May, 1908. Mr. Farley is a member of the Canadian Society of Civil Engineers. He will continue to act as city engineer until his successor has become familiar with the work now in progress. It is understood that he contemplates returning to private practice, which he finds more remunerative.

Notes and Comments

The union carpenters at Fort William and Port Arthur, Ont., are endeavoring to obtain a new schedule.

Toronto's building permits for the first five months of 1910 totalled \$7,518,098, an increase of \$690,268 over the corresponding period of last year.

Building permits issued at Saskatoon, Sask., since the first of the year, totalled one and a half millions. The figures for the month of May were \$856,000.

The Hunter Bridge & Boiler Company, of Kincardine, Ont., manufacturers of bridges, boilers, steel water towers and stand pipes, have recently completed a large addition to their plant. The new wing is 176 x 76 feet, of reinforced concrete and brick, which, with additions of new machinery, greatly increases the capacity of the factory.

The J. I. Case Threshing Machine Company, Inc., have favored us with a copy of an informative, well illustrated catalogue relating to the "Case" steam road roller. The strong claims made for this machine in the past are fortified by the evidence in proof contained in this booklet. The contents thereof will be worth the careful study of all who are interested in improved streets and highways.

The general feeling of the people of Lindsay, Ont., at the condemnation of their ozone plant by the Provincial Board of Health may be gauged from a recent dispatch containing the following extract: "The town will ignore absolutely the adverse report of the Provincial Board of Health. Furthermore, if the Board tries to close down the plant, the town will fight the attempt through all the courts in the land."

A petition was recently presented to the Dominion Parliament at Ottawa by the Stonecutters' Union of Vancouver and the Manitoba Union, asking for the better protection of the stonecutting industry. The memorial of the Manitoba stonecutters set forth that the duty on articles consumed by them had gone up 30 to 35 per cent., and the duty on cut stone was only 20 per cent., the result being that men were walking the streets out of employment while immense quantities of cut stone were being imported from the United States.

Canadian City Engineers

Joachim Antonisen, Port Arthur, Ont.

Christiana, the capital of Norway, is the native city of Mr. Joachim Antonisen, city engineer of Port Arthur, Ont., who was born there on February 24, 1869. The Scandinavian people are known to possess good educational systems, and the future city engineer had all the advantages of a thorough training from his youth up. For three years he attended school at Christiana and for nine years at Bergen. He graduated from the Latin High School in Bergen in 1887, and matriculated at the University of Christiana with a view to studying medicine. It was not long, however, before he discovered that his natural bent was far removed from the sphere of medical work. He was always intensely practical and in short order he decided to come to the United States. Before leaving his native country Mr. Antonisen deemed it advisable to learn the rudiments of a trade, and he entered a large machine shop as an apprentice. For a year, also, he attended a technical institute as well as a carpentry school. Having applied himself diligently during this period



City Engineer Antonisen, Port Arthur, Ont.

it was not without confidence that, in 1888, he left for San Francisco. In that city he obtained employment in several machine shops and rolling mills, and later held a position as stationary engineer for about three years.

Mr. Antonisen then went east to Kansas and worked for a year on the Kansas river under an engineer from whom he learned the first principles of surveying and engineering for the development of a water power. He next went to Ohio, where he had charge of the preliminary surveys and construction of an electric street railway between Akron and Cuyahoga Falls. From there, in 1892, the year of the World's Fair, he went to Chicago, where he obtained employment with the city surveyor, who was also of Norwegian birth. At Chicago he obtained a position as assistant to a civil engineer who had charge of the development of a water power on the Kankakee river at Wilmington, Ill. Later he went on to Keokuk, Iowa, in the service of the same engineer and made preliminary surveys for the development of a water power on the Mississippi river at Des Moines Rapids. Owing to lack of the necessary capital, the company which was making these surveys was unable to proceed with the actual work at that time. (It may be of interest to men-

tion that a company has been organized recently to undertake the construction of a hydro-electric plant at Keokuk, capable of developing 200,000 h.p.)

After six years' practical experience in the United States, Mr. Antonisen returned to Norway and for about six months studied mathematics at Bergen. He then entered the Polytechnic University at Dresden, Saxony, where he took a four years' engineering course, making a specialty of hydraulics and municipal engineering. During his vacations from the University Mr. Antonisen obtained further valuable experience in the practice of civil engineering. Leaving Dresden University in 1898, he entered the service of the Government railways as field engineer, in which capacity he had charge of a considerable amount of responsible construction, including roadbeds, track laying and several bridges. After two years' experience in railroad engineering he became associated with the government department of river improvement and road building at Leipzig, Saxony, where he remained for four years. Mr. Antonisen considers that during this period he obtained his most beneficial experience. The city of Leipzig had requested the Saxon Government to have its engineers design a plan for the regulation of the rivers in and around the city to prevent the annual flooding of the lower parts of Leipzig. Mr. Antonisen had the good fortune to be employed on this work, which entailed a thorough study of hydraulic principles in regard to the flow of water in river channels, discharge over weirs and effect of high and low water on the operation of mills, of which there were ten or twelve in and around the city. A most thorough investigation was made and the report prepared subsequently by the engineers called for an expenditure of about \$2,000,000. While at Leipzig, Mr. Antonisen was elected an associate member of the Saxon Society of Civil Engineers, an institution very similar to our Canadian society.

In February, 1905, Mr. Antonisen secured a position with the C.P.R. and left for Winnipeg, Man., where he was appointed resident engineer and placed in charge of terminals under the divisional engineer, Mr. Schwitzer. In April, 1906, he obtained the post of town engineer of Port Arthur. At the time of Mr. Antonisen's appointment the town had just started a large amount of municipal improvement and during the four years that he has held office Mr. Antonisen's duties have been of a varied and interesting character, including charge of all work in connection with streets, such as grading, pavements, sidewalks, bridges, waterworks and sewer construction and operation, water power development and electric railway construction.

A month or so ago Mr. Antonisen was appointed Utility Manager of Port Arthur. The duties of this position are defined as follows:

To supervise and control (1) Water and sewer construction; (2) Public works department, including construction, maintenance and service; (3) Water and electrical power construction, maintenance and service; (4) Electric light and telephone construction, maintenance and service; (5) Construction, extension, maintenance and operation of electric street railway; (6) Purchasing, stock-keeping and issuing of all supplies required for various departments, but all purchases exceeding \$50 to be by tender and all such tenders to be first opened up and accepted by the council of the city of Port Arthur, etc.

Mr. Antonisen is an associate member of the Canadian Society of Civil Engineers and also a charter member of the American Society of Engineering-Contractors. During his regime the city has progressed in a manner that is distinctly creditable to all connected with its development. Mr. Antonisen is enthusiastic about his work, but thinks that a course as city engineer should be an eminent qualification for the diplomatic service of any country.

It is of interest to note that while he was in Germany



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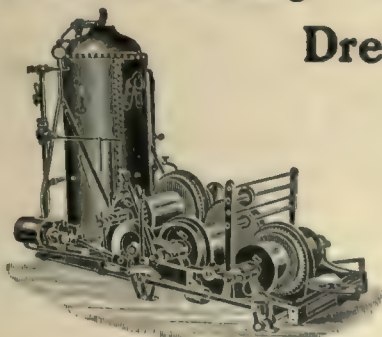
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Mr. Antonisen married an American girl from Brooklyn. There is reported to be a little Antonisen, five years old, who already aspires to follow his father's profession.

The Late Napoleon Tessier

It is with much regret that we have to announce the death of Mr. Napoleon Tessier, Secretary of the Public Works Department, Ottawa. The late Mr. Tessier occupied the position rather less than two years, having succeeded to it in September, 1908. Death resulted after two weeks' illness from typhoid. Mr. Tessier was born at St. Cesaire, Que., in December, 1870. After a course at the St. Cesaire business college he entered the classical college of St. Laurent, from which, in 1893, he graduated in arts, taking medals also for philosophy and chemistry. In 1893 he was admitted to the



The Late Napoleon Tessier, Secretary Department of Public Works, Ottawa.

bar. The degree of LL.B. was conferred upon him in 1897 by Laval University. For five years he practised law with much success at Marieville, Que.

The Passing of Old Style Macadam

In our issue of May 4th, we published an article, "A New Mixture for Prevention of Dust," which reflected upon the use of tar in road work. We have since received an interesting communication from which the following extracts are taken:

"MacAdam's science has had its day. The principles of this famous Scotch engineer have been faithfully followed for some 60 years, but the coming of the automobile has brought the period to a close. MacAdam's roads have been thoroughly satisfactory for MacAdam's traffic; but he did not build surfaces that were calculated to stand the powerful shearing action of automobile wheels.

"The modern engineer builds his roads with tarvia—a coal tar product, which gives to his surface an element of plasticity. Tarvia is a dense pitchy substance of considerable adhesive power. When it is poured over the macadam and allowed to soak in, it fills the voids and hardens into a tough elastic matrix, from which the stone particles do not come loose. The thrust of automobile wheels on this surface does not make it crumble or pulverize.

"The tarvia applications vary according to the conditions of the road, and the thoroughness with which the surface needs to be protected against automobile wear. Many roads are now being built using tarvia from the foundation up to the top. A very dense kind of tarvia, known as Tarvia X, is used. It is poured over the stones until every stone is thoroughly coated with it, and the voids are well filled. Then the smaller crushed stone of the upper course is spread and rolled into the tarviated bed. The finished surface is a mosaic—a kind of tarvia-concrete, smooth and waterproof.

"Tarvia can also be applied to roads that are built in the old way, although the application, being confined to the surface, is naturally less thorough. The kind of tarvia known technically as Tarvia A, is painted over the road after it has been carefully swept, to clean away surface dust and debris. The tarvia soaks into the macadam while it is hot, and then cools, making a tough, firm matrix for the stone."

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope, and stating number of enquiry:

736. Metal ceilings—A South African firm desires to be placed in touch with Canadian shippers of metal ceilings. Quotations to be f.o.b. Montreal and St. John; ocean freight rates to Durban and Delagoa Bay.

737. Roofing—A South African firm desires to be placed in touch with Canadian shippers of prepared roofing. Quotations to be f.o.b. Montreal and St. John; ocean freight rates to Durban and Delagoa Bay.

738. Damp-course—A South African firm of timber merchants desire to be placed in touch with Canadian shippers of damp-course. Quotations to be f.o.b. Montreal and St. John; ocean freight rates to Durban and Delagoa Bay.

739. Ventilator—A South African firm desires to be placed in touch with Canadian shippers of wrought steel louvre 6-inch x 9-inch ventilators. Quotations f.o.b. Montreal and St. John; freight rates to Durban.

750. Window frames—A Manchester firm asks for dimensions and price of window frames from Canadian manufacturers of same.

754. Agency abroad—A Liverpool firm desires to correspond with Canadian manufacturers of closet seats for the purpose of acting as sole agent in Great Britain.

777. Expanded metal lath—A large South African firm of hardware merchants desire to be placed in touch with Canadian exporters of expanded metal lath. Ocean freight rates to East London and Durban.

805. Agents—A firm in the north of England manufacturing brick machinery, mortar mills, etc., wish to appoint Canadian representatives.

845. Agents—A Midlands company manufacturing red roofing tiles wish to obtain suitable Canadian resident agents.

Mr. Albert T. Corpe, a well known contracting painter, of London, Ont., died last week.

Mr. John Stoughton, who superintended the construction of the famous Victoria Bridge over the St. Lawrence river at Montreal, died at Detroit last week at the age of 67 years. Mr. Stoughton was erection superintendent for the Dominion Bridge Company, Walkerville, Ont. He was about to retire and had just purchased a large farm.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brandon, Man.

Tenders addressed to W. Bowling, chairman of waterworks, will be received until June 17th for the construction of a filter building at the pumping station. Plans, etc., at office of the city clerk.

London, Ont.

Tenders are invited for \$357,882 artesian well system, waterworks and Niagara power debentures.

Ladner, B.C.

Tenders addressed to N. A. McDermid, C.M.C., will be received until June 17th for the following material and work: Electric pumping engine, 350 gallons per minute; wire-wound wood pipe, about 50 miles; valves, hydrants and special castings; hauling and laying pipes, etc. Plans, etc., at office of T. H. Tracey, consulting engineer.

Montreal, Que.

The city council have accepted the reports of the Board of Control and have voted \$499,800 for sidewalk and \$788,958 for street pavements. Successful tenderers previously mentioned.

Medicine Hat, Alta.

It is stated that terra cotta sewers are to be constructed at a cost of \$35,000 by day labor, and also about \$35,000 worth of paving is to be done by the city, mostly concrete sidewalks. A. K. Grimmer, city engineer.

Nanaimo, B.C.

Tenders are being called until June 24th for excavation and laying only of vitrified sewer pipes, with outfalls in harbor, etc. For further information see advertisement in "Tenders and For Sale Department" of this issue.

The bylaw to raise \$25,000 for the purpose of extending the outlet of South Forks pipe will be submitted shortly.

North Vancouver, B.C.

City Engineer Hanes was instructed by the council to go ahead with plans for the installation of the first units of the sewerage system in the city and to submit them to the government for approval.

Oakville, Ont.

This municipality have authorized T. A. Murray to prepare plans for sewerage disposal.

Regina, Sask.

The city council recommended that the construction of the north portion of the trunk sewer be undertaken by the engineering department. A. L. McPherson, consulting engineer, estimated the work at \$187,000. The tenders submitted were as follows: Parsons Construction Company, total amount, \$271,466.10; Parsons Construction Company, Meriwether Construction, \$226,657.91; Wm. Newman & Company, \$250,481.70; Wm. Newman & Company, Meriwether Construction, \$261,451.15; A. C. Stewart & Company, Winnipeg, \$239,638.65; Wm. Hurst, Winnipeg, \$208,463.14. Estimated total cost of work by

figures to date for cement and reinforcement. Monolithic Construction—Construction contract, Wm. Hurst, \$208,463.14; Cement, 11,500 barrels, \$31,050; reinforcement, \$12,300; junctions, \$536.64; total, \$252,349.78. Meriwether Construction—construction contract, Wm. Hurst, \$208,463.14; cement, 7,750 barrels, \$20,925; reinforcement, \$17,220; junctions, \$536.64; total, \$247,144.78.

St. Thomas, Ont.

Board of Water Commissioners decided to ask council to issue debentures for \$40,000 to cover proposed extensions.

Stratcona, Alta.

Tenders were called by this municipality for street paving until June 14th. A. J. McLean, city engineer.

St. John, N.B.

Tenders will be called shortly for the balance of paving work to be done next year.

Smiths Falls, Ont.

This municipality is calling for \$16,000 waterworks debentures, 30-year, 5 per cent. Also local improvements debentures. J. A. Lewis, town clerk.

St. Catharines, Ont.

The council have decided to have the sidewalks and curbs this year laid by day work, and the city will buy a cement mixer.

Tofield, Man.

The bylaw to spend \$4,000 on preliminary work for waterworks, and \$3,500 on sidewalks, was carried.

Vancouver, B.C.

Tenders addressed to Wm. McQueen, city clerk, will be received until June 29th for lining the Little Mountain Reservoir. Plans, etc., at office of Messrs. Hermon & Burwell, engineers, 423 Hamilton street, or at the waterworks office.

The contract will be one of considerable magnitude as the reservoir has a capacity of 21,000,000 gallons. Its size is 350 by 450 feet about the rim, the sides sloping to a bottom, the perpendicular depth being 25 feet, 270 by 450 feet in dimension.

Walkerville, Ont.

Owen McKay, township engineer, will receive tenders until June 17th for dredging Little River Drain. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Wingham, Ont.

J. T. Jones, town clerk, will receive tenders until June 21st for the construction of sewers and sewage disposal work. Davis & Johnson, Berlin, engineers. For further particulars see "Tenders and For Sale Department" of this issue.

Winnipeg, Man.

Tenders are being called by the Board of Control until June 16th for supply of quantity of sewer pipe and junctions. Specifications, etc., at office of City Engineer.

M. Peterson, secretary, Board of Control. Also for supply of from 25,000 to 30,000 barrels of cement, to be delivered, f.o.b. city yards.

The board of control has been instructed to purchase a Linkbelt asphalt mixer for use in laying asphalt macadam pavements: estimated cost, \$8,000.

The Board of Control are calling for tenders until June 16th for construction of the following: sewers, granolithic walk, cedar block pavement, asphalt pavement, creosote block pavement, water main. M. Peterson, secretary.

AWARDED.

Burnaby, B.C.

The Brouse-Mitchell Co., of Vancouver, has secured the contract to construct waterworks for this town.

Crystal City, Man.

The contract for granolithic pavement has been let to A. E. Dobson, of Manitou.

Finch, Ont.

D. G. McMillan, of Finch, was given the contract for the construction of the Johnston drain at the following prices: Earth, 17 15 16 cents per cubic yard; hard pan, 90 cents; rock, \$2; reinforced concrete culverts, \$13.69 a cubic yard.

Fort William, Ont.

Tenders on sewers were received as follows: Atlo & Jacobson, 10 and 12, \$13,297; E. S. Rutledge, 10 and 11, \$51,685, 10 and 12, \$12,886, 10 and 13, \$18,298, 14, \$4,675; T. McCallum, 14, \$3,900; Stewart & Hewitson, 10 and 11, \$51,750; Stewardson Bros., 10 and 11, \$60,761, 10 and 12, \$12,759, 10 and 13, \$16,280, 14, \$1,700; Laidlaw & Grant, 10 and 11, \$54,000; C. Donati, 10 and 12, \$12,900; A. Cameron, 10 and 11, \$64,145, 10 and 13, \$29,681, 10 and 13, \$23,525, 14, \$4,529; H. Murphy, 10 and 11, \$62,000, 10 and 12, \$17,000, 10 and 13, \$27,550, 14, \$5,200; J. J. Flanagan, 10 and 11, \$51,000, 10 and 12, \$13,750, 10 and 13, \$22,500, 14, \$4,000; H. S. Hancock, 10 and 11, \$49,500, 10 and 12, \$13,140, 10 and 13, \$18,951, 14, \$4,315. T. McCallum was awarded the contract for sewer, 10—14 at \$3,900. Stewardson Bros. were awarded the contract for sewer 10—13 at \$16,280, and contract for sewer 10—12 at \$12,759. The work on Francis street sewer was awarded to engineer at his tender, \$49,500.

Hull, Que.

Messrs. Carriere & Wilson have been awarded the contract for the construction of the new sewer on Champlain avenue for \$2,850; other tenderers, Malette & Lambert, \$3,403; Jas. Thomas, \$2,248. E. Thomas, this city, was given the contract for the construction of new concrete sidewalks at 19 1/2 cents per square foot.

Kingston, Ont.

The British American Oil Company were given the contract of this city for road oil at 5 cents a gallon, in barrels, f.o.b. Toronto.

London, Ont.

The tender of the Barber Asphalt Company for a pavement on Ridout street, from King to York, for \$3,792, was accepted.

Lethbridge, Alta.

The city council has awarded a contract to the Forest City Paving Company for 27,000 square yards of cement.

Nanaimo, B.C.

The contract for constructing eight miles of concrete walks was given to W. H. Worswick, of Victoria. Prices noted in last issue.

Ottawa, Ont.

The council accepted the recommendation of the Board of Control for award of contract for pavement on Bank and St. Patrick streets. Noted in last issue.

The following tenders were received for the supplying of ten flexible cast iron joints as per plans and specifications, in connection with the new intake pipe: Gordon Law, Ottawa, \$1,650 (accepted); Victoria Foundry, Ottawa, \$1,950; Wm. Hamilton Company, Peterborough, \$2,080; Staveley Coal & Iron Company, Limited, Chesterfield, England, \$2,475; John Inglis Company, Toronto, \$2,590; Chaudiere Foundry Company, Ottawa, \$2,680; Thos. Lawson & Sons, Ottawa, \$3,250; Canada Foundry Company, Toronto, \$3,300.

St. John, N.B.

Robert S. Low, Sydney, N.S., has been awarded the contract for granite block paving in St. John, N.B., about \$70,000. Contracts for supplying castings for the department were awarded to J. E. Wilson, Limited, the lowest tenderer. Tenders for supplying 500 barrels of English Portland cement were opened and the following bids disclosed: C. H. Peters Sons, Limited, \$1.97 a barrel; W. H. Thorne & Company, \$1.75 (accepted); A. M. Rowan, \$1.85; Charles Neviens, \$1.95; Gandy & Allison, \$1.89 a barrel or \$1.94 in casks of 150 pounds. The only tender for supplying 100,000 bricks was from John Lee & Company, at \$9.50 a thousand (accepted). Tenders for castings were opened and the following bids disclosed: McLean, Holt & Company, 40 main stop cock vault taps, \$6.69 a set; sixty cast iron sewer manholes, \$6.44; twenty catch basin frames, \$2.59 each; J. E. Wilson, Limited, vault tops, \$6.45; sewer manholes, \$6.25; catch basin frames, \$2.45; J. Fleming, vault tops, \$6.80; sewer manholes, \$6.40; catch basin frames, \$3.20; St. John Iron Works, vault tops, \$6.45; sewer manholes, \$6.45; catch basin frames, \$3.59. The tender of John E. Wilson, Limited, was accepted.

Tenders for core castings were opened and the following were the bids: James Fleming, 3 4-10 cents a pound; St. John Iron Works, 3½ cents; J. E. Wilson, Limited, 3¼ cents, and McLean, Holt & Company, 3½ cents. The tender of J. E. Wilson, Limited, was accepted.

Viridien, Man.

The Manitoba Hardware & Lumber Company were given the contract for supply of 800 barrels cement, f.o.b. cars, Viridien, at \$2.91 per barrel, with sacks. A. B. Cunningham, Melville, Sask., tendered at \$2.99 per barrel, with sacks; Rat Portage Lumber Company, this place, at \$2.90 per barrel, without sacks.

Vancouver, B.C.

The following tenders for Broadway grading and bulkhead from Scott to Glen, were received: M. P. Cotton, \$17,656; J. D. Cameron (bulkhead only), \$5,900; T. R. Nixon & Company, \$8,500 (both); Palmer Bros. & Henning, \$12,370; H. V. Tucker, \$10,170. Nixon's tender was accepted.

The following tenders were received by the Board of Works for the concrete and brick sewers: Palmer Bros. & Henning, \$26,000 (city yard to Dufferin); \$64,155

(Seventh avenue); \$69,750 (Tenth to Sixteenth avenue); M. P. Cotton, \$24,000, \$57,000 and \$79,284, respectively. L. Placa Bros., \$39,721 (Seventh avenue). The tender of La Placa Bros. for Seventh avenue was accepted. The city engineer was instructed to do the rest of the work by day labor.

Railroads, Bridges and Wharves**Chatham, Ont.**

The extension of the C. W. and L. E. from Chatham to Pain Court will be proceeded with at once, the Railway Commission having granted the order.

Collingwood, Ont.

Tenders will be received until June 25 for the construction of a reinforced steel arch bridge on the town line, etc. Plans, etc., at office of John Wilson, architect.

Edmonton, Alta.

Engineers are running the final locations for the C. P. R. high level bridge this week, and it is expected that construction will start at once. Estimated cost, \$500,000.

Fergus, Ont.

Tenders will be received until June 22nd for the construction of nine reinforced concrete bridges and culverts, and for abutments, steel deck and concrete floor on the Moorefield bridge. Bowman & Connor, county engineers, 36 Toronto street, Toronto.

Fort William, Ont.

Tenders on Simpson street bridge were received as follows: S. Moran, \$22,000; A. Cameron, \$23,545; E. G. Penniman, \$29,500; J. J. Flanagan, \$24,500; H. Murphy, \$26,200. The city engineer estimated at \$20,000 and \$22,000. The city engineer was instructed to build the Simpson street bridge by day labor.

Hampton, N.S.

Tenders are being called by the Public Works Department, Ottawa, for extension to breakwater. Plans, etc., at offices of the above; C. E. W. Dodwell, Halifax; E. G. Millidge, Antigonish, and on application to local postmaster.

Lethbridge, Alta.

The council accepted the proposition of the C. P. R. and Alberta Railway & Irrigation Company to bear half the cost of an overhead bridge over the railway tracks; cost about \$90,000.

Longueuil, Que.

The Montreal Central Terminal Company have submitted plans to the council for a connecting line between Longueuil and Montreal. They propose to tunnel under the river at the lower end of St. Helen's Island to connect with the Grand Trunk and Central Vermont and other lines at Montreal.

Ruskin, B.C.

It is reported that the Western Canada Power Company has awarded the contract for grading seven miles of standard gauge from here to Stave Falls to Messrs. Morrissey, Smith & McLean.

Sackville, N.B.

Tenders are being called by the Department of Public Works, Ottawa, until July 4th for the construction of wharf here. Plans, etc., at the above department and at offices of E. Shewen, St. John, G. Stead, Chatham; and on application to local postmaster.

Smith's Falls, Ont.

The C. P. R. will spend about \$50,000 on bridges here.

Toronto, Ont.

It has been announced that the T. H. & B. would be double tracked. Estimated expenditure, \$1,000,000. Superintendent, Adams.

Winnipeg, Man.

The C. P. R. is preparing to continue the double tracking of the line between Portage and Brandon. The completion of this work will give the C. P. R. 522 miles of double track.

AWARDED.**Drayton, Ont.**

Tenders for bridge work were awarded by the engineers, Messrs. Bowman & Connor, Toronto and Berlin, as follows: Cole's bridge, 50 foot steel structure, superstructure, Hunter Bridge & Boiler Company, Kincardine, Ont., \$850. Eight bids were received, ranging from \$850 to \$1,154. Abutments, 120 cubic yards, Jno. D. Callaghan, \$564. Six bids were received, ranging from \$564 to \$670. Arnold bridge, sub-structure, 233 cubic yards, Jno. D. Callaghan, \$1,171. Seven bids, ranging from \$1,171 to \$1,943, were received. Stirton culvert (10 feet), Simmons Bros., \$374. Eight bids were received, ranging from \$339 to \$625.

London, Ont.

The contracts awarded were as follows: Kenilworth Bridge — Concrete, R. Waltham, \$3,265, next lowest, Chas. Ferguson, \$3,225; steel and iron work, Hamilton Bridge Company, \$8,100, Western Bridge & Equipment Company, \$7,850. Caverhill Bridge—Concrete, superstructure and floor, D. Witherspoon, \$580, next lowest, L. O'Dell, \$624; steel superstructure, Western Bridge & Equipment Company, \$550, next lowest, Petrolia Bridge Company, \$680. McGillivray — Reinforced concrete, E. Talbot, \$525, next lowest, Chas. Nickle, \$526.50. Meadow Lily bridge over the Thames river, as follows: Steel work, Hamilton Bridge Company, \$5,266; concrete, L. Crouse, \$3,090. R. P. Piper, was appointed overseer.

Montreal, Que.

The Dominion Bridge Company, of Lachine, were the successful tenderers for the construction of a new bridge at Lachine for the Canadian Pacific Railway Company. Work will be proceeded with shortly and will be spread over a period of two years.

Narva, Ont.

C. S. Wood, of Tiverton, was awarded the contract for the construction of a two-span flat arch bridge, eighty feet long, by the Township of Greenock, at \$2,779. Other tenders were: A. Knox, Pinkerton, \$1,950; Wm. Wittman, Chepstow, \$2,741; John Coumans, Chepstow, \$2,787; David Keyes, Kincardine, \$2,762; Hunter Bridge Company, Kincardine, \$2,945; J. Reid, Brantford, \$3,375.

Prince Rupert, B.C.

Foley, Welch & Stewart have been awarded the work of building twenty-five miles of the line of the Kootenay Central Railway.

Weston, Ont.

E. C. Lewis, of Toronto, was given a contract by this municipality for the construction of a 118-foot span concrete arch bridge. Barber & Young, Toronto, consulting engineers.

Woodstock, Ont.

We are informed that the contract for two county bridges on the 10th line of East Nissouri has been awarded to Wm. Crellin, of Kintore, for \$1,460. F. J. Ure, C.E., city engineer.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

The ratepayers will be asked to vote shortly on the expenditure of \$25,000 for the new central fire hall, and also \$20,000 for the construction of city hall.

Milliwack, B.C.

A bylaw will be submitted to the ratepayers shortly for the erection of city hall, etc. Noted in last issue.

Plans for the new post office have been prepared and site secured. Estimated expenditure, \$30,000.

Calgary, Alta.

The Horse Show Association will ask the city council to submit a bylaw to the ratepayers for the expenditure of \$55,000 for the erection of a first class building and for the improvement of the present stabling accommodation.

Chatham, N.B.

The preliminary plans for the new Roman Catholic college are well advanced. It is understood it is to be under the direction of the Basilian Fathers, of Toronto.

Cranbrook, B.C.

The council will purchase lots on Norbury avenue upon which to erect a municipal building and fire hall.

Dauphin, Man.

The \$12,000 bylaw for school buildings, etc., was carried.

Durham, Ont.

Tenders addressed to W. B. Vollet, town clerk, will be received until June 17th for the erection of clerk's office.

Dresden, Ont.

Tenders addressed to J. P. Bridgewater, secretary, Public School Board, will be received until June 20th for the erection of a concrete, brick school, etc. Plans at offices of the above, or of the architects, J. L. Wilson & Son, Chatham.

Edmonton, Alta.

A new Presbyterian theological college will be established here.

The specifications and plans of the new city hospital are completed and as soon as the city council passes the vote granting the necessary funds, the contract for construction will be awarded, probably about the 20th inst.

Fort William, Ont.

Tenders addressed to R. E. Mason, architect, will be received until June 16th for the erection of north wing hospital for the Board of Health; also for a boiler house and heating plant.

Gretna, Man.

Ratepayers have carried a \$12,000 school bylaw.

Hanover, Ont.

Tenders for erection of town hall will be called for by Forster & Clark architects, Owen Sound.

The bylaw granting \$13,000 for the erection of town hall was carried; plans are being prepared for the public library, on which \$10,000 will be spent.

Lethbridge, Alta.

Tenders addressed to J. Stocks, deputy minister of public works, will be received until June 30th for plumbing, electric wiring, ventilations and mechanical equipment in connection with jail building here.

Montreal, Que.

The Grey Nuns have purchased the property, southwest corner Sherbrooke and St. Lawrence Boulevard for \$135,000 from the Molson Estate, and this will be converted into a hospital building.

North Vancouver, B.C.

The plan of Messrs. Hope & Barker was accepted for the new school. Plan calls for eight rooms with full basement of brick, and rough east, with concrete foundation and provides for wings.

Napanee, Ont.

Tenders for the complete construction of a skating rink will be received until June 15th. C. M. Warner, secretary.

Niagara Falls, Ont.

The city council decided to submit three bylaws to raise money: one for \$15,000 to build a new assembly hall, gymnasium and collegiate; another for \$2,000 to repair the heating at the collegiate, and the third to raise \$2,500 to build a new fire hall.

Owen Sound, Ont.

Tenders will be called shortly for erection of an addition to General Hospital and Nurses' Home. Forster & Clark, architects.

Orillia, Ont.

Out of the \$35,000 to be raised in the building campaign for the Presbyterian church, \$20,000 will be spent on a new school room.

Ottawa, Ont.

It is expected that the matter of a municipal abattoir will be taken up when the new incinerator is completed.

Portage la Prairie, Man.

Owing to a mistake in the tenders for the new school, the board will call for new ones to be in by the 15th inst.

Quebec, Que.

Tenders for roofing the Civic Hospital were called until June 15th. W. D. Bailarge, city engineer.

Ridgeville, Ont.

Tenders are invited for \$9,000 school debentures. A. N. Armhurst, township clerk.

Renfrew, Ont.

Tenders are being called until June 24th for the various trades, including heating and plumbing, required in the erection of an eight-room addition to the Renfrew Model School. Geo. Eady, Jr., secretary, Board of Education.

Regina, Sask.

Tenders will be received until June 18th for the erection of Officers' Quarters at the R. N. W. M. P. Barracks. Plans, etc., at office of Messrs. Storey & Van Egmond. R. S. Knight, inspector, supply officer.

The Board of Governors of Saskatchewan Methodist College have decided to purchase eighteen acres of the present jail property from provincial government, on which they will erect their proposed college. Plans, etc., will be submitted to the government for approval.

Sudbury, Ont.

L. O. Connor, mayor, will receive tenders until June 27th for the various trades required in the erection of a municipal building. For further particulars see "Tenders and For Sale Department" of this issue.

South Vancouver, B.C.

The \$179,000 schools bylaw was carried. The plans and designs of three new schools submitted by Mr. J. H. Bowman, architect, were accepted. The cost of the three new schools totals about \$120,000.

Stewart, B.C.

Plans for the new government court house and police station have been received by Government Agent McMullen. Construction will start at once.

Springdale, B.C.

Tenders are being called by the Department of Public Works until June 25th for the erection of a school building in the municipality of Surrey. F. G. Gamble, public works engineer; J. Barham, secretary school board, Clayton.

Smith's Falls, Ont.

This municipality is calling for tenders for \$10,000 hospital debentures, 20-year, 5 per cent.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until June 28th for the erection and completion of a new band stand in the Exhibition grounds. Plans, etc., at office of G. W. Gouinlock, architect.

Property Commissioner Harris has recommended the installation at the City Hall of the Canadian May-Otway protection fire alarm system at a cost of \$2,000.

The Library Board has decided to erect a new wing to the College street branch. G. Locke, librarian.

Victoria, B.C.

The site for the high school has been selected at Spring Ridge and \$30,000 contributed towards its erection by the trustees. Mr. Jay, chairman of the board; McNeill, Staneland and McIntosh, trustees.

Vancouver, B.C.

The accepted tender for the construction of a machinery hall was \$11,885.

Tenders have been called for the clearing of land on military reserve, opposite Barnet, the site for the isolation hospital. Hermon & Burwell, surveyors.

Public tenders are requested for general excavation to new Congregation church, Thurlow street. Plans, etc., at office of the architects, Sharpe & Thompson, 536 Hastings street west.

Tenders were received for the new incinerator, as follows: Blackwell & Desarie, \$65,000; Public Works Engineering Company, of Portland, four tenders on different types of plant ranging from \$59,107 to \$84,966; Dundon Excelsior Furnace Company, \$69,000; Heenan Froude Company, who installed the present incinerator, \$54,968, and \$46,131 for varying types; Dickson Engineering Company, \$49,500; J. E. W. Macfarlane, \$82,357.

Woodstock, Ont.

The ratepayers will be asked to vote on an \$85,000 city hall bylaw in July or August.

Winnipeg, Man.

The city council will call for competitive plans for a new city hall to cost \$2,000,000.

The plans prepared by J. H. G. Russell, architect, Sylvester-Willson Building, for the new Westminster church, have been accepted. They call for an edifice of Gothic design with two towers and Sunday school in rear. Reported cost of two buildings, over \$150,000. Plans for the Children's Hospital on Aberdeen avenue have also been prepared by Mr. Russell. Work on latter will probably start during the present month. Noted previously.

A permit has been issued for Pritchard avenue fire hall, \$14,000.

The building of a Labor Temple is under consideration by union organizations of the city.

AWARDED.**Arnprior, Ont.**

The contract for building addition to and making alterations in high school has been awarded to S. R. Rudd, the lowest tenderer, at \$12,907.

Estevan, Sask.

The contract for the building of the school for the Knoxville school district was awarded to J. H. Wilson.

Hull, Que.

The contracts for the improvements to the St. Thomas School at Hull have been awarded to A. Archambault and Caron Pepin. The former will install the heating apparatus for the sum of \$900, whilst the latter will put in ventilators throughout the building and erect a fire escape for the sum of \$2,300.

Montreal, Que.

The contract for the erection of a hall building for the Canadian Amusement Company, has been awarded to the J. Jacobs Company. Mr. J. Seath Smith, architects.

Messrs. Peden & McLaren, architects, have awarded contracts for the erection of Victoria church, Point St. Charles, as follows: Excavation and masonry work, J. Charette; plastering, R. D. Clarke & Sons; carpentering work, D. F. Deslaurieres; painting and glazing, John Allan; plumbing and heating, Dominion Camp Equipment Company; roofing, G. W. Reed & Company; wiring, E. A. Gregory; rolling doors, David McGill.

The contract for large concrete entrance way and stairs for the Chapel of the Immaculate Conception church, Rachel street, has been awarded to Messrs. Church, Ross & Company, concrete contractors.

The contract for reinforced floors, beams and fireproof partitions, Rosemount and William Dawson Schools, have been awarded to Church, Ross & Company. Mr. A. F. Dunlop, architect.

Contracts have been awarded as follows for the erection of seven cottages for the MacDonald College, Ste. Anne de Bellevue: Masonry and brick work, Robertson Bros.; carpentering work, Mr. Shaw; roofing, G. W. Reed & Company; wiring, Collyer & Brock; plastering, R. G. Hamilton; plumbing, M. Quigley; painting, W. P. Scott.

Orillia, Ont.

The contract for the Carnegie Library was awarded to Joseph Langman, of Pene tanguishene, the lowest. The only other whole tender was that of W. L. Bennet, Orillia, for \$12,668.

Toronto, Ont.

Contracts were let for the erection this summer of a two roomed addition to St. Anne School, Bolton avenue, and also for an extension to St. Peter's School, Bathurst street, at an approximate cost of \$9,000 each. Right Rev. Mgr. McCann, V.G., chairman.

Contracts for repairs, painting, etc., in connection with public schools were awarded as follows: For painting—Jarvis Street Collegiate Institute, T. Barrett, \$205; Parkdale Collegiate Institute, F. Palmer, \$128.40. Contracts were let in connection with the York Street School: Mason work, Self Bros., \$10,225; carpenter work, E. Hollett, \$5,670; roofing, G. M. Bryan, \$325; plastering, T. Blackburn & Son, \$765; plumbing, Fred Armstrong Company, \$1,175; painting, James Taylor, \$1,025; structural steel, Reid & Brown, \$393; steam heating, Keith & Fitzsimmons, \$3,000; heat regulating, Johnston Temperature Regulating Company, \$649. Other tenders accepted were for repairs on

the following schools: Coleman School—mason work, Self Bros., \$800; carpenter work, W. Williamson, \$345; roofing, Flowers & St. Ledger, \$55; painting, R. G. Johnston, \$206. George Street School—Mason work, self Bros., \$1,060; carpenter work, Frank Armstrong, \$262; roofing, Flowers & St. Ledger, \$65; painting, J. R. Robinson, \$320. Painting contracts were awarded as follows: Annette Street—Gould & Malcolm, \$280; balmy Beach, Jas. Casey, \$150; Bolton Avenue, T. Barrett, \$290; Carlton, Gould & Malcolm, \$245; Church Street, Jas. Casey, \$310; Clinton, T. Barrett, \$90; Cottingham, F. J. Cox, \$187; Deer Park, Taylor & Company, \$109; Dewson, George S. Eagles, \$130; Givens, Jas. Casey, \$224; Alexander and Brock Avenues Schools, Wm. F. Palmer, \$92.

Winnipeg, Man.

Alexander Wunsch has been awarded the contract for the erection of Evangelical Lutheran Church on Aberdeen avenue, at \$11,000.

Residences**Brantford, Ont.**

Building permits have been issued to James Shields, double brick dwelling on Colborne street, to cost \$2,600.

Hamilton, Ont.

Permits have been issued to Edward New, brick dwelling, on Sophia street, corner of King street, to cost \$2,500. W. Theaker, brick dwelling on Garth street, between Aberdeen and Orchard Hill, cost \$2,500.

Montreal, Que.

Tenders are now being received for erection of an apartment house on St. Mark street for Mrs. H. S. Phillips. Mr. Theo. Daoust, architect.

Plans and specifications have been prepared and tenders were received until June 14th for the erection of an apartment house at the corner of Mance and Fairmount avenue for Mr. Emond. Mr. G. A. Monette, architect.

Owen Sound, Ont.

Plans and specifications are being prepared by Forster & Clark, architects, for a solid brick residence for Wm. McLaughlin.

Toronto, Ont.

It is stated that James Gibson, contractor, has purchased 380 feet frontage on Campbell avenue, on which about twenty brick houses will be erected.

Vancouver, B.C.

Permit was issued to Mr. E. M. Rinehart for an apartment house at 845 Smith street, \$12,000.

Victoria, B.C.

The building inspector has issued the following permits: Fred Harper, dwelling on King's road, \$2,700; Mrs. S. M. McDowell, dwelling on Blanchard street, \$3,500; Dr. G. W. Hall, alterations to building opposite the court house, Langley street, \$2,800; Thos. Brown, for a dwelling to be erected on Burleigh street, cost \$3,900.

Permits include two large residences, H. Bowen, on Rockland avenue, \$20,000; J. A. Tracksell, on Foul Bay road, \$10,000.

Winnipeg, Man.

Tenders addressed to W. Wallace Blair, architect, were called until June 15th for erection of apartment for Mr. H. Brownrigg.

A permit for the construction of a 3-storey apartment block on William ave-

nue, was issued to Jos. Johnson, \$40,000. P. M. Clemens, architect.

Herbert B. Rugh, architect, Union Bank Building, is receiving tenders for a house to be erected for Allan C. Ewart. The plans call for a cement-plaster structure of handsome design. Approximate cost \$15,000.

Building permits include one for a new 3-storey apartment block on the northeast corner of Ellice avenue and Furby street. This is 66 feet by 89. Cost, \$75,000.

AWARDED.**Fort William, Ont.**

The contract was awarded to Cusson Bros. for the construction of D. McKellar's residence; cost \$15,000.

Montreal, Que.

Messrs. Church, Ross & Company, have been awarded the contract for the reinforced concrete work, "Waldmere Apartments," St. Matthew street. Messrs. Wright & Son, architect.

Contract for the erection of a reinforced concrete garage for Mr. L. J. Forget at Senneville, Que., has been awarded to J. F. Jago & Company.

Contract for the electric wiring, residence for J. M. Wilson, Ontario avenue, has been awarded to M. Rubenstein. Saxe & Archibald, architects.

Contract for the completion of Mr. Russell's residence on Guy street, has been awarded to Mr. A. Trudeau, in succession to Mr. Thomas Wand. Saxe & Archibald, architects.

Business Buildings and Industrial Plants**Brantford, Ont.**

The Cockshutt Plow Company will make extensions to the local plant this summer at an outlay of about \$400,000. New warehouses will also be erected at Brandon, Saskatchewan, Calgary, and the one at Regina will be enlarged.

Brandon, Man.

D. Beaubien, of this city, has offered \$100,000 if the Methodist Conference will give \$50,000, towards the establishment of a temperance hotel in Saskatchewan.

The Cockshutt Plow Company is asking for tenders for the construction of a fine warehouse, 80 x 80, three storeys, on the C. P. R. property at the foot of Sixth street. For further information apply to J. Inkster and D. Sheriff.

It is stated that tenders for the excavation for C. N. R. hotel, being too high, the company have put 75 men on the work.

Bows, Man.

The lumber mill of Calverley & Son was destroyed by fire on the 11th inst. Loss, about \$10,000.

Bridgeburg, Ont.

The Canada Foundry Company recently purchased the shipyard of the Canada Shipbuilding Company and will convert it into a structural steel plant. Narcross Marble Company and the Monitor Harrow Company are seeking sites.

Berwick, Ont.

The cheese factory owned by Mr. Patterson was destroyed by fire recently. Total loss, about \$4,000.

Cargill, Ont.

The power house, pump house, cooper shop and heading mill of H. Cargill & Son were entirely destroyed by fire on the 10th inst. The loss will run up into thousands of dollars. The firm will rebuild at once.

Chatham, N.B.

It is expected that J. H. Crandall, Moncton, will shortly erect a new saw mill at Morrisson's Cove, near here.

Calgary, Alta.

Tenders are being received until June 20 for the erection of a business block for Beveridge Bros., Judge Travis and G. J. Bryan. This does not include heating, electric wiring or elevators. Hodgson & Bates, architects, Grain Exchange, Calgary.

Danville, Que.

The plant of the Nicolet Falls Pulp & Lumber Works was damaged recently to the extent of about \$5,000.

Fort William, Ont.

A. W. Frodsham & Company will complete the block on the corner of May and Myles street, by the erection of an addition. Cost, \$15,000.

Goderich, Ont.

The town council have decided to erect a freight shed and waiting room.

Headingley, Man.

It is stated that the C. P. R. will erect a station at once on a site given to them by Messrs. McLaurin and McCallum.

Hamilton, Ont.

Thomas C. Watkins, Limited, represented by Thomas W. Watkins, purchased a block of property on the east side of John street, 100 feet front by 180 feet deep, on which the reorganized concern will build immediately an immense warehouse and stables.

Damage to about \$2,000 was done to the tinning and galvanizing department of the E. T. Wright factory on Cathcart street on the 9th inst.

Lavina, Man.

The grain elevator was destroyed by fire on the 9th inst.

Moose Jaw, Sask.

The Gordon, Ironsides & Fares Company, Limited, meat packers, will locate their western plant here and commence work as soon as possible on the construction of their buildings.

Montreal, Que.

The building occupied by the Montreal Herald Publishing Company was destroyed by fire on the 13th inst. President, Jas. S. Brierley; F. Abraham, secretary-treasurer. It is understood that the building is owned by them.

Plans have been filed at Ottawa by Vickers, Sons & Maxim, of England, for a \$2,500,000 shipbuilding and ship repair plant to be located in Montreal. The plans include dry dock, three large berths for the repairing and building of steel vessels, machine shops and plant capable of doing the heaviest construction and repair work, covering some fifty acres of ground. The plant will be located on the shore of the St. Lawrence, a little to the west of Longue Point, just at Molson's Creek. The site for the new shipyard will be prepared by the Montreal Harbor Commissioners, and about fifty acres of ground will be made by filling out from the shore. A dock will be built approximately 2,000 feet from the present shore line and parallel with it. A dry dock, 650 feet long by 135 feet wide, with a lifting capacity of 27,500 tons, will be located inside the main dock, and also a basin 1,000 feet long by 500 feet wide and 50 feet deep. In the rear of the dry dock basin there will be three construction and repair berths, with a length of 500 feet and a width of 60 feet each. An application has been made to the Government for a dock subsidy, and it is expected that this will be granted at the rate of three and a

half per cent. for twenty-five years on \$2,500,000. Plans have been filed by Levis Brothers, Canadian agents for Vickers, Sons & Maxim, and it is stated Mr. Vickers will shortly arrive with the final plans.

Owen Sound, Ont.

E. O. Young is the architect in charge of the new foundry being erected by the Corbett Foundry & Machine Company, of Owen Sound. Noted previously.

Oshawa, Ont.

The McLaughlin Carriage & Auto Company will greatly extend their plant. It is stated that contracts have been let.

Port Alberni, B.C.

The Bank of Montreal, through Mr. C. Sweeney, manager in Vancouver, has purchased a building site here.

Portage la Prairie, Man.

Tenders were called until June 15th for the erection of offices for the Urban Mutual Fire Insurance. R. H. M. Pratt, manager; C. H. Mounsey, architect. Noted previously.

Proctor, B.C.

Tenders addressed to W. Wallace Blair, architect, Winnipeg, will be received until June 22nd for the erection and completion of an hotel building at Riverside, near here, for the C. P. R. Plans, etc., at offices of the architect, and also of the company at Nelson.

Peterborough, Ont.

G. Walter Green Company have bought the entire block in which their present plant is situated for future extension.

Sydney, N.S.

The Dominion Steel Company, it is stated, will locate a wire nail factory here or at Fort William. J. H. Plummer, president.

St. Marys, Ont.

Building operations in connection with a new cement company will be commenced shortly. The plant will have a capacity of 1,500 barrels a day.

Stratford, Ont.

A bylaw will be submitted to the ratepayers shortly to grant privileges to the Dufton Company, Limited, in return for which they will erect a two storey factory.

St. Thomas, Ont.

It is reported that a large steel plant may be established in this city for the manufacture of the Durbin Automatic Safety Car Coupler. J. L. Hendrick, L. Durbin and C. T. Hunn, all of Fort Scott, Kansas, and E. R. Powers, of Sarnia, Ont., are interested.

Toronto, Ont.

Tenders will be received until June 18th for the reinforced concrete structure of a 6-storey building on Yonge street for the Mason & Risch Piano Company. Bond & Smith, architects, 19 Wellington street west.

The Toronto Engraving Company has purchased a site on Richmond street west, where, it is stated, they will erect a fire-proof building.

Tenders will be received until June 21st for mason work, roofing, plumbing and painting in connection with the new electric sub-station on Macpherson avenue. G. R. Geary, mayor. Plans, etc., at office of the city architect.

The Massey-Harris Company propose building a club house, etc., for their employees near their factory. Estimated expenditure, \$100,000.

Messrs. Taylor, Scott & Company have

purchased property at 732 King street west where they will erect a warehouse.

Vancouver, B.C.

A building permit was issued for extensive alterations to basement of Thomson Bros. block, corner of Hastings and Abbott streets, \$35,000; also for construction of steel frame, 5-storey block on Mount Pleasant, to Mr. H. O. Lee, for \$100,000.

The B. C. Casket Company have notified the council of their intention to locate a plant on Burrard Inlet.

The National Paper Mills, Limited, head office, this city, will erect a large mill in this vicinity. C. J. Kay, manager; Sylvester Cropper, general superintendent, both of this city.

Victoria, B.C.

A permit has been issued for the additions to Empress Hotel, \$125,000.

Permit was issued to G. T. P. for wharf buildings, \$12,000.

Tenders were invited until June 14th for 2-storey brick buildings on Douglas street for the Drake Hardware Company; also for excavating, blasting and concrete for an office building for the Dominion Trust Company; also for a 3-storey brick building on Langley street for Messrs. Sweeney & McConnell. Plans, etc., for above at office of H. S. Griffith, architect, 100½ Government street.

Windsor, Ont.

It is stated that the Paterson Automobile Company, of Flint, Mich., will locate a Canadian branch here.

Winnipeg, Man.

Building permits were issued to Petrie Manufacturing Company for a 2-storey warehouse, Henry avenue, brick and stone, \$22,000; also to Gallagher, Holman & La France, meat market, King street, two storeys, \$20,000.

Applications from fifty different districts throughout Manitoba have been received up to the present by the Provincial Elevator Commission for the erection of grain elevators. The engineering department has been inaugurated, with E. P. Estier as chief engineer. He is engaged at present in drafting a new elevator system for Manitoba.

Permit was issued for interior finishing of the Fort Garry depot, \$300,000; also to Dingle Bros. for warehouse on Stanley street, \$25,000.

Yorkton, Sask.

The International Harvester Company has purchased a warehouse site on West Broadway on which they will erect a \$70,000 five-storey building.

AWARDED.**Montreal, Que.**

The general contract for alterations to property, corner Notre Dame street and St. Francois Xavier street, for Messrs. St. Cyr, Frigon and Gauthier, has been awarded to Mr. A. Mercure, contractor. Mr. Eugene Payette, architect.

The general contract for the alterations and repairs to the office building at 15 St. James street has been awarded to J. R. Gratton, Limited, contractors. Eugene Payette, architect.

The general contract for the erection of the H. Kellert & Sons building, corner St. Catherine and St. Ursin street, has been awarded to Messrs. Peter J. Vall & Sons, general contractors. Donlon & Company, "Carrara" terra cotta will be used for the facings on this building. Messrs. Hutchison, Wood & Miller, architects.

(Continued on page 30)

Tenders and For Sale Department

Tenders for Dredging

Sealed tenders marked "Tenders for Dredging" will be received by the undersigned up to 6 o'clock p.m., JUNE 17TH, for Dredging Little River Drain from the Grand Trunk Railway to the River Detroit.

Plans, specifications and all information may be obtained at the office of the undersigned. The lowest or any tender not necessarily accepted.

OWEN McKAY,
Township Engineer.

Walkerville, Ont., June 7, 1910.

24

Town of Wingham To Contractors

Tenders, addressed to the undersigned, will be received up to 6 p.m., 21ST JUNE, for the construction of Sewers and Sewage Disposal Works for the Town of Wingham. Plans and specifications may be seen and forms of tender obtained at the office of the undersigned or at the office of the engineers, Davis & Johnston, Berlin.

Lowest or any tender not necessarily accepted.

JOHN F. GROVES,
Town Clerk.

24.

County of Wellington Bridge Tenders

Sealed tenders will be received by Jas. Beatty, County Clerk, Fergus, Ont., until 2 p.m., on WEDNESDAY, JUNE 22ND, for the construction of 9 reinforced concrete bridge and culverts, and for abutments, steel deck and concrete floor on the Moorefield bridge. For plans, specifications and other information, apply to the Reeves of Guelph, Pilkington, Arthur, Peel, Erin and Maryboro, or to the undersigned.

ALEX. STEWART, Living Springs,
Chairman County Roads.

J. M. YOUNG, Harriston,
County Roads Superintendent.
BOWMAN & CONNOR,
County Engineers,

36 Toronto St., Toronto, and Berlin.

24



Tenders Wanted

Sealed tenders addressed to the Secretary, Department of Indian Affairs, Ottawa, and endorsed "Tender for Oneida School-house," will be received up to noon of the 25TH OF JUNE, 1910, for the erection of a brick school-house on concrete foundation for the Oneida Indian Reserve, Ont.

Plans and specifications may be seen at the Post Office, St. Thomas, the Post Office, London, and the Office of the Indian Agent, Delaware.

The successful tenderer will be required to furnish a bond in satisfactory sureties for a sum equal to the amount of the contract.

The lowest or any tender not necessarily accepted. The unauthorized insertion of this advertisement in any paper will not be paid for.

J. D. McLEAN,
Secretary.

Department of Indian Affairs,
Ottawa, May 27, 1910.

24

Notice to Contractors

Whole or separate tenders for the various trades required in the erection of a Municipal Building in the Town of Sudbury will be received by the undersigned up to 6 p.m., MONDAY, JUNE 27, 1910. Tenders to be accompanied by a marked cheque for 5 per cent. of the amount of the tender, made payable to L. O'Connor, Mayor, cheques to be returned to unsuccessful tenderers.

Lowest or any tender not necessarily accepted. Plans, etc., may be seen at the office of the architect, Jas. Thomson, 43 Victoria street, Toronto, or with George Elliott, Town Clerk, Sudbury.

L. O'CONNOR,
Mayor.

25

For Sale

Steam Shovel

One Style "A" Marion Steam Shovel, 1½ yard dipper capacity, about 45 tons working weight, in first-class condition, with new extra heavy reinforced boom, latest style new independent crowding engines, all thoroughly overhauled, the boiler just re-tubed. Can be inspected where it is now working. Offered subject to inspection and acceptance before shipment, and subject to prior disposition.

Apply

F. H. HOPKINS & CO.,
New Imperial Bank Bldg., Montreal.

24

City of Nanaimo

Sewerage Contract No. 1

Tenders will be received by the undersigned up to noon on FRIDAY, THE 24TH DAY OF JUNE, 1910, for the Excavation and Laying only, of Vitrified Sewer Pipes, with outfalls in harbour, and other incidental works of sewerage.

Tenders will not be considered unless made out on the forms supplied, and must be accompanied by an accepted cheque for a sum equal to five per cent. of the amount of tender with the envelope sealed and endorsed "Sewerage" Tender Contract No. 1.

Plans, specifications and general conditions may be seen and forms of tender obtained from the City Engineer's office.

The lowest or any tender not necessarily accepted.

ALLAN WATERS,
City Engineer.

Nanaimo, B.C., June 10th, 1910.

24

Village of Weston

Tenders for Sunday School

Tenders will be received up till JUNE 20TH for the construction of a building to be used as Sunday School and Church. Outside measurements 68 feet by 72 feet. Two storeys; semi-basement, including swimming bath, 12 x 35 feet, to be concrete. Main portion of the building to be brick, with artificial stone trimmings. Will receive tenders for whole of building, or on separate trades. Plans and specifications to be seen at office of

MOFFATT STOVE COMPANY,
Weston.

24

Don't Miss this Chance

About \$2,000.00 worth of The Trussed Concrete Steel Company's Kahn Bar for sale. Send for a specification. Inspect the goods and make me an offer.

J. ELLIOTT,
165 Queen St. East, Toronto.

24

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—TRAVELLING SALESMAN to represent firm manufacturing bank, office and store fittings. Must be competent to make sketches, etc. Man having experience in architect's office preferred. Apply, Box 974 "Contract Record," Toronto. TF

Miscellaneous

Advertisements under this heading two cents a word per insertion.

PINE PILING—Can supply large quantities pine piling, any length up to, say, 70 feet, on cars C. N. O. R. Apply to A. Prentice, 649 Bathurst Street, Phone College 5729, or A. McPHERSON & COMPANY, Longford Mills, Ont.

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 foot x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail.—WM. LESSLIE, Walkerville, Ont. TF

Business Buildings and Industrial Plants

(Continued from page 20)

The contract for the reinforced concrete work, Dominion Oilcloth Building, has been awarded to Messrs. Church, Ross & Company. Messrs. Hutchison, Wood & Miller, architects.

Contracts have been awarded as follows for the alterations to the Kastel restaurant on St. Catherine street west: General contract, D. M. Long; steel work, Phoenix Bridge Company; plumbing and heating, Thos. O'Connell. Messrs. Finley & Spence, architects.

Messrs. Church, Ross & Company, concrete contractors, have been awarded the contract for all the concrete work in connection with the six storey factory building and dry kilns for the Dominion Oil Cloth Company on Parthenais street, designed by Messrs. Hutchison, Wood & Miller. The Dominion Bridge Company are erecting the steel work. The building will be of brick and concrete and fireproofed throughout.

Nelson, B. C.

John Burns, of the Nelson planing mills, was awarded the contract for the erection of warehouse for A. Macdonald, wholesale grocer, Winnipeg, Man.

Toronto, Ont.

The following contracts have been awarded in connection with Laundry Building, West Lodge avenue: Masonry and brickwork, Elgie & Page; carpentry, J. Bulger; structural iron and steel, McGregor & McIntyre; plumbing and heating, W. J. McGuire & Company; roofing and galvanized iron, Douglas Bros.; painting and

glazing, T. G. O'Connor, J. M. Cowan, architect.

Vancouver, B.C.

The contract for the excavation work for Hotel Vancouver has been awarded to Messrs. Purdy & Henderson, of New York and Vancouver.

Power Plants, Electricity and Telephones

Calgary, Alta.

Plans are being prepared for a power plant here. Estimated expenditure, \$80,000.

Dauphin, Man.

The \$11,000 bylaw for electric light purposes was carried.

Ingersoll, Ont.

Mayor McKay, Reeve Fleet and Alderman Fleet have been authorized to take over and operate the plant and make the necessary changes to receive and distribute Niagara power. Noted previously.

Medicine Hat, Alta.

Preliminary reports are in on the electric light plant. Probable cost, \$60,000. The city is considering moving the waterworks farther up the river in conjunction with the electric light plant.

New Michel, B.C.

Brolley & Martin, the contractors in charge of the new waterworks system for this municipality, are making a deal with the New Michel Sawmill Company to put in an up-to-date electric lighting system.

New Westminster, B.C.

B. C. E. R. has purchased ten lots at the junction of the Burne and Westminster-Vancouver line as a site for freight sheds.

Peterborough, Ont.

The Board of Works authorized W. Chipman, C.E., Toronto, to prepare plans, etc., for the new pumping station and sewers, and to have tenders advertised.

Quebec, Que.

Tenders addressed to Staveley & Staveley, architects, will be received until June 22nd for the following trades required in the enlargement of car barns at St. Malo, for the Quebec Railway, Light & Power Company: Excavation, masonry, plastering, carpentry, joiner's work, roofing; also for steel erection. Plans, etc., at office of the above.

Winnipeg, Man.

At a special meeting of the city council it was decided to purchase seventy-one feet of property on the west side of King street, some 200 feet distant from Notre Dame, for the erection of sub-distributing power station No. 1.

AWARDED.

Fort William, Ont.

Contracts for various supplies in connection with street railway material, were awarded as follows: Cull ties, J. C. Hunter, 21 cents each; cedar poles, J. C. Hunter, 15½ cents per foot; spikes, Fife Hardware Company, \$2.47 per 100 lbs.; bolts, Northern Engineering & Supply Company, \$3.60 per 100 lbs., f.o.b. West Fort; washers, R. S. Piper Company, \$13.00 per 100 lbs., f.o.b. West Fort; gravel, Mount McKay & Kakabeka Railway Company, 65 cents per yard; weatherproof feeder wire, Canada General, \$16.70 per 100 lbs.; copper trolley wire, Phillips Electric Company, \$15.49 per 100 lbs.; steel rail bonds, United States Export Company, 29 cents, 37 cents and 63 cents each; rail joints, rail

joint company, \$1.53 each; steel rails, Algoma Steel Company, \$32.50 per ton; strain insulators, Northern Electric, \$27.50 per 100 lbs; 5-16 span wire, Northern Electric Company, \$4.50 per 100 lbs.; 3/8 span wire, Northern Electric Company, \$4.30 per 100 lbs.; fork bolts, Northern Electric Company, \$26.87 per 100 lbs.; cone hangers, Canada General, 54 cents each; single pull-overs, Canada General, 67 cents each; double pull-overs, Canada General, \$1.10 each; clinch fars, Dawson & Company, \$32.50 per 100 lbs. The engineer was authorized to order brass goods from next tenderer if present company cannot fill order as specified. G. A. Knowlton, chairman, Works Committee.

Regina, Sask.

The Francis Rural Telephone Company have awarded a contract for the construction of sixteen miles of telephone system to S. T. Ross, at the following prices:—Cross-arm, 66 a mile; bracket, \$58.

Victoria, B.C.

The contract for the work of laying the conduits on Douglas street for the underground system of telephone wires will be let to the Electrical Construction Company, of Vancouver, for \$3,900.

Miscellaneous

Medicine Hat, Alta.

Until June 20th, tenders are invited for \$125,000 local improvement debentures. E. Roberts, secretary-treasurer.

Ottawa, Ont.

Tenders addressed to the Board of Control will be received until June 16th for supply of one hook and ladder truck; one hose waggon; one hose sleigh; two double sets of harness. John Henderson, city clerk.

It has been announced at the marine department that tenders for the ships of the Canadian navy will be called in September next. The admiralty is sending out plans and forms of specifications upon which the tenders will be based.

Recent building permits include: Edward Gaulin and Father Myrand, concrete dwelling, Anglesea square, \$7,000; F. W. Burn, brick veneer dwelling, McLaren street, \$6,000; A. Tracey, two brick veneer dwellings, Spruce street, \$2,500 each; J. A. Des Rivieres, 1-storey, brick veneer and solid brick heating room, planing mill, Church street, \$2,000; H. Hayley, brick veneer dwelling, Sweetland avenue, \$4,000; Achille Fortier, brick veneer apartments, Besserer street, \$7,000; W. D. Hopper, brick veneer dwelling, Carling avenue, \$4,000; Dr. R. P. Robinson, alterations and additions to apartments, Slater street, \$9,000; Wm. Hunt, double brick veneer dwelling, Arlington avenue, \$8,000; F. Diamond, brick veneer dwelling, Centre street, \$3,000; Alex. Parker, three brick veneer dwellings, in row, Third avenue, \$6,000; F. G. Allen, solid brick apartments, Somerset street, \$7,000; J. More and W. D. Hooper, brick veneer dwelling, Chapel, \$3,000.

Toronto, Ont.

Recent building permits include: H. H. Goode Esq., 2½-storey brick dwelling, Whitney, \$6,000; J. T. & W. Garton, 1 pair semi-detached 2-storey and attic brick dwellings, on 349-351 Sunnyside, \$6,000; Toronto Plate Glass Importing Company, 1-storey corrugated iron shed, Don, \$5,500; Canadian Rubber Company, 4-storey brick warehouse, near Yonge street, \$11,000; A. A. Kennedy, 2 rows of 3 attic 2-storey brick dwellings, corner Shaw & Yarmouth,

\$10,000; J. J. Walsh, 2 detached 2½-storey brick dwellings, on Spencer avenue, \$6,000; Miss M. Wallace, 1 pair semi-detached 2-storey and attic brick dwellings, on 1057 Gerrard east, \$5,500; Mrs. M. E. Coles, 2½-storey brick dwelling, on Deer Park crescent, \$6,000; C. H. Dies, 4 detached 2-storey brick dwellings, Kenilworth, \$9,200; G. B. Smith, 4 attached 2-storey roughcast dwellings, brick fronts, Deleware, \$6,000; A. W. Moore, 2 detached 2½-storey brick dwellings, Fairview, \$5,000; J. Wickett, 1 pair semi-detached 2½-storey brick dwellings on Danforth, \$5,000; F. M. Tuckett, 3 pairs semi-detached 2-storey brick dwellings on Dundas, \$12,000; R. A. Stapells, 2 detached 2½-storey brick dwellings on Farnham, \$7,000; Jos. Bryant, 2 pairs semi-detached 2-storey brick dwellings on Deleware, \$8,000; J. S. Case, 2 detached 2½-storey brick dwellings, on Westminster, \$9,000; Butler Bros., 1 pair semi-detached 2-storey brick stores and dwellings on College, \$8,000; R. A. Baldwin, 2½-storey brick dwelling on Whitney, \$5,500; Weismiller & McKenzie Bros., 8 2-storey and attic brick dwellings, near Sorauren, on Marion street, \$24,000; Miss M. H. Brown, 2-storey brick dwelling on Wileox, \$6,000; W. O. McTaggart, 3 attached 3-storey brick stores and dwellings on Bloor, \$12,000; Mrs. Hill, 2-storey brick stores and dwellings, Edward, \$7,500; Barrett Bros., 1 pair semi-detached 2-storey brick dwellings, on Irene, \$5,000; W. J. Brown, 4 detached 2-storey brick dwellings, Algonquin and Indian, \$12,000.

Winnipeg, Man.

Tenders addressed to C. W. Sharp, Chairman Public Parks Board, will be received until June 20th, for erection, etc., of 2,500 lin. ft. wire fencing for Elmwood Park. J. H. Blackwood, secretary.

Recent building permits include: Dunn and Wallace, dwelling, Home street, \$5,000; A. C. Galbraith, ten houses, east side Newman street, \$25,000; P. N. Kellar, one house, Athol Main and Mac, \$3,500; D. R. Williams, two dwellings, west side Greenwood place, \$7,000; T. Ferguson, four dwellings, Bannerman avenue, \$10,000; P. Wright, dwelling, Lenore street and Preston avenue, \$3,500; Miss E. Spence, dwelling, west side Spence street, \$4,000; F. W. Harvey, house, Bannerman, \$3,000; J. Leslie, house, north side of Corydon avenue, \$5,000; J. Christie, two houses, north side of College, between Charles and Aikins, \$6,000; Mrs. C. Gerrie, \$12,000 residence on Furby street, between Broadway and Preston; W. Stephenson, repairs and alteration to residence at 199 Kennedy street; E. H. Fleming, house, south side of Rosedale, between Helen and Lilac, \$3,600; H. Bauer, terrace of store and dwelling, northwest corner Salter and Alfred, \$4,500; R. D. Guy, dwelling, south side of Yale avenue, \$5,000; L. Bell, dwelling, west side of Craig street, between Portage and Wolseley avenues, \$2,500; T. Kelly, dwelling, north side Rosedale avenue, \$2,500; Superior Fuel & Coal Company, east side of St. James street, coal briquette manufacturing company, three storeys, \$10,000; Winnipeg Canoe Club, boat house, south end River Park, two storeys, 60 x 67, \$5,250; For-seng and Monson, dwelling, east side of Arlington, between Portage and Preston, \$5,000; R. Skipworth, dwelling, west side Furby, between Buell and Ida, \$6,000; P. Olson, dwelling, west side of Home, between Portage and Lavinia, \$2,500; C. Guarino, two houses, south side of Johnson, between Brazier and Rock, \$5,750; T. Wilson, two houses, east side Spence, between Preston and river, \$9,000; G. H. LaPlante, two houses, west side Arlington, between Preston and Buell, \$6,500.

Economical Work in Masonry Contracts

Methods and Appliances Adopted on Record Construction—Stimulus Resulting from Publication of Individual Performances—Value of Carefully Devised Systems

From the following article relating to modern methods of bricklaying in England and America, published by the London "Builder," many of our Canadian contractors may find helpful suggestions:

During the erection of the British Westinghouse works at Trafford Park, Manchester, the daily number of bricks laid per man was increased from the average of 900 for the first month to the number of 2,250. The commencing figure was exactly double the trade union standard, and nearly three times the average attained by bricklayers employed by the London County Council. At the outset everything possible was done to ensure rapid work; the men were paid at a higher rate than that fixed by the trade union, they never had to wait for materials, the most modern labor-saving appliances were utilized, and the operations were under efficient supervision. Further improvements in the rate of laying were due to the weeding out of slow workers and the substantial inducements offered by the builders for the encouragement of rapid work.

Even the high record attained at Trafford Park was surpassed last year in the construction of six brick factory buildings at Chelsea, Mass., where by the employment of special methods the daily average of 2,600 bricks per man was reached, while individual records of 3,000 bricks were made from time to time.

Methods and Appliances Adopted

As all of our readers are interested—some directly and others indirectly—in economical construction, we give a brief account of the methods and appliances adopted by the contractors for the buildings mentioned.

All bricks, including those for facing and ordinary work, were brought upon the site in railway trucks by way of a short siding. Owing to the circumstance that only three trucks could be accommodated at a time, it was found best to put a good staff of men on the work of unloading. The number of bricks handled by each man was carefully noted, and the figures were recorded on diagrams affixed to the outer wall of the contractor's office. As a result of this system the men soon began to take pride in their scores, and the spirit of competition thus engendered had the effect of facilitating operations to a noteworthy extent.

In place of ordinary hods, racks of special form were used, which consisted of cheaply made frames each holding 18 bricks in two tiers.

Bricks arriving by rail were sorted by the unloading gangs and stacked on racks, and these in turn were loaded upon special two-wheeled barrows designed for carrying twelve filled racks, or 216 bricks in all. For supplying the men working on two of the buildings the racks were delivered direct to lifts, whence the bricks were distributed by means of wheelbarrows at the required elevation. The other four buildings were supplied with bricks on barrows loaded up in storage sheds.

To avoid unnecessary labor in the transfer of material from the trucks to the storage sheds or the elevators, a simple form of gravity conveyor was used, consisting of steel rollers working in ball bearings carried by a light steel frame.

The number of bricks per rack was settled by practical experiments, which proved that the weight of about 90 pounds could be handled more economically than any other. Every effort was made to save the wasteful expenditure of skilled labor. With this aim the bricks were not only sorted into

two classes, but chipped and damaged specimens were rejected, and all bricks were placed on the racks with the plane face of each brick towards one end of the rack distinguished by a coat of black paint.

Stacks of bricks on racks were disposed close to each bricklayer. At first it was thought that the most convenient arrangement would be to place the racks parallel to the wall, but experience soon demonstrated the point that the bricks could be picked up more readily with the racks perpendicular to the wall. With two piles of bricks, facing and ordinary, close to his hand, and a trough of mortar equally near, the bricklayer had every opportunity of executing work without waste of time.

The mortar troughs were spaced 3 feet apart along the wall, and close alongside were the stacks of bricks, the arrangement being such that mortar was trowelled up with the right hand, and bricks were picked up with the left hand. It is stated that the bricklayers were not entirely satisfied with the spacing, but actual records of work accomplished speedily convinced them. So thoroughly did the contractors carry out the system that the arrangement of materials was reversed for left-handed bricklayers, and the results proved remunerative. After various experiments the mortar troughs were mounted at a given height above the staging so as to obviate stooping, and practical tests also showed that the best spacing of bricks and mortar was 19 inches from the wall.

System means Rapid Execution

Comparing the carefully-devised system briefly outlined above with the haphazard methods followed by the average building contractor, we have a very clear indication of one reason for the rapid execution of brickwork in the United States.

It is obvious, however, that the most scientific organization must fail in securing its intended object unless backed up by the willing support of those upon whom its application depends. In the case of the buildings now in question, the interest of the workmen was excited and sustained by counting and publicly recording the number of bricks laid per hour by every man. The necessary rule requiring that a wall shall be carried up course by course along its entire length, usually encourages slow work by men who can lay a specified number of bricks faster than some of their fellows. It was found that the system of counting bricks laid got rid at once of all tendency to loiter. Rapid workers seemed anxious that their records should not be spoiled by neighboring laggards, and having completed a course for their section of the wall they were only too pleased to empty the racks remaining by laying bricks on the right or left hand section where operations were behindhand.

In addition to the emulation fostered by the publication of individual records, further rivalry was established by providing flags of different sizes from 5 inches by 8 inches up to 5 feet by 8 feet, and permitting the largest flag to be flown by the foreman whose gang had laid the largest number of bricks on the preceding day. Miniature flags representing those on the various buildings were placed daily on the diagrams attached to the office wall.

The local labor unions at St. John, N.B., have organized a building trades council, of which Mr. J. S. Brown is the chairman.

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Bids Should be more Uniform

When the prices for which work is being let in this country to-day are considered, it is sometimes perplexing to attempt to fathom from what source the estimators have received their data. This in some cases must have been very inexact, for one not infrequently sees tenders for a particular job the prices for which vary as much as one hundred per cent. It is evident that the system of estimating must work in very different ways according to the opinion of the estimators.

Now the basis for estimating should exist in addition to a well-tested cost system and thorough knowledge of the materials and quantities required. It is not, of course, the custom for the engineer to place before the contractor the result of his careful calculation as to the cost of the work. Were this to be the general custom, the contractor would be better informed as to what was required of him and the engineer would receive more uniform prices on the work to be done. It is just as necessary for the contractor to have a basis upon which to build his estimate as it is to have material with which to construct. This basis the engineer should furnish, and there are those who consider it unfortunate that the lump sum tender has become so common. It must be admitted that many conditions exist in which this form of tender is most suited, but in large works this has been forced to an absurdity, and as a result most of the estimating is mere guesswork. In many cases it is asking too much of the tenderers to spend large sums of money in securing information upon which to bid, having in mind the fact that their chance of securing the contracts is possibly but one in twenty. It is obvious that

the contractor and engineer's client would both be more fairly treated if it were the custom among engineers to prepare in detail an estimate of the quantities of material, so that whether the work is let by unit prices or lump sum, the contractor would not be required to spend much time in preparing his tender. In this way he would figure more closely and with much greater assurance. Doubtless this would place greater responsibility upon the engineer, requiring him to be more exact in his work, but it would make it possible for him to secure better returns for that work.

Should Cement be Sold by Weight?

At a recent meeting of the American Society of Engineering Contractors, the custom of selling cement by weight came in for a good deal of criticism. A particular source of trouble, it was contended, is the fact that while cement is bought and sold by weight, its proportion to other ingredients with which it is mixed in construction work is figured according to volume. The added facts, that weight and volume do not always bear the same ratio to each other, and that there is a considerable difference between the volume loosely packed and the same weight of cement when closely packed, tend only to aggravate the case. The society closed the discussion by passing the following resolution:

That it is the sense of this meeting that the American Society of Engineering Contractors adopt, and advocate for general use, as a standard bag of cement, one weighing 94 pounds, and that this be considered the equivalent of one cubic foot.

The crop reports from the various sections of the country are on the whole most favorable. Grain is doing well all through the west, despite the fact that the recent cold spells somewhat retarded growth. The farmers expect to make new records in 1910. There is plenty of moisture in the ground and the grain is from five to seven inches high. From New Brunswick comes a statement that while May was a cold month and vegetation was consequently slow, the season in that province was favorable for seeding and the acreage put in crop quite up to the average.

Some little time ago the city council at Victoria, B.C., decided that a "Granitoid" pavement, for which an American concern has a Canadian patent, if laid by any other name, would wear as well. The American concern, to wit, the Bloom Paving Company, of Chicago, did not deny the truth of this assertion but resented the infringement of their patent. They are now contemplating a law suit against the city with a view to showing the illuminating effect of good deeds in a naughty world.

The Carpenters' and Joiners' Union at Toronto have decided to affiliate with the Trades and Labor Congress of Canada. At present they are only affiliated with the American Federation of Labor.

Equipment of Fire-fighting Waterworks

Installation and Cost of the Fire Service Water Supply System at Winnipeg, Man.—Results of a Working Test of the Plant*

By H. N. RUTTAN, City Engineer, Winnipeg.

In the year 1905, the city of Winnipeg was subject to very excessive fire insurance charges, due largely to the fact that the development of the waterworks system had not kept pace with the extraordinary growth of the city. As a means of relief the city council had a thorough investigation made.

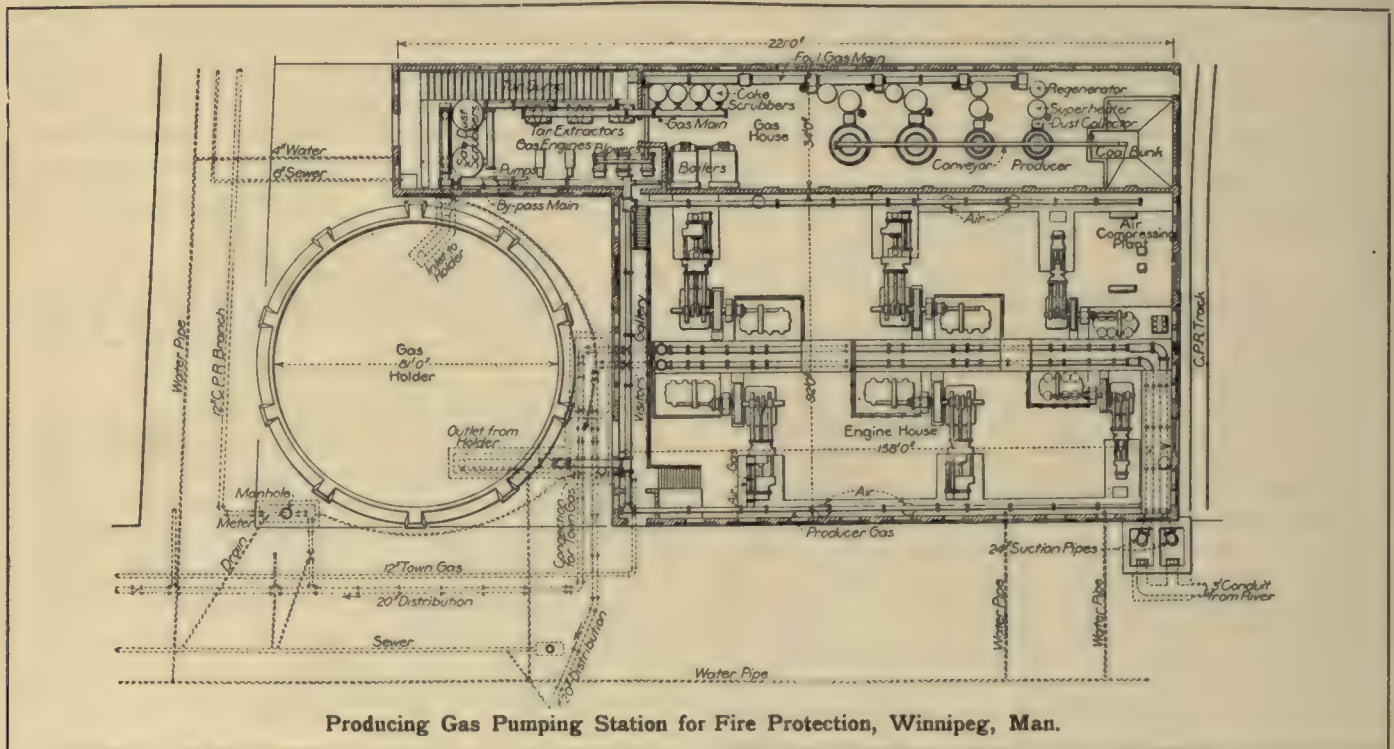
Committees of the council, with the city engineer, made several visits to the principal cities in Canada and the United States, where special systems were in use, and after a careful consideration, determined that the gas engine pumping plant offered, for the conditions of Winnipeg, the most economical and satisfactory solution of the problem of fire protection.

It was essential, from the fire underwriter's point of

The distribution is made by eight miles of mains from 10 to 20 inches in diameter, and 85 fire hydrants. It covers the central, closely built, business section of the city.

Pumping Station

The pumping station is situated on the bank of the Red river and contains the following equipment: 4 Crossley, 2-cylinder tandem gas engines of 540 h.p. each; 2 Crossley, 2-cylinder tandem gas engines of 250 h.p. each; air compressing starting plant in duplicate; 1 producer gas main supplying all engines; 1 city gas main, in reserve, supplying all engines. The engines above described drive six triplex double acting pumps. The pumps are furnished with suction and discharge mains, 20 inches



Producing Gas Pumping Station for Fire Protection, Winnipeg, Man.

view, that any plant adopted should be provided with two independent sources of power. Electricity would have been an ideal power, if the above condition could have been fulfilled. Steam was, on account of the heavy standby losses, out of the question.

Steam and electricity being out of the question, gas power, filling all the requirements, was finally adopted. For alternative sources of power, there are available, producer gas and city gas, in addition to a large reserve of producer gas in the holder. Standby losses in fuel in this system are practically nothing.

The first of the pumping units was placed in service in November, 1907, and has been available for fire protection since that time. The remaining units were completed, and placed in service between that time and July, 1908, when the whole plant was practically completed, and its operation taken over by the city.

in diameter, in duplicate, all pumps being connected with both mains, either main being of sufficient capacity for the whole plant. The pumps take their water from a well, which is divided into two compartments, either of which will supply the whole plant. The water is conducted to the well by an intake pipe three feet in diameter, which extends for a distance of 425 feet from the well to the deep water in the river, where it ends in a stone ballasted crib.

Producer Gas System

The producer-gas system consists of four Crossley producers, two of 500 h.p. and two of 1,000 h.p. each, an elevator and conveyor for handling coal, two air superheaters, hot-gas boilers for each unit, four wet scrubbers, three centrifugal tar extractors, two sawdust scrub-

*Extracted for this journal from a paper read before the American Waterworks Association, April 30th, 1910.

bers, centrifugal circulating pumps and Root air blowers. The cleaning plant is operated by two 18 h.p. Crossley gas engines, either of which is of sufficient capacity to drive the whole plant.

An important feature of the installation is that there is a spare unit of each type of machine, so that in case of a breakdown, the plant can still be operated to its rated capacity. Two steam boilers, of about 50 h.p. each, furnish what additional steam is required for the producer, and also drive the elevator and blowing engines, and supply steam for heating the buildings.

The gas holders and pumping station are connected with the city gas mains by a special 12-inch pipe. If, for any reason, the producer-gas system should be out of service, a full supply of city gas may be at once conducted to the holder or directly to the engines by a special main provided in the pumping station for that purpose. A gas holder of 250,000 cubic feet capacity stores a reserve of gas, either producer or city gas, sufficient to operate the whole plant for from one and one-half to five hours. This will give ample time to fire additional producers, or to make provision for the use of the city gas, in case of a long-continued fire. It is not likely that more than half the capacity of the plant will be required except in extraordinary cases.

Distribution System

Two 20-inch mains lead from the pumping station to Main street by different routes, connection with sub-mains on the way. Either of these mains, in case of accident to the other, is sufficient to take the water from the pumps when working at their rated capacity. The mains are designed to withstand the ordinary working pressure of 300 pounds per square inch and water hammer. They were tested to 700 pounds per square inch at the foundry, and after being laid, were tested to from 500 to 700 pounds. The pipes were provided with extra heavy hubs and two lead grooves. These joints have given entire satisfaction.

The hydrants are connected to the mains by 8-inch flanged pieces. They are provided with 4½-inch hose nozzles with independent gates. These nozzles are, when required, reduced to 3½ and 2½ inches by suitable reducers, 3½ inches being the largest hose now used.

The hydrant valve is 8 inches in diameter, and is provided with 1-inch pilot valve to fill the hydrant before opening the main valve against the pressure. Both the valves are operated by the same stem. Each hydrant connection is provided with a gate valve so that the hydrant may be cut out from the system in case of necessity.

With bituminous coal of 14,000 b.t.u. per pound the contractors guaranteed to deliver 75 per cent. of the heat value of the coal to the engines. Two tests of the producer plant were made, as follows:

Efficiency Test, Producer Plant

Bituminous slack coal and coke used in test,	
b.t.u. per pound	11,442
Guarantee 75 per cent. of above	8,582
Seventy-five per cent. of total b.t.u. in coal	226,616,292
Less surplus in holder	625,806
Guarantee	225,990,486
Delivered for use in engines computed on basis of individual tests	199,865,298
Deficiency amounting to 11 per cent.	26,125,248
This may be partly accounted for, Mr. Ruttan says,	

by (1) want of economy in firing boilers; (2) leakage from holder, which was allowed to blow of between 4 and 5.30 p.m., resulting in a considerable loss of gas; (3) the coal used was not up to the specifications as regards heat value as shown above. It was also of poor quality, on account of the large proportion of dust which it contained.

Working Test—The plant was run from 9.45 a.m. to 5.45 p.m. From 8.30 to 2.30 producers Nos. 1, 2 and 3 were operated with air-inlet valves half open, the pressure on the air main being 22 inches of water. At 2.30 o'clock the gas holder had risen 9 feet. At this time No. 1 producer was cut out, and air valves to Nos. 2 and 3 were opened to full extent, air blast being increased to 25½ inches of water. At 2.30 the calorific value of the gas in the holder was 170.74 b.t.u. per cubic foot. At 3.30 the holder had lowered 1 foot 8 inches, and the calorific value of the gas was 162.18 b.t.u. per cubic foot. The holder was maintained at this level until 4.30 o'clock, the calorific value of the gas at this time being 167.78 b.t.u. per cubic foot. Between 4.30 and 4.45 there was a rise of 9 inches in the holder. Between 4.45 and 5.30 the holder fell 1 foot 6 inches. Ashes were taken from the producers at this stage, and in the final 15 minutes of the test there was a slight rise in the holder. The whole plant was operated during this test at a pressure of 300 pounds per square inch.

Detailed Cost of Work

The buildings, intake, foundations, and distribution system, were constructed by the city, by day labor, and the cost of the several branches of the work were as follows:

Land	\$ 58,549.80
Buildings: Comprising about 840,000 bricks, 7,500 cubic yards concrete, 15,000 cubic yards excavation, 132 tons structural steel, roofing, mill-work, cranes, heating, etc.	179,144.11
Intake from river and well; Excavation, 3,500 cubic yards; concrete, 600 cubic yards; wooden conduit, 425 feet	28,912.80
Machinery, including gas producer plant	396,003.47

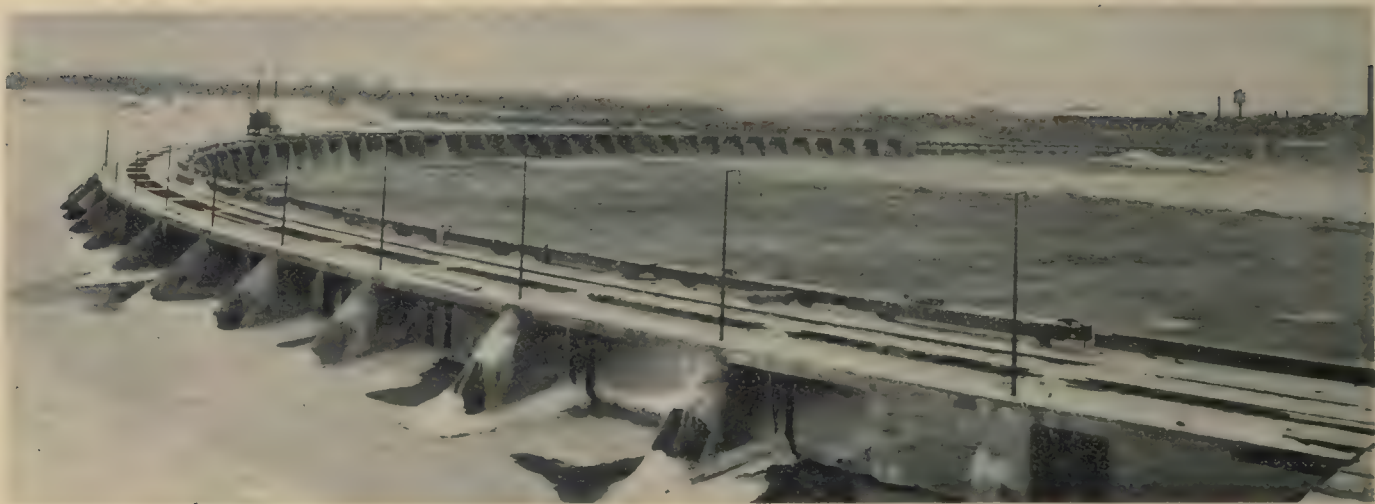
Distribution System:—

8-in. pipe, 285 feet	\$ 3.00	\$ 855.00
10-in. pipe, 18,261 feet	3.47	63,366.71
12-in. pipe, 16,290 feet	4.50	73,307.25
20-in. pipe, 3,196 feet	9.20	29,403.20
8-in. flgd., 1,390 feet	8.70	12,093.00
Asphalt, 13,414 feet	1.30	17,438.46
Hydrants, 79	200.00	15,800.00
8-in. valves, 79	33.00	2,607.00
10-in. valves, 41	45.00	1,845.00
12-in. valves, 26	68.00	1,768.00
20-in. valves, 4	180.00	720.00
Miscellaneous		6,851.92
		226,055.54

Miscellaneous:—

Preliminary expenses	\$3,003.57
Printing, etc.	1,405.55
Tools and plant	325.03
Spur track	84.48
Emergency gas main	3,518.71
Contingencies	1,174.02
	10,311.36
Engineering and interest, estimated	\$698,977.08
	44,948.00
Total	\$943,925.08

During the months of April and May of this year the building permits issued at Moose Jaw, Sask., totalled \$153,250 and \$207,000, while for the five months the permits represented a value of \$420,000, compared with an aggregate of \$194,900 for the first five months of 1909.



Chaudiere Dam upon Completion—The Steel Nosings, shown here, are an interesting feature.

Construction of the Great Chaudiere Dam

Brief Particulars of the Design—Methods and Special Features of the Work — Noteworthy Success of Steel Concrete Construction

BY A. HECTOR DION.

The Chaudiere dam, which has been in operation for some eleven months, and that has admirably fulfilled the purpose for which it was constructed, is one of the most striking applications of steel concrete applied to hydraulic purposes; its suitability and eminence over other forms becoming more and more apparent every day. The dam consists of 49 piers and 2 abutments placed radially to the arc of a circle having a radius of 566.33 feet, the length of arc being 1,300.189 feet. These piers are built up from solid Trenton bed rock to a height of 22 feet. They are connected by bridge floor slabs 15 inches thick, heavily reinforced.

The general dimensions of the piers are as follows: Length, 39 feet 5 inches at base, 23 feet 5½ inches at bridge floor; width, nose upstream at 4 feet, tail downstream 2 feet

The plan of pier presents a modified ellipse—this being the section creating least obstruction to flowing water. In designing the pier a water pressure of 100 tons and an ice pressure of 200 tons was used. The principal reinforcing used in piers consisted in long steel rods, 1¼-inch at 6-inch centres and ¾-inch diameter at

9-inch centres, bent into the shape of a hairpin. These had their ends upset and threaded to take a nut. These hairpins were bolted in a vertical position to 4-inch channels, which run the whole length of pier. These channels were, in turn, securely bolted to the rock by means of rock bolts. Outside of these, and wired to them, are ¾-inch steel rods, running horizontally, spaced at 16-inch centres. ¼-inch rods run parallel to the upstream and downstream ends of pier. These do not extend to the anchorage. A ½-inch steel plate nosing, plainly shown in picture, completes the pier. This nosing was to take care of the grinding and wear caused by ice shoves and logs.

The bridge slab, which is 23 feet 5½ inches wide and 15 inches deep, is securely tied in to piers by ¾-inch round steel rods bent to suit angle. This floor slab is reinforced with ¾-inch round steel rods at 6-inch centres at bottom and ½-inch round steel rods, 6-inch centres, at top. These are fastened together by U-shaped stirrups made of ¼-inch rods at right angles to the above rods. Cross rods were placed, these of ¼-inch round steel and at 14-inch centres. Double stop-log checks are



Rock Anchorage and Pier Nearly Complete.



Showing Stop Log Post and Hair Pin Reinforcement

placed in each pier; these are built up from 8-12-inch channels.

In the construction of this dam very little cofferdamming had to be resorted to, for at that time the water in the Ottawa river was at a very low level—a four-foot cofferdam sufficed. After the cofferdams were completed, the rock was barred and stripped off and the exact position of each pier located by transit checking back several times. This being done, rock bolt holes were drilled, and channel foundations put in, then hairpins erected in place, stop-log gains and nosings placed, the forms were put in. Steel nosings were placed to act as part of the forms.

One mixer was placed first at the Quebec end of dam and a travelling derrick mounted upon a track running at downstream side of dam. A Smith mixer was used. This dumped into buckets, which were hauled to derrick, which lifted them and deposited their contents into the forms. As each pier was completed, the derrick moved on. Sixteen piers were done from this end. Two mixers were used on the Ontario side and 33 piers were finished by the same method as above. A mixture of 1:3:6 was used in all foundations. For everything above the foundations a mixture of 1:2:4 was used.

Fissures or cracks were present in the rock above the



Method of Handling Concrete by means of Travelling Derrick

piers, so it was decided to put in a cut-off trench. This was done wherever there was any indication of cracks. In these a mixture of 1:3:6 was used.

The engineers who had the construction of the power dam in charge were Wm. Kennedy, Jr., Montreal, for the Quebec power owners, and John B. McRae, Ottawa, for the Ontario companies.

Methods of Reinforcing Macadam Roads*

By E. M. VAIL.

The method giving the best general satisfaction is to sweep the loose dirt from the stone bed to the shoulders, scarify or break up the surface of the upper course of stone, then spread and shape the old material to form a proper crown of the same curvature as the surface of the finished road, using a little new material where necessary.

Old roads are usually worn more in the centre than at the edges of the stone bed; hence when the loosened stone is raked toward the centre to form a crown, a shoulder of dirt is formed for the new stone which is to be added later. The shoulders are then cleaned and shaped for their entire width, the gutters properly attended to and the shrubbery and overhanging limbs of trees trimmed to at least twelve feet above the road at

all points. It is especially necessary that this work be done in advance of the spreading of the new stone, so that the new work may be kept clear of dust and dirt of all kinds.

The roadway, having been thus prepared, is ready to receive whatever kind of resurfacing the specifications call for. One method is to spread a cushion of clean, sharp sand, followed by new, clean 1½-inch stone, cubical wooden blocks being used to ensure a uniform width. After rolling once, hot asphaltum binder is applied, followed by a light coat of clean ¾-inch stone, enough to keep the roller from picking up the stone. This first application of binder and ¾-inch stone is sometimes followed by another applied in the same manner.

In cases where the old material is properly rolled and shaped, as explained above, no depressions or irregularities appear in the new work, but the 1½-inch stone shows on the surface with just enough ¾-inch stone and asphaltum oil to fill the voids and bind the whole together.

It is frequently necessary to take up an excess of binder appearing on the surface by spreading a light layer of ¾-inch stone and screenings, carefully broadcasting it with shovels where needed. If sand is used to fill a part of the voids between the stones, it is very important that it be shaken down out of sight before the asphaltum binder is applied or the binder will not adhere to the stones.

Uniformity of Courses

Some local engineers and supervisors do not yet realize the importance of having each course of stone uniform in size and the same depth in all parts, and therefore allow the contractor to dump the new stone on the hard, dusty surface of the old road where it will not properly bind.

If the loose dirt has not been swept away or scarified and rattled down among the old stone by rolling, it mingles with the new stone and prevents the asphaltum binder from adhering.

The additional stone necessary to build up a crown on an old flat surface costs more than scarifying and reshaping, because the depth of the new stone varies, perhaps, from 1 to 6 inches.

The amount of asphaltum binder required varies according to the depth of loose stone to be treated. When too little is applied, dust will soon work in and render it impossible to properly bind the stone even with an additional amount of binder. An excess of binder will result in soft, spongy spots, from which melted asphalt will ooze on a hot day. It will therefore be readily seen that in a section varying from 1 to 6 inches in depth it is almost impossible to determine the amount of binder required. In some cases only enough extra dirt is borrowed from the side of the road to form a narrow shoulder for the new stone instead of reshaping the entire shoulder to the gutter line as suggested. This causes an abrupt drop from the edge of the stone, which is liable to upset a vehicle.

The process just described is what is known as the penetration method, and gives very good results when exactly the proper material is obtained, heated and carefully applied in the right quantity. On account of the extreme care necessary from start to finish with the penetration method, it has been thought advisable on some of the more important roads to adopt the mixing method, even after considering the additional first cost.

The Mixing Method

For the mixing method the foundation and shoulders, or box, as it is commonly called, is formed in exactly the same manner as for penetration. Coarse stone, thoroughly coated by some one of the various mechanical

* Assistant State Supervisor of Public Roads, New Jersey.

methods, is then spread, cubical wooden blocks being used to aid in getting a uniform thickness before rolling, for when the roller has passed once over it, the material has set firmly together and it is difficult to fill up any slight depressions or roll down bumps.

This first course is followed by a thin second course of small stone coated in the same way, which is intended to fill up any spaces between the coarse stone and make a water-tight road. In some processes even a third coat, consisting of treated stone dust, is lightly scattered or broomed on to make a finished surface.

Since most of the work to be performed, with money apportioned the various counties from the motor ve-

hicle fund, will be by contract, it will be necessary for contractors who would successfully compete for this work, and, in fact, all state-aid work, to provide themselves not only with standard 10-ton rollers, the regular wide-tired wagons and small tools, but a scarifier and a suitable outfit for asphaltum work. One roller and one scarifier have occasionally been made to do the work for two or three small jobs located in the same district. While we should encourage small contractors in every possible way, it is not fair to county or state to put up with the annoyances and delays consequent upon such work, and every contractor is now expected to set apart a full set of tools for each particular job contracted for.

Effect of Sewage Gases on Concrete Work

Reliable Investigations and their Results—Disintegration Caused by Sulphur Compounds—Conditions Most Injurious to Portland Cement Concrete*

BY WM. DUNN, F. R. I. B. A.

The subject of the present communication, the author stated, was one in regard to which it might be assumed that the available evidence was either inconclusive or of a more or less negative character. For, notwithstanding that cases were on record of destructive changes in tanks and sewers, the opinion tended to prevail that when the concrete construction was sound no marked disintegration need be anticipated, neither from sewage nor from its emanations.

The author's experience, however, did not support this view, and it was to the elaboration of this, the positive side of the question, that he desired to direct attention. During the last five or six years he had had very special opportunities for studying the problem.

The concrete was composed of one part of Portland cement properly mixed with clean water and six parts of ballast thoroughly free from loam, clay, mud, or dirt of any kind, and no material was allowed to be used larger than would pass through a 2-inch screen.

Along the sewage inlet channel it was observed that the greatest disintegration had taken place on the walls at the liquid level. Owing to variations in the flow of the sewage, the level of the liquid in the tank and channels rose and fell; thus a certain area of the walls was constantly being immersed in the sewage and then exposed to the air. This area was, consequently, even when not immersed, much wetter than the part of the walls which was always above the level of the liquid. The latter area at this point showed erosion, which, however, had not penetrated so deeply as that at the level of the liquid itself. At the liquid level there was a deep groove in the concrete, and above this the face of the work had bulged out and lost its nature.

The first portion of the hydrolytic tank appeared to have suffered very little. The walls and roof had only the slight sulphur deposit. At the liquid level, which varied less than in the channel, there was a slight erosion. The second part of the tank, i.e., the hydrolysing chambers, was found to have suffered in places to a marked degree. It was observed on breaking through the erosion on the surface that the concrete at the back was moist, soft and gritty. Also, it was noticed that increased dampness constituted an important factor in the destruction of the concrete, for the lower parts of the vertical faces of the beams supporting the roof were more

affected than the upper parts. The lower portions of the vertical walls of the tank also were more eroded than the upper. At the liquid level the concrete had been severely attacked, and a deep groove existed in it.

The point indicated by analyses was the conversion of the lime in the cement into sulphate of lime, the sulphur being obtained from the sewage flowing through the tank and channels, as well as from the gases expelled from the sewage, and contained in the air withdrawn from the several parts of the installation.

Suggested Explanation

Much thought had been given to the explanation of the foregoing observations, and it had been concluded that the effects had arisen from the putridity of the sewage and the oxidation of the putrid products by the air supply. The main erosive effect was at the varying liquid level, and was there dependent upon the amount of sulphuretted hydrogen in solution in the liquid. The gas was comparatively small in amount in the incoming sewage and in the liquid in the hydrolytic tank, and increased as the liquid passed through the hydrolysing chambers. The results of this were especially well shown in the two channels; the alternate wet and dry area of the upper channel conveying the sewage from the rising main was less markedly affected, whilst in the lower channel the corresponding area was severely attacked. So with the two parts of the tank; the first part into which the sewage was delivered, and wherein comparatively little putrefaction took place, had not been affected to anything like the extent that the second part or hydrolysing chambers had.

When the level of the liquid fell it left the concrete which it previously covered wetted with a liquid containing sulphuretted hydrogen in solution. This wet surface was then exposed to the action of the air supply, which oxidized the sulphuretted hydrogen with the production of sulphur and sulphuric acids; these decomposed the concrete, the lime being converted finally into sulphate of lime. What the exact nature of the intermediate compounds was could not be stated, as none of them had been isolated, but it was probable that the active agent was sulphurous acid, as it was known that cement was insoluble in sulphuric acid. When the liquid rose again, the decomposed concrete was washed away either wholly or in part, and a fresh surface was exposed to action when the liquid fell again. It was the continua-

*Synopsis of a paper read before the Concrete Institute, London.

tion of this cycle which led to the formation of the grooves at the varying liquid level.

Concrete Above the Liquid Level

The erosive effects on the concrete above the liquid level were dependent upon the sulphuretted hydrogen evolved from the liquid and mixed with the air supply. Some of this gas was dissolved by the moisture which was present on the walls and roofs, from evaporation and condensation; it was then oxidized by the air, and decomposed the concrete. In this case the decomposed concrete either remained as a coating on the surface, peeled off, or crumbled away.

Effect on Concrete Tubes

In order to observe the phenomenon on concrete tubes, two 9-inch concrete tubes were selected, which were supplied by the makers of the paving slabs, previously referred to, and were composed also of similar materials in the same proportion. One of the tubes was coated with Dr. Angus Smith's composition (coal tar, pitch, linseed oil, and resin). They were placed side by side in the second part of the tank in such a position that they would be subjected to the rise and fall in the level of the liquid. At low level the tubes were not in contact with the liquid, and at high level the liquid rose to half the diameter.

After the tubes had remained in the tank for eight months they were taken out and examined. The coated tube did not appear to have been affected, other than at the highest liquid level, where a thin line could be observed, and when struck it was found hard and had a good sound. It was noticed that there were two areas on this tube without any coating, due no doubt to its having been placed upon two supports to allow it to dry; these areas were soft on the surface and similar to the uncoated tube. With these exceptions the tube appeared to be in as good a condition as when first placed in the tank. On the other hand, the uncoated tube had a distinct line at the highest liquid level, which was found to be soft, and when tapped with a chisel had a dull sound; the interior of the tube which had been immersed appeared soft and had a dull sound when struck; the portion of the tube above the liquid level was unaffected, and when struck had a clear ring.

The author then referred to other cases of disintegration of concrete by sulphur compounds.

Conclusions

The deductions to be drawn from the investigations were that the gases in solution in sewage, and those expelled from it, arising from its decomposition, do act injuriously upon Portland cement concrete, notwithstanding the fact that the concrete is constituted of sound and good materials, when the following conditions prevail:

1. A high degree of putrescence of the sewage.
2. A moistened surface, which held or absorbed the putrid gases.
3. The presence of a free air supply.

Further, that in the absence of one or other of the above enumerated factors little danger from erosion need be feared.

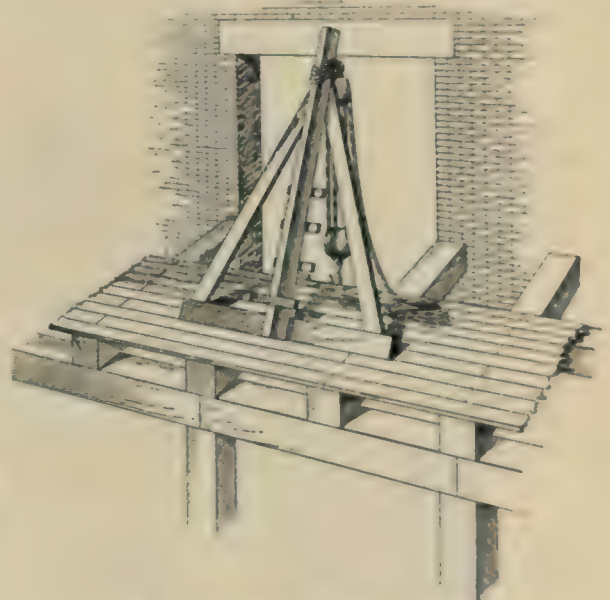
Good Roads Competition

The Manitoba Good Roads' Association has instituted a competition in which any four municipalities may participate, the first four applicants only securing the privilege of competing. Entries must be made before June 16, and the amount to be paid by a municipality to contestants for the mile allotted them must not exceed \$15 for the three months. There are three prizes for each

municipality, to be donated to individuals keeping the best mile of road. The first prize is \$25, the second \$15, and the third \$10.

An Improvised Builders' Derrick

There are times—and rather frequently, too—when it becomes necessary to hastily lower into or raise from basement or cellar, or from one storey of a building to another, great weights, such, for example, as safes, machinery, wooden cases, etc., and for this purpose some extemporized means must be devised in order to accomplish the work quickly and satisfactorily, says "The Building Age." An appliance for such a purpose is illustrated in the sketch shown herewith, the apparatus being rapidly put together by a builder for lowering a



An Improvised Builders' Derrick.

boiler, elevator machinery and dynamos from the street into the basement of a recently erected building.

Virtually it might be stated that the drawing explains itself. Still, for the benefit of those interested, we might state that, as shown, the derrick is placed on a platform or bridge extending over the sidewalk, this bridge being not only for the purpose of providing a protection for pedestrians passing underneath against materials and scraps falling from the new building while in process of construction, but also, fully as important, affording a clear working space for the mechanics and the materials with which they are concerned.

The derrick is built up of a 2 x 8-inch or 3 x 12-inch timber, which is set on edge. Square to one end a piece of 1 x 8-inch flooring is solidly nailed and then on each side the derrick plank or timber, as it may be termed, is braced with two 1 x 6-inch strips or pieces securely nailed as indicated in the sketch. The derrick slopes at an angle of about 60 degrees when placed against a wall or lintel of a window opening, for example, and is provided with climbing cleats and tackle. Its construction is but the work of a few minutes and it is most useful when a job of this nature is to be done in a hurry.

Building operations at Victoria, B.C., are very brisk. There is a great deal of work on hand, notably in residence construction, the demand for houses being particularly well sustained. The difficulty of contractors in every line is securing sufficient men for the work.

Distinctive Design for Small School

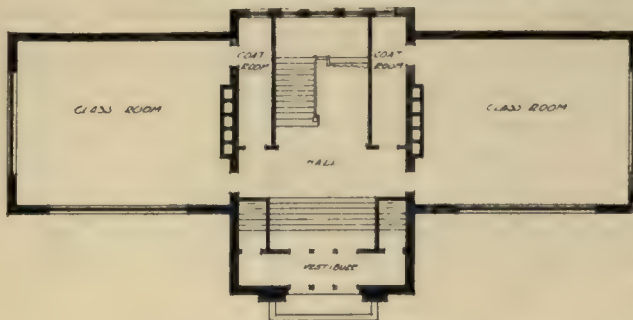
In the last issue of the "Contract Record," June 8th, we published a well considered design for an 8-room school at Amherstburg, Ont. With a view to assisting the smaller municipalities in the selection of a design and to show the latest ideas in this important branch, we herewith present perspective and plans of an attractive well designed 4-room school building. The school is designed in the Elizabethan style, a very pleasant yet striking use of stucco and exposed timber work having been used. The grouping of the windows carries out the idea of this style also. In a building of this kind

brick. The effect on the eye was that of a surface so absolutely uniform as to produce the appearance of a pointed and ruled wall, says "Shoppell's."

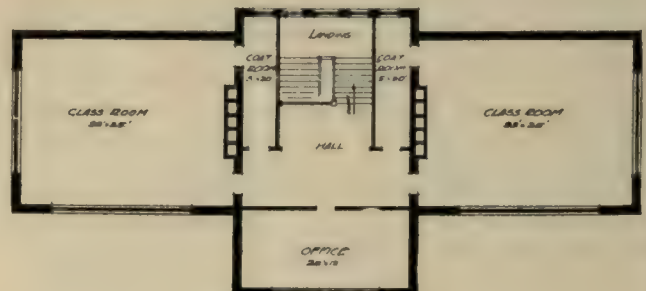
The later discovery of clays that would burn brown, old gold, buff, gray and other light colors brought these into wide use and plain red brick was no longer the prevailing and exclusive style. One color has succeeded another in popularity, until to-day the intending builder has a wide range of color from which to select, even green and blue being at his command, these shades being secured by the use of glazed, or semi-glazed, surfaces. With the increase in the colors, there has been a rapid development in the matter of thickness, the



Attractive 4-Room School, Offering a Satisfactory Solution to the Problems of Small Municipalities.



First Floor Plan.



Second Floor Plan.

all the pupils are certain to have plenty of light and air. The arrangement of the rooms assures an easy-running school with no congestion nor crowding.

The exterior material of this building is brick, both for walls and trimmings. Cement plaster on metal lath is used in the gables. The roof is slate.

A score of years ago the finest fronts of buildings were constructed of red pressed brick, carefully gauged to size, and shaded to one even color. The brick was laid in running bond, with the narrowest possible mortar joint, which was usually of a red color to match the

color and texture of the mortar joints and in the style of bonding the face brick to the backing-up wall, so that the construction of a brick facade in the twentieth century has become a highly artistic proposition, capable of the best results, only under the supervision of a skilled architect.

In these days a brick wall, to be interesting, must have "life" and "texture," and these features can be secured by the use of brick that varies in color. This change of the fashion in brick is the strongest evidence

How to Light the Modern School Building

An Important Phase of Hygiene for Architects and Others— Notes on the Selection of Site—Width and Structure of Windows*

BY G. T. FOREST

A combination of three requirements is necessary for the proper and efficient lighting of a school: (1) The selection of the site; (2) the requisites of the architecture and equipment; and (3) the teachers' duty. With reference to the latter it is important that the teacher bear in mind that he has an interest and responsibility in connection with each of the sub-divisions. He may have no hand in the choice of the site or in the planning of the building, but unless he knows the principles involved he is almost certain to violate seriously the requirements of school hygiene as applied to the lighting of classrooms.

Selection of the Site

The value of high ground for the school site is inestimable; it ensures good drainage and more light by reducing the height of the obstructions and giving a freer play to the sunlight, the influence of which secures immunity from dampness. The building should be placed so that it is possible for each child to see the sky from his desk. The control of trees should be secured with the purchase of the site. If they do not interfere with the lighting of the building well and good, but this point should be carefully considered when inspecting suitable ground. The question of how to secure sunlight for all the rooms during some part of the day has led to considerable discussion as to the best direction for a building to face. Buildings should not be placed so as to coincide with the points of the compass, otherwise the north side rooms, if lighted on one side only are cut off from the sun, while south rooms may get too warm in hot weather. To avoid this the building should face the middle points of the compass. By this arrangement each side receives the sun at some time during the day. A frontage of this sort makes southeast rooms most desirable, southwest next, then the northeast, and the northwest is least desirable, as the effects of the sun are only felt after the children have gone for the day. These distinctions, however, must not be carried to an unnecessarily fine point, but when such a site can be obtained as readily as another it should be given the preference.

If a building is so planned that it is impossible to secure the sun for each room the deficiency should be made up by increasing heating and ventilation. Having determined the character of the building be careful to put the light in the rooms used for school work. This, of course, is the mandate of common sense, but how many times do we see that these considerations are not always regarded—e.g., assembly halls put on the south side, teachers' rooms monopolizing windows which should go to light classrooms, and staircases often to be found on the side of the building having the best light.

Amount of Window Space

The relation of window space to floor space should be at least one to six; this ought to give the minimum of defective eyesight. Knowing the amount of window space required as compared with the floor space, the next problem concerns the location of the light. Here two considerations are involved: (1) The full light must

shine on the children's work; (2) the light must not be faced by pupils or teacher.

The conditions are fulfilled by adequate lighting from the left, and it must be borne in mind that the light from the highest part of the room is by far the most valuable. That which comes through the lower panes goes to the floor. No shadows are cast by left-hand light. Light from behind, however, casts shadows on the books from the head and body of the pupil. Light from the right is obstructed by the pupil's hand, and there should be no light facing the pupil. For reading purposes, front lighting is exceedingly bad, as the light is thrown on the binding of the book instead of the page. Of all possible combinations of bilateral lighting, that with windows at the left and right is much to be preferred. This form of lighting is very often seen in small country schools. Also care should be taken that the lighting from the right hand should be shaded, leaving the chief source of illumination from the left. Light from the left and rear is particularly trying to the teacher, although from the pupil's standpoint alone the left and rear lighting is usually better than right and left, for, as a matter of fact, the children farthest away from the windows on the left get from that direction not only the light from windows on that side, but even the light from most of the rear windows comes to them from the left.

In furnishing a classroom, seats should never be placed close to the windows; the last desk nearest the wall facing the teacher should always be in a line with the side of the window openings, and not be placed in the shadow of the wall.

Width and Structure of Windows

So many varieties of classroom windows are in vogue both as regards design and construction, and having regard to the ventilation of the classroom, that it will be sufficient here to outline a few of the main principles which determine their use. It is well to remember when designing windows that the light should enter the room as a unit, so that there will be no distinguishing cross lights, no distinctly outlined shadows, and one light will shade into another without any visible lines. In other words, there should be broad piers or mullions between the daylight openings. On that account I am not an advocate of planning classrooms having only two windows, as this necessitates a considerable amount of wall surface between them. I am of opinion that the best and most suitable form of classroom window for an ordinary sized classroom, to accommodate, say, 50 or 60 children, is a 3-light one; but it is hardly possible to construct brick piers of sufficient strength in a building of any height that will not interfere considerably with the light. Eighteen inches seems to be the width usually adopted, but as this width throws a shadow on the desks nearest the window, cast iron mullions are, I believe, now used, although I have not seen any. These are cast with heavy webs, and with the window frame bolted directly to them. In this way it is possible to put the windows sufficiently close, and at the same time provide sufficient strength. When brick piers are used they should always be bevelled on the inside.

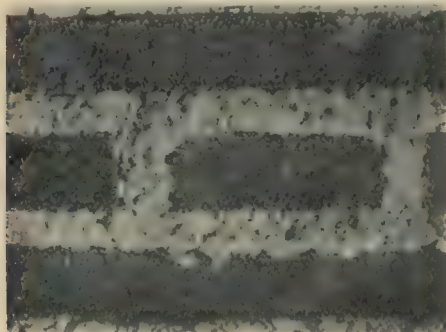
* Extracted for this journal from a paper read before the Royal Sanitary Institute

Suggestions in Brickwork

Till some twenty-five years ago bricks were commonly considered as convenient substitutes for stone where the cost of a building was to be kept down, but during the last quarter of a century, and particularly during the last ten years, architects and builders have realized that there are possibilities in building with bricks which were formerly undreamed of, even by the most progressive men.

It used to be thought that bricks should be of as even and regular a texture and color as possible, but of late years it has been found that a less mechanical effect can be produced, and in some instances really artistic results can be obtained by means of somewhat rougher bricks laid with a wider jointing or in mortar of a different color from that usually employed.

The accompanying illustrations show what is being accomplished by a progressive firm of builders, who wish to



Late Fashions Show Ruggedness in Texture and Irregularity in Appearance

impress on their customers the desirability of a great variety, and the beautiful effects which may be obtained at comparatively little cost by the use of a little artistic taste.

Both in this country and in Great Britain architects are becoming keenly interested in getting away from the dull monotony of ordinary brickwork, and the builder who can point to some of the designs shown in the accompanying photographs can often secure customers who would otherwise pass him. This is especially the case with residences in the country and smaller towns.

Nothing harmonizes quite so well as a variegated brick set in an appropriate mortar for country residences; the surrounding green and the play of color in the brick help to show each other off. On the other hand, few colors are more



Brick of Even Color and Narrow Joints

Detail of Brickwork Showing Rough Brick and Wide Mortar Joints

glaringly discordant than the beautiful green of the trees and grass and the ordinary dull and lifeless color of monotonous bricks.

Modern bricks are no longer made in the same way as formerly, and the play of colors now obtainable, together with the more artistic texture of the surface, are such as to commend themselves in all places where stone is expensive or undesirable, and in many others where stone and brick are in competition.

A glance at the illustrations is sufficient to show the force of this argument, and in addition to the standard sizes fur-



Brick of Varying Shades with Wide Joints

Tapestry Brick in Variable Colors Laid in Black Mortar

ther effects can be obtained by employing narrower bricks of the old "Roman" type.

A style of brickwork which is rapidly increasing in popularity in this country, is made of vitrified bricks, or "pavers." These are remarkably dense and waterproof, and of a dark red or even bluish color. The headers are often darker than the stretchers, but this is considered to increase the effect rather than diminish it. The Galesburg bricks associated with Milwaukee are somewhat too harsh in appearance for this kind of work, but the redder varieties from that district are admirable, and may well be used in conjunction with a few vitrified bricks.

The wide mortar joint requires considerable care, or it will offend by its coarseness rather than please by its rugged beauty. When properly used, however, it undoubtedly adds to the interest of buildings in which it is employed.

Slates or tiles should be chosen to harmonize with the brickwork, and, like it, should have some variety of coloring, as a tiled roof, the whole of which is a bright brick red, is scarcely less ugly than the monotony of a slated roof. Fortunately, the roofing tile manufacturers appreciate this fact, and supply tiles which are admirable in every respect.—National Builder.

Cost and Methods of Sewer Work at Hamilton, Ont.

Some interesting information is noted in the annual report of City Engineer Macallum, of Hamilton, Ont. The following extracts are culled from this report:

Street Railway Work—New street railway tracks were laid on James street from Herkimer to Barton street, and on Barton street from James street to Sherman avenue. The rails used were 9½-inch girder lip rails, running 94 pounds to the yard and double bonded to each other. They were laid on steel ties at 10-foot centres, these ties being 6 inches deep, 6 feet, 6 inches long, having a top web of 4 inches and a bottom one of 8 inches. Every 5 feet tie-rods connecting the rails were placed. The concrete base of a 1:3:5 mixture and 6 inches in thickness was placed beneath the cross ties, and when rails were in position this same mixture was placed to come up above the base of the rails, leaving sufficient space for a ½-inch cushion of cement and sand and a 3-inch creosoted wooden block.

On James street the space between the rails and one foot beyond outside rails was paved with creosoted wooden blocks of long leaf Georgia pine. The spaces between the blocks were filled with cement grout, with the exception of the portions outside of rails, which were filled with an asphalt filler.

On Barton street, from James to Sherman avenue, the space between the rails was paved with vitrified brick laid in cement grout, and one foot outside of the outer rails was paved with wooden blocks filled with the asphalt filler.

On Barton street great difficulty was experienced in keeping the traffic off the brick paving a sufficient length of time to ensure the proper setting of the cement grout filler. Where the traffic was resumed too soon, on some portions of this pavement, the grout filler was destroyed, thereby lessening

the life of the pavement. The remaining portions of the pavement between the rail and brick gutter was paved with asphalt.

Pavements—Below is appended a list of all streets paved with asphalt during the year:

Street	Sq. yards.	Sq. yd.	Total Cost
**John street	2,181	1.27	\$ 3,302.11
*Park street	1,766	1.38	2,547.77
West avenue	897	1.20	1,082.29
Webber avenue	585	1.24	725.12
Market street	2,739	0.75	2,056.52
James street	4,625	0.95	4,617.95
*Barton street	7,742	0.83	6,419.75
*Barton street	13,570	0.92	12,442.46

Totals 34,105 \$33,193.97

**Cost of brick pavement 8 feet wide alongside curb between Hunter and Jackson streets included.

*Cost of binder included in these figures.

Repairs to the extent of 3,129 square yards were made to the asphalt pavements at a cost of \$2,987.94, or 95.5 cents per square yard.

A creosoted wooden block pavement, having blocks with grooves, because of the grade, was laid on James street, from Herkimer to a point 200 feet south of Markland street. The spaces between the blocks were filled with an asphalt filler.

A further decrease in the amount of cement walks laid during the year is shown below in comparison with past years. The old wooden walks have now been entirely superseded by cement walks, which leaves only cement walks to be constructed on new streets that may be opened up.

Cement Curbs Constructed in 1909

Total lineal feet	3,051
Total cost	\$1,070.79
Average cost per foot	cents 35.1

Cement Curbs Constructed in 1908

Total lineal feet	569
Total cost	\$253.73
Average cost per foot	cents 44.5

The mileage of cement walks laid each year, from 1897 to 1909, is as follows: 1897, 0.5; 1898, 0.67; 1899, 5.17; 1900, 11.13; 1901, 23.7; 1902, 34.1; 1903, 21.43; 1904, 18.58; 1905, 18.89; 1906, 9.93; 1907, 8.23; 1908, 8.06; 1909, 3.9; total, 164.29 miles.

Outfall Sewers—The main overflow sewer on Catharine street from the end of the present sewer to the revetment wall was completed. This sewer, which is 387 feet in length and 36 inches in diameter, was built on a pile foundation, the double row of piles being spaced 6 feet apart. The base was made of a reinforced concrete slab, while the barrel was made of ordinary concrete 9 inches thick. This sewer, including the piling, cost \$2,978.75, or \$7.69 per linear foot.

The main sewer on Ferguson avenue was also extended to the revetment wall. Part of this sewer was constructed of concrete and part of 5-foot cast iron pipe laid on pile bents and stringers. The concrete portion of the sewer was completed and the iron pipe placed in position and caulked. The pipe has yet to be connected to the revetment wall and to the concrete end of the sewer.

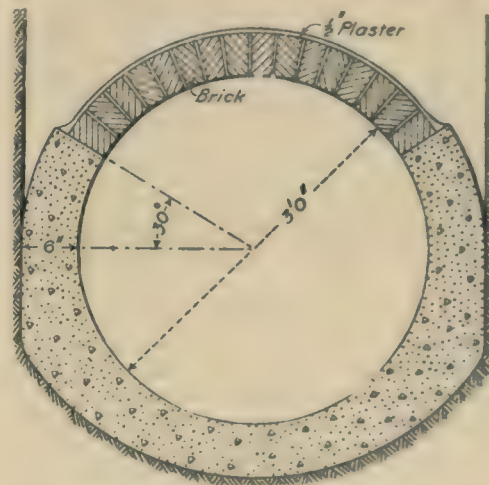
The concrete base of the sewer was constructed on a foundation composed of 9-inch I beams, placed 4 feet apart and checked into the old piles of present flume. The bottom and sides of this sewer are flat, but top is arched. The total cost of the concrete part of this sewer, not including the I beams, was \$2,168.48, or \$5.22 per foot. This sewer was 415 feet long, having the concrete 9 inches thick.

West End Sewer—This sewer, emptying into the marsh, burst during the summer. It is draining a district too large for it, including the Provincial Asylum, and besides being too small is also in bad condition. A new sewer 6½ feet in diameter, together with a disposal plant, has been designed and is now awaiting the decision of the Provincial Government as to the proportion they are willing to contribute towards its construction and maintenance.

Mountain Sewers—The recently annexed mountain top district had a sewerage system built during this summer. The construction was entirely in rock, and to reduce cost where water pipes were laid, the same trench held both pipes. Besides possible settling of the water pipes, it will be extremely difficult to locate breaks using this method of construction.

Itemized Cost of Storm Water Drain

A 3-foot storm water drain with concrete invert and sides and a brick arch has been built recently at Indiana, Pa. The following particulars of the work are furnished by the "Engineering Record": The length of the line was 700 feet and



Cross Section of Storm Water Drain

the depth of the trench, which was 4 feet wide, averaged about 5 feet; the material was earth, and was taken out with pick and shovel.

Concrete was mixed by hand in the proportion of 1:3:5 and deposited, by shovelling into a trough, directly against the sides of the trench and on the bottom which had been brought to a circular shape at the required grade. The mix was sloppy and rammed into place with a curved tool, the average thickness of the invert and side walls being about 7 inches.

The forms were of wood and were built in lengths to 10 feet. Each section was made up of two longitudinal pieces fastened together by five ordinary door hinges fixed to 2-inch braces spaced every two feet, so that the forms could readily be collapsed and withdrawn after the concrete had set. They were held 6 inches above the trench bottom by a single line of brick, placed on end and spaced on 2-foot centres. Cross-braces, 2 x 2 inches, were nailed temporarily to the 2-inch braces of the forms to act as spreaders, and 2 x 4-inch braces were extended from the bottom of the form, where they were held by a single spike, into the sides of the trench, in order to prevent the centre from rising when the concrete was rammed beneath it.

The brick arch, shown in the section of the sewer reproduced herewith, was put on a 3-foot wooden form supported from the invert by a 2 x 4-inch post, and moved forward as each section was completed, making the brick work continuous. The arch was plastered with mortar.

The cost of building this drain, as given by Mr Thomas

Pealer, borough engineer, under whose direction the work was carried on, is given in the accompanying table:

3-foot Circular Drain, Concrete and Brick.

Total length, 700 feet. Average depth of trench, 5 feet.

Item—	Cost per foot.
Excavation and back fill	\$0.60
Cement, \$1.20 per barrel	.174
Sand, \$1.25 per ton	.104
Stone, \$1.25 per ton	.208
Mixing and placing (5 men and foreman placed 60 feet in 10 hours)	.194
Setting forms	.029
Cost of forms (60 feet at 67 cents for 700 feet)	.058
Removing forms	.022
Brick (old paving brick, \$5 per M)	.135
Bricklayer and helper	.094
Mortar	.085
Certing	.100
Incidentals	.030
Total	\$1 837
Labor at \$1.75 for 10 hours.	

Reinforced Concrete for the Small House*

By C. R. KNAPP

The small and medium priced house in reinforced concrete is to-day a reality and not a theory. It was not so long ago that concrete was considered suitable for the large structures only, and even to-day the big man, in concrete, will tell you that the small house, in concrete, cannot be built in competition with other building materials. They are right, in so far that it cannot be done using their methods, which are only adapted to the large structure. It can be, and is being built successfully, by using any one of a number of systems that are adapted for the small work, which would be just as much out of place in large work as the large methods would be in small work. The small house is the one thing nearest to the masses. Anything that pertains to a home appeals to them. They are watching all concrete work with much more than ordinary interest.

Size of Wall for Two-Storey House

Not so very long ago, to build less than a 12-inch solid concrete wall for even a one-storey building was considered unsafe. Now a 6-inch reinforced wall is found to be of sufficient strength for any two-storey house. This saving in labor and materials has greatly reduced the cost and helped very much towards making the small house possible in reinforced concrete. The 6-inch wall will not show any dampness, if the concrete is properly mixed and placed. For a summer home, inland or seashore, no plastering is necessary, thus the cost is reduced to a minimum. For an all-the-year house, in a warm climate, plaster directly on the wall, thereby the furring and lathing can be done away with. If the house is in a cold climate, I would advise that furring blocks be used, with the usual brown coat of plaster, as otherwise the wall may be too cold.

The wall that seems best suited for house construction and one which I believe has more advantages than any other is the hollow wall, consisting of two 4-inch walls with a 4-inch air space between. Both walls are reinforced with $\frac{1}{2}$ -inch or $\frac{3}{4}$ -inch steel rods spaced upright, at least every 18 inches, staggered and horizontal about 3 feet apart. To tie the two walls together, I leave a 3-inch web every 8 feet, and have metal ties every $2\frac{1}{2}$ feet both ways. The double wall ensures against dampness and makes the house cool in summer and warm in winter. The air space may be utilized as a ventilating system, allowing each room to be ventilated without regard to any other room.

The extra cost of double walls is more than offset by the saving in being able to plaster directly on the concrete, using

only one brown coat or the white putty coat. A beautiful and artistic effect may be had by so erecting the inner walls and partition walls (if of concrete) that they do not require plastering or other covering. Concrete has sufficient merit to be treated frankly as such, instead of being hidden. Now introduce color and decoration by using tiles and mosaic to give the needed life and relieve the monotony, but not for the purpose of hiding the concrete, which is exposed frankly where decorations do not occur. Then decoration will exercise its true function, by emphasizing, instead of hiding structural beauty. It is almost needless to say that, where this effect is sought, concrete, being a plastic material, is admirably adapted for this purpose. In this way we "decorate construction," and we do not "construct decoration." In many instances the effect of the decoration is so great as to at once convince the uninstructed.

To make the air space a system of collapsible cores is generally used. A better way, to my mind, is to make a concrete core, similar to a terra cotta partition tile, which is, of course, left in the wall. By using this method from one to two inches of concrete may be saved without affecting the strength. The core can be made on the job for about half what the terra cotta partition tile will cost.

Damp-Proof Character of 6-inch Wall

An illustration of not only this simple method of surface treatment, but also the damp-proof character of a thoroughly well-made 6-inch wall, is the seashore house of Mrs. Gaston Daus, at Ocean City, N.J., within a block of the beach. While most of the rooms are furred and plastered, there are several apartments in which the porch floor serves as a ceiling, in which the walls have not been plastered. The house was built during the past summer and not the slightest sign of dampness or condensation has appeared. For weeks a pool of water lay on the porch before the top coat was put on, and no dampness appeared underneath. After protracted storms the surface seemed to dry off instantly, while neighboring houses of brick and even frame construction retained evidences of moisture upon the outside, long after the concrete house had assumed its natural color.

People are demanding fireproof houses to-day. They must, however, be educated to pay a higher first cost, if necessary, for this class of construction, and to realize that it is economy in the end, even at the increased cost. Repairs and insurance are practically eliminated. There is also a saving of 25 per cent. to 40 per cent. in the cost of heating, besides having a house that is thoroughly sanitary.

In the matter of cost we constantly see unfair comparisons made between concrete and other materials. For example, you and I, as cement workers, build a dwelling of reinforced concrete from cellar to roof. This type of house is expensive, and immediately somebody exclaims: "My, your concrete house cost more than my brick house!" As a matter of fact our critic has not a brick house, in the sense that our house is concrete, he merely has a house with brick walls. Suppose he were to introduce the durable and fire-resisting features of the all-concrete house, by having his floors, stairways and other features in brick. What would become of his theory as to excessive cost of concrete? It is in this way that the two materials should be compared. We can easily hold our own when it comes to mere wall construction, and more than hold it when our opponents seek materials of like durability for interiors and roofs.

One of the first things to do in building a concrete house is to get a concrete design, for, of all building material, concrete requires the most individual treatment. Many houses are built of concrete, after being drafted for brick, stone or frame and this is the reason, some people say, they do not like the looks of a concrete house. The houses they have in mind probably would not appeal to us any more than they do to them.

*Extracted from paper read at the recent Convention of the National Association of Cement Users.

Live-Loads and Life of Railway Bridges

For what Loading should Railway Bridges be Designed—A few Practical Suggestions Emanating from Developments of Last Quarter of a Century

Railway bridges have always occupied a peculiar position among engineering structures on account of the steady increase in engine and train weights. Bridges could not remain "modern" very long, but were outgrown after a very short period. It was always the custom to design for existing loadings, or at most only a small margin of increase. But loads continued to increase and to render new bridges obsolete.

The same custom still prevails. There is to-day better reason for expecting that train loadings will remain practically stationary. Freight cars have reached a very high capacity, and engines, while still increasing in weight, show little or no increase in wheel-loads but distribute the additional weight over added length of base. May we, therefore, expect that the bridges which are now being built will have a longer term of life than those of the past generation?

Just now many railway bridges built in the 80's are being taken out and replaced by heavier structures. An example of such renewal, interesting for a variety of reasons, is the Ohio river bridge at Point Pleasant, on the Kanawha & Michigan Railway. This bridge lived to be 25 years old. A parallel instance from a larger and more prominent railway is the case of the Panhandle bridge over the Ohio at Steubenville, O. This is only 20 years old, but it has also become too light and is therefore being replaced.

These bridges, as well as many others which are being removed, have not rusted out, but on the contrary are usually in excellent condition as regards corrosion. On the score of rusting alone, they would be only just entering the prime of life. But the weight of trains outgrowing their strength, they show the very short life of 25 years at most.

The Developments of Two Decades

Doubtless the bridge designers of 20 years ago did not anticipate this; they did not believe that their bridge would be outgrown in barely two decades. They were at that time taking down the bridges of the preceding generation, "antiquated" bridges, and had before them good models of what to avoid in the way of short-lived construction. They knew how rapidly engines and trains had become heavier, and probably believed there would be little further increase. Yet hardly a dozen years had passed before their estimated loadings were surpassed by the actual rolling stock, and soon thereafter the matter of renewal became a question only of favorable opportunity.

Doubtless also the designers of to-day are loth to believe that their work is to live only 20 years. With thoroughly modern design in all details, and with engine and train weights apparently near their physical limits, there is no obvious ground for fearing that, with good protection against rust, our new bridges of to-day may not be fully satisfactory after 20 to 25 years. It is quite clear that this view must be held rather generally, since the loadings on which new designs are based contain but small allowance, if any, for future load-increase. Otherwise, it would be a simple and comparatively cheap matter to provide for a considerable increase in live-load, certainly much cheaper than the complicated and bothersome rebuilding under maintained traffic, of which kind of work we have a fair sample in the account of the Point Pleasant bridge.

It is a fact that there is no immediate prospect of greatly increased loadings. The 50-ton car is not likely to be far outstripped even for the heaviest bulk-freight traffic. For

general freight and for light bulk-freight, on the other hand, even this capacity is needlessly high. Even if physical limitations did not govern, the factors of general economy of transportation set a limit to car capacity. On the other hand, engine loadings are of less importance to-day, because aside from local effects they do not amount to more than our maximum train loadings. The heaviest locomotive averages no more per foot of track than the heaviest freight-train. Future slight increases of engine weights on the basis of present-day construction are not likely either to change this state of affairs or to increase the local effects of wheel loads.

But to give the opposing argument its due, we must recognize that 50 years, or even 25, is a long period of time, and that much may happen before it is over. We may feel able to forecast the detail development of railway practice for five, perhaps for ten years, but can we say as much for 25? Can we confidently assert that the strength of rail, of draft-gear, of car wheels, etc., and all the other limiting factors of to-day, will not undergo more or less extensive modification? Or that particular kinds of traffic may not develop which will demand far heavier transportation units than 50-ton cars? If electric operation becomes at all extensive, will it remain within the limits of present-day transportation practice in all respects?

Neither Corrosion Nor Wear.

There is much force in the lesson of the past, that railway bridges never wear out and never rust out, but always are outgrown; and there is equal force in the oft-repeated lesson that bridge replacement is very costly indeed, besides involving a risk to safety of traffic which in effect still further raises the cost of the undertaking. Experience has not shown us what length of life we can expect from a railway bridge. But it has shown, at least, that for mere durability a bridge may last very much longer than 20 or 25 years. In fact, there is no reason why a life of 50 years should not be realized. But if that be true, should we not design for such contingencies as 50 years of the future may bring?

It is not our purpose to suggest anything like the changes of the past quarter-century. The designers of the early 80's might profitably (as we now see it) have doubled the live-loads then existing, before proceeding to design their bridges. Of course railway managers of those days would not have permitted such extravagance. To-day they are more liberal, perhaps. Yet a 100 per cent. increase over the live-loads of to-day seems wholly out of reason. A more moderate ratio of increase, however, would be a protection against many future contingencies of load increase, besides giving a margin for the special high loads that need to be transported occasionally, as heavy single pieces of steel, very heavy machinery, large blocks of stone, and the like. In addition it would raise the factor of safety, and give increased security generally.—Engineering News.

"Good Roads" Campbell, the Deputy Minister of Public Works, delivered a lecture upon his favorite topic before the Canadian Club at St. John, N.B., last week. Mr. Campbell is remaining in the maritime provinces for three weeks.

Mr. Lionel H. Buck, of Vancouver, has submitted a report dealing with the question of drainage and sewerage at Chilliwack, B.C. He estimates that a complete sewerage system for a population of 5,000 will cost \$166,760, and a drainage system \$70,000.

English Practice in Sewage Disposal

An Account of what is being done by the Urban District Council of Chiswick*—Interesting to Canadian Municipalities†

By J. H. ABBOT, Resident Engineer*

The urban district of Chiswick comprises an area of 1,337 acres, of which about 92 acres are represented by the water surface of the river Thames.

The district, which is bordered on three sides by the river Thames, is very flat, the sewers generally being laid at flat gradients. Some of the branch sewers have to be flushed regularly by means of a water van to prevent the accumulation of deposit in them. The surface water from streets in the districts is partly connected to surface-water drains and soakaway pits in the subsoil, but many of these latter have connections to the sewers. Practically the whole of the roof water from houses and paved yards is admitted to the sewers. The daily average dry-weather flow of sewage amounts to 1,500,000 gallons, or 43 gallons per head, which is accounted for by the large quantity of waste waters from breweries, factories, and steam laundries, and also by subsoil leakage into some of the older main sewers which are laid in water-logged ground. During heavy rains, storm water diluted sewage frequently reaches the works at a rate exceeding ten times the average hourly rate of flow in dry weather, and it is necessary to pump at this rate to avoid flooding in certain parts of the district. It is seldom, however, that the total flow in 24 hours in wet weather exceeds three times the volume of the dry-weather flow. A rainfall of $\frac{1}{2}$ -inch will produce a total flow of twice the average dry-weather flow. There is one storm overflow controlled by penstocks at the disposal works discharging direct from the sewers into the river; but this is practically useless, as it is tide locked at half-tide and submerged to a depth of 13 feet at high water.

Description of Works—The works were originally opened in 1879, and since then practically no alterations of any importance have been made until during the past five years, when the additions have been somewhat extensive. They include the change from pumping by steam to pumping by gas power, the installation of a destructor, enlargement of the press house, and the addition of extra precipitation tanks and filter beds now in the course of construction. The sewage, as it enters the works, passes through the screening chamber, where two screens, having a mesh of $\frac{1}{2}$ -inch, are placed, and after receiving a dose of milk of lime, passes onwards to the pump-well. The screenings and filth removed on the screens are burnt with the house refuse in the destructor. The total pumping capacity is 16 million gallons per day, and consists of two sets of 10-inch Gwynne centrifugal pumps directly coupled to Crossley gas engines of 20 b.h.p. and two sets of 15-inch centrifugal pumps directly coupled to Crossley gas engines of 36 b.h.p. The total lift is 20 feet, and one of the 10-inch pumps can easily pump the dry-weather sewage flow in 17 hours. Town's gas is used throughout, and the engines are started by means of compressed air. In the engine room there are also two four-cylinder single-stage Reavell air compressors directly coupled to Crossley gas engines of 16 b.h.p., each capable of delivering 50 cubic feet of free air per minute compressed to 100 pounds per square inch. These supply compressed air for the sludge presses, and the engines are also utilized for driving shafting for the lime mixers, circulating water pump, and hydraulic power pump. The air compressors are fitted with an automatic unloading device, which throws off the load when the pressure in the air receiver exceeds 103 pounds,

the load returning automatically when the pressure falls below 97 pounds. By means of a three-way valve the air compressors can be worked as vacuum pumps, and when so worked are employed for charging the centrifugal pumps before starting and also for lifting sludge from the sludge pit. A 6-k.w. direct-coupled generating set, consisting of dynamo and gas engine, supplies the works with electric current at 100 volts. The lime mixing house contains two lime mixers and an alum vat. The sewage is treated with milk of lime, aluminoferric and copperas. The dose of chemicals is varied to suit the requirements of the sewage, but the usual amounts employed per gallon of sewage are 8 grains of Buxton lime and 5 grains together of alum and copperas.

Tanks—The precipitation tanks are eight in number, and have a total capacity of 1,660,000 gallons; they are fitted with lateral openings in the side walls for series working, and floating arms for decanting off the supernatant water when removing sludge. These floating arms can either discharge direct to the river, or partly on to the filter beds, or by means of a 10-inch centrifugal pump, driven by a gas engine; the liquid in the tanks can be delivered into the main pump delivery channel for retreatment through the tanks. The sludge is swept from the tanks into the sludge receivers. From the receiver it is forced into the sludge presses in the usual way, and the cake produced is partly burned in the destructor and partly barged away or sent away by rail to farmers. A cable tramway is used for transporting the pressed cake from the press shed to the destructor. The press house contains two of Johnson's presses with 38-inch diameter plates, and three Warner presses with plates 42 inches square; the output of the five presses together amounts to 112 cwt. per operation. The presses are fitted with hydraulic ram heads as a labor-saving device to facilitate opening and closing.

Filters—From the precipitation tanks the effluent passes onwards to the filter beds, which are at present being constructed, and ultimately reaches the river by means of the new outfall. The filter bed walls, carriers and channels thereto are all constructed of cement concrete. The floors of the beds are of concrete 9 inches thick. There is a cross fall of 3 inches from the sides of the beds towards the central sub-drain, which has a longitudinal fall of 9 inches, and the effluent is discharged into a culvert constructed underneath the supply carriers. There are 13 filter beds, each of $\frac{1}{4}$ -acre area, or a total of $3\frac{1}{4}$ acres, 3 feet 6 inches deep, arranged for single contact and controlled by Adams' hydraulic apparatus, as well as means for hand regulation. The drainage tiles are of Naylor's and also Stiff's patterns, placed in rows 9 feet apart, and the filtration area is capable of dealing with three times the average dry-weather sewage flow. The syphon feeds are arranged to take any quantity from the minimum flow that may be coming to them up to three times the mean average dry-weather flow, so that when it becomes necessary to pump at this rate the beds will receive the tank effluent automatically when working one cycle without it being necessary to start additional feeds, the excess flow when pumping at higher rates of flow escaping over the storm overflows after treatment in the tanks. With two cycles in operation the amount the feeds would be capable of discharging is six times the average dry-weather flow, but it is thought that it will rarely be necessary to have more than one cycle in operation at one time.

*Paper read before the Association of Municipal and County Engineers.

†Chiswick is one of London's best known western suburbs. Its present population is approximately 36,000.

Destructor—The destructor consists of four cells of the Horsfall standard back-fed type, each capable of consuming 15 tons of a mixture of two parts by weight of house refuse to one of pressed sludge cake per 24 hours. During an official test of the destructor carried out in January, 1906, the quantity of water exaporated was 0.78 pound, from and at 212 deg. F. per pound of a mixture of house refuse and sludge cake in the proportions of 3 to 1. The refuse burned per square foot of grate per hour was 37 pounds. The furnace gases pass through two Babcock boilers on their way to the chimney shaft and also through a Horsfall centrifugal dust catcher, which effectually arrests fine particles of flue dust. The steam generated mainly goes to supply the steam jets for the forced draught, but enough is produced to supply the 20 h.p. engine in the workshop which drives the shafting in the workshop, sewage screens, flag-making plant and sludge tramway, and steam is also used through an ejector for creating a vacuum instead of running one of the air compressors for this purpose, and also for heating the workmen's baths, etc. In the destructor boiler house there is a Lassen and Hjort water softener for softening the boiler-feed water, which is obtained from a shallow well on the premises and er railway and tipped on the clinker cooling space adjacent to the flag-making house.

Flag-making Plant—The flag-making plant consists of a Horsfall granulating clinker crusher and mortar mill and a single mould 400-ton hydraulic press by Fielding & Platt, which is fitted with their patent vacuum plate arrangement for removing the slabs from the mould. The flags are made with either plain clinker faces or with $\frac{1}{8}$ -inch wearing surface of granite chippings and cement. The mixing of the concrete of which the flags are composed is done by hand. The press works with water at a pressure of one ton per square inch, furnished by two hydraulic pumps and stored in an accumulator. The author of these notes acted as resident engineer in charge of the installation of the whole of the pumping plant and auxiliary machinery, the erection of the destructor furnaces, boilers, and chimney, the flag-making plant, offices, etc. Since then he has acted as engineer to the Chiswick Council in the design and construction of the recent extension of the press house, and of the present scheme of extensions of the precipitation tanks and filters. The cost of these extensions has been \$125,000.

An all-mixed concrete road, 18 feet wide and 1 mile long, has been built in Wayne County, Mich., and has given such satisfaction that 8 or 10 miles more are contemplated, according to Mr. G. A. Burley, who described the work recently in "Good Roads." After trying other methods, expansion joints were put in at 100-foot intervals, a strip of heavy 4-ply tar paper being introduced between abutting sections. The maximum expansion for such a section, Mr. Burley states, will not exceed $\frac{1}{8}$ -inch and after a season's traffic the expansion joints were not seriously affected by spalling. On next year's work it is the intention to omit open joints entirely and lay the concrete in 25-foot sections with tar paper between each pair. A 1:2:4 mixture is used by Mr. Burley, and according to him the all-mixed concrete road has shown superiority over macadam from the standpoint of maintenance and in some cases was cheaper in initial cost. On the mile stretch referred to the contract price for grading and placing concrete was a little less than \$1 per square yard.

The Belleville Cement Mills, which have been idle since the inauguration of the merger, have commenced operations. One hundred and fifty men arrived at Belleville recently to operate the mill. The Lehigh mills, two miles from Belleville, turn out 3,000 barrels a day. The demand, however, is so great that another mill is necessary.

Trade News from Montreal

Features of Supply Market—A Good Season for Cement
—Gratifying Progress Indicated by Building Returns

Montreal Office of the "Contract Record."
Montreal, June 13th, 1910.

The continual rainfall of the past fortnight has undoubtedly hindered and depressed the general contracting trade. Teaming, for instance, has been rendered difficult and contractors with large excavation work on hand have not made the most satisfactory progress. In fact in all lines there has been a noticeable lull. It is only natural to expect therefore that with better weather conditions prevailing there will be a big effort made to rush construction work. Even at present, with the large amount of work on hand, the scarcity of teams and teamsters is a pre-eminent feature, and one large firm of contractors have been forced to keep two men employed in scouring the city gathering teamsters in order to keep abreast of their excavation work. The higher prices usually demanded by teamsters in the summer months are also very much in evidence and \$7 for services of man with team is now in some cases demanded.

Market News

The figures at which the city obtained their supply of cast iron pipe are much lower than quoted previous years. This low level of prices is based on the reduced cost of pig iron in England, where it is manufactured. This year, too, Canadian dealers are forced to pay higher freight rates than ever before on their supplies.

Prices for cast iron water pipe in standard weights are approximately as follows, f.o.b. Montreal, per net ton: 4-inch, \$32.50; 6-inch, \$32; 8-inch, \$31; 12-inch, \$30.

Cement is enjoying a good summer season and from the headquarters of the Canara Cement Company we learn that it is moving quite freely at present. It is quoted as follows, f.o.b. different important Canadian centres, the lower rates obtaining where water transportation is available (the price per bag is given, exclusive of cost of package): Montreal, \$1.40; Toronto, \$1.60; Fort William, \$1.50; Winnipeg, \$2.20; Calgary, \$2.60; Ottawa, \$1.40; Halifax, \$1.50.

City's Building Progress

The building permits issued from Inspector Chausse's office during May, 1910, are well in advance of those taken out in May, 1909, the figures being respectively \$1,703,200 and \$1,269,504, an increase of \$433,696. The figures for the first five months of the year show an approximate increase of 48 per cent. over the same period in 1909.

Comparing May with the preceding month of April, we note a slight falling off in number and value of permits issued for both new work and alterations. During April, however, permits for large work, such as the A. E. Rea & Company additions, National Breweries, Catholic Seminary, new building for the Guaranteed Pure Milk Company, two large Protestant schools and extensive building for Institute de Petite Fils were taken out.

To date this year, while a substantial gain has been recorded, it must not be overlooked that there are several large permits which in the ordinary course of events will shortly be taken out. Included among these may be noted the Windsor Station, Dominion Express building, Place Viger Hotel extension, Ritz Hotel, art museum and Yorkshire building (since taken out).

June is generally a good month in building circles and Mr. Chausse anticipates a steady patronage of his department.

Additions to City Hall Planned

With the annexation of eight new municipalities which occurred recently, the present City Hall is deemed entirely

inadequate by the Board of Control for the transaction of the city business, and Inspector Chausse has been asked to make an exhaustive report outlining the steps that should be taken to increase the present capacity. In all probability the Government's permission will be obtained for the use of a portion of the Champ de Mars for the erection of a new building to cost in the neighborhood of \$500,000.

The new wards added to the city will be known as follows: Notre Dame de Grace, St. Paul, Ahunstic, Emard, Longue Pointe, Bordeaux, Cote des Neiges and Rosemount.

Standard Ideal in New Offices

The Standard Ideal Company, Limited, have opened show rooms at 155 Notre Dame street west. The new quarters are finished with dark oak panelling and blue burlap. The offices are located in a gallery at the back with the same style of panelling continued and brown burlap replacing the blue used in show room. Mr. J. J. Laferme is sales manager for Montreal and district.

Elevator Construction Commenced

The excavation work on the new 2,000,000 bushel capacity grain elevator has been placed well under way by the Harbor Commissioners. The new structure is being erected opposite Bonsecours Market, between the Jacques Cartier and Victoria piers.

For excavation, a Browning locomotive crane, with grab bucket attachment, is being employed and also a floating derrick equipped with orange peel bucket. The foundations will be of reinforced concrete and will be carried down to solid rock.

The elevator plans are being prepared by the John S. Metcalf Company, of Montreal and Chicago, acting in conjunction with Chief Engineer Cowie of the Harbor Board.

New Marble Quarry Company

The Dominion Marble Company, which was organized some time ago, are making active preparations to develop their marble quarries and to place their product on the market. The company's property is located in the vicinity of South Stukely, Que., about 70 miles south of Montreal, and the test cores taken out have compared very favorably with the highest class of Vermont marble, and it is supposed, in fact, that the deposit is really a continuation of the Vermont marble.

The plant is being installed and the location of the finishing mill will shortly be selected. There is also about one mile of railroad to be constructed into South Stukely to give the necessary railway connection. The company anticipate that within two months they will be able to market marble blocks in the rough.

Mr. Harry Brown, late of the Missisquoi Marble Company, is superintendent of the quarry, with Mr. A. E. Carr, for 22 years superintendent of the Barney Marble Company, Swanton, Vt., in charge of mill operations.

The officers of the company are as follows: President, Mr. R. T. Hopper; Vice-president, Mr. C. J. McQuaig; Secretary-treasurer, Mr. F. A. Johnson, of the J. C. McLaren Belting Company, Montreal.

President of A. C. Leslie & Company Banquetted

The Place Viger Hotel was recently the scene of a complimentary banquet tendered by the officers and staff of A. C. Leslie & Company, Limited, to their president, Mr. William Strachan Leslie, on the occasion of his approaching marriage. After the dinner, Mr. George B. Ball, western representative of the company, from Toronto, was called upon to propose the health of the guest of the evening and to present him with a magnificent mahogany cabinet of solid silverware. Mr. Leslie expressed his heartiest thanks for the co-operation and assistance received from those under his direction. After the various conventional toasts had been duly honored, "The

Firm" was proposed by Mr. W. T. Cox, who spoke of the high regard in which A. C. Leslie & Company, Limited, were held by all those having dealings with them throughout the Dominion. Mr. E. H. Copeland responded with a brief sketch of the firm since its establishment by the late Mr. A. C. Leslie in the year 1866. The chairman then presented Mr. Leslie with a very handsome silver salver on behalf of Messrs. John Lysaght, Limited, of Bristol, England, who have been represented in Canada by A. C. Leslie & Company, Limited, for a great many years. The toasts were interspersed with voca! and instrumental music.

Creed and Contract Matters

London, Ont., June 8th, 1910.

Editor, "Contract Record":

At a meeting of the London Builders' Exchange held last week, the attention of the members was directed to an article published in the "Contract Record" of May 18th, in which it was stated that creed had been a consideration in awarding the contract for a public school in the city of Ottawa.

Your valuable journal took a decided stand against countenancing any such practices, and criticized the action of the trustees very severely for passing by the lowest tender on the ground that one of the members of the firm submitting it was not a public school supporter. Taking it for granted that the facts are as represented in your journal, the members of this exchange instructed the secretary to inform you that they are heartily in accord with the stand you have taken on this question, and they desire to express the hope that the "Contract Record" will continue to be a public educator and vigorously denounce all such dishonorable actions that are brought to its notice. Further, they are of the opinion that a continuance of such methods as those under discussion will hasten the time when those who are asked for tenders will have to be compensated for their time and trouble in figuring.

Appreciating very fully your efforts to improve the conditions of contracting,

Yours very gratefully,

GEORGE S. GOULD,

Secretary London Builders' Exchange.

The foundation for the new pier recently built on the north side of the mouth of the River Tyne, England, is 26 feet below the foundation of the old pier, to which it is joined. There is, therefore, a high step from one foundation to the other, and in order to prevent settlement of the old structure a barrier was constructed across the end where the new one was to start. This acted as a retaining wall to prevent displacement of the large boulders and sand on which the old pier is built. The barrier consisted of eight steel cylinders, each 13 feet in diameter, sunk under compressed air into the shale on which the new pier was to be founded. They were sunk as closely together as possible in a line across the pier site, and when down to a sufficient length were filled with concrete. The angles between the cylinders were filled with jarrah timber piles. In sinking the cylinders a cast iron inner lining leaving an annular space between it and the cylinder was used. This space was filled with concrete, in order to weight the cylinder and also to act as reinforcing during sinking. The lining was removed before the tube was filled with concrete, and in order to facilitate the removal the rings were made of bolted sections and had a removable key piece.

The head offices of the Ontario Iron & Steel Company and the Page-Hersey Tube Works will be removed from Toronto to Welland, where a fine brick office building is in course of construction.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brantford, Ont.

Tenders will be called for pavement on Lorne Crescent, Darling street, from George to Market street, and Park avenue, from Arthur to Colborne.

Chilliwack, B.C.

A scheme involving \$10,000 is on foot to dredge a channel along the foot of the Chilliwack mountain to a junction with the Fraser river.

Collingwood, Ont.

Tenders addressed to K. S. Macdonell, town engineer, will be received until June 24th for construction of brick-paved roadway on Hurontario street.

Tenders addressed to K. S. Macdonell, town engineer, will be received until June 24th for construction of sewer on Fifth street. Plans, etc., at office of the above.

Dunnville, Ont.

Tenders will be received by J. W. Holmes, town clerk, until June 28th for the completion of a system of sanitary sewers which have been partly constructed. For further particulars see "Tenders and For Sale Department" this issue.

Humberstone, Ont.

Tenders addressed to H. J. Knoll, reeve, will be received until July 31st for the work known as Lyons Creek Drain, etc. Plans, etc., at office of G. Ross, C.E., Welland, or at the office of the above.

Ladysmith, B.C.

The council has passed a bylaw to raise \$25,000 to improve its waterworks system.

Lindsay, Ont.

The town of Lindsay are calling for tenders for the construction of approximately 6,950 square yards of bituminous pavements. Tenders close June 27th. For further particulars see "Tenders and For Sale Department" this issue.

Moncton, N.B.

This municipality is considering the advisability of boring artesian wells in order to increase the water supply.

Moose Jaw, Sask.

Tenders are being called by this municipality for supplying material and constructing sewage disposal plant, etc. For further information see advertisement in "Tenders and For Sale Department" of this issue.

North Bay, Ont.

Tenders will be received until July 2nd for furnishing materials and construction of approximately 60,000 square yards of concrete sidewalk. M. W. Flannery, town clerk. For further particulars see "Tenders and For Sale Department" of this issue.

Ottawa, Ont.

On the recommendation of Mr. A. Hazen, the New York expert, surveys will be made as to the cost of bringing water supply from McGregor's Lake to the city.

Outremont, Que.

Tenders are being called for laying of cement sidewalk, etc. For further information see advertisement in this issue.

Point Grey, B.C.

A \$20,000 pavements by-law will shortly be submitted to the ratepayers.

Stoney Creek, Ont.

Tenders addressed to Erland Lee, township clerk, will be received until June 25th for all excavation required to complete the Saltfleet Swamp Drain. Plans, etc., at office of the above or at that of Tyrell & McKay, Hamilton.

St. John, N.B.

Tenders are invited until June 28th for paving, etc. W. Murdoch, city engineer. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Swift Current, Sask.

Tenders addressed to G. W. Bilbrough, secretary-treasurer, will be received until July 12th for the supply of hydrants, valves, etc.; sewer tile; and cast iron water mains. J. Darlington Whitmore, engineer; Regina; A. W. Snider, mayor.

Sydney, N.S.

Tenders addressed to J. J. Curry, city clerk, will be received until June 29th for the construction of sewer extensions. Plans, etc., at office of City Engineer.

Thamesville, Ont.

Until July 4th \$10,000 30-year, 4 per cent. waterworks debentures will be received. W. J. Cryderman, clerk.

Tenders are being called until June 24th for supply of gravel, cement, and construction of cement basin and laying of pipe lines, etc. W. J. Cryderman, clerk.

Toronto, Ont.

Only one tender was received for the pumping station at Sunnyside, being \$7,353. Engineer's estimate, \$3,800. Work will be done by day labor.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until June 28th for wooden patterns for special castings for water works purposes. Specifications at office of City Engineer.

The tenders received for construction of asphalt block pavement on College street, between Manning avenue and Dovercourt road were as follows per bulk sum: First Tendering—(1) \$43,964; (2) \$44,880; (3) \$49,950; (4) \$48,497; (5) City Engineer, \$50,052. Second Tendering—(1) \$42,506; (2) \$42,486; (3) \$27,000 (heavy sheet asphalt); (4) (City Engineer) \$50,052. No award has yet been given owing to the ratepayers being divided as to kind of pavement.

Victoria, B.C.

Tenders for the construction of permanent sidewalks on portions of Maple, Quadra, Work, Blanchard and Caledonia streets were received from the following: City engineer, \$19,707.21; A. Pike, \$18,015.40; F. Stedman, \$17,532.

Winnipeg, Man.

Tenders are being called by the Board of Control until June 28th for construction of sewer connections and installation of plumbing, etc. M. Peterson, secretary.

AWARDED.

Cobourg, Ont.

D. H. Minaker, town clerk, writes that the contract for cement walks has been awarded to Jex & Company, Cobourg, at 9 7-8 cents per square foot. The Forest City Paving & Construction, London, also tendered at 9.90 cents per square foot.

Fernie, B.C.

G. H. Boulton, city clerk, writes that the contract for the construction of storm sewers was let to J. J. Wood, contractor, Fernie.

Halifax, N.S.

Tenders for furnishing 10,000 feet of six-inch water pipe were received as follows: H. A. Drury & Company, Montreal, \$31.65 per ton of 2,000 pounds, delivered; Gaudry & Company, Quebec, \$31.90; Wm. Stairs, Son & Morrow, \$31.20, delivered at Halifax, or \$30.20 at New Glasgow; Messrs. Hankin, Montreal, \$29.80 delivered; W. B. Robinson, Montreal, \$29.20; R. D. Wood & Company, Philadelphia, \$21.50, f.o.b. cars at foundry, freight guaranteed \$3.70, duty extra; D. Y. Stewart, Glasgow, \$31.00. The tender of W. Beverley Robinson being the lowest was recommended for acceptance. Tenders for two 9-inch, fifty 6-inch and three 3-inch valves were opened as follows: H. A. Drury & Company, 9-inch, \$29.20 each; 6-inch, \$17.53; 3-inch, \$10.23. McAvity & Son, St. John, 9-inch, \$30; 6-inch, \$10; 3-inch, \$5. R. D. Wood & Company, Philadelphia, 9-inch, \$19.10; 6-inch, \$9.85; 3-inch \$4.95. This tender called for the firm's own special make of valve and was therefore not considered. McAvity & Son's tender being the lowest was recommended for acceptance.

Montreal, Que.

The Structural Steel Company have been awarded the contract for the construction of an 80,000-gallon stand pipe for the municipality of Longueuil.

The Structural Steel Company, of Longue Point, have been awarded the contract for the construction of extensive penstocks for the Brampton Pulp & Paper Company, at East Angus, Que.

Niagara Falls, Ont.

Contracts have been let for the laying of the macadamized road between Niagara Falls and Bridgeburg. The total cost will be \$95,000. Messrs. Cook & Menzie, of Niagara Falls, will build two sections, and H. Campaign, of Niagara Falls, the other half. The Niagara Falls Park Commission have charge of this work.

Prince Rupert, B.C.

S. P. McKord & Company, Victoria, have received a \$15,916 sewer construction contract at Prince Rupert. W. H. Mitchell & Company tendered at \$16,209; S. H. Watson & Company, \$18,635.

Renfrew, Ont.

We are informed that the contract for supply of 2,500 barrels Portland cement

was awarded to E. J. McGarry at \$1.75 per barrel, f.o.b. Renfrew, in paper sacks.

Toronto, Ont.

The Board of Control has awarded the contract for the pipe for the 500-foot extension of the waterworks intake pipe to the Canada Foundry Company.

Details of tender — 72-inch steel riveted pipe, per foot—500-foot lot, \$19.98; 1,000-foot lot, \$19.22, 1,500-foot lot, \$19.00; branch for present intake, \$709; new intake branch, \$1,481; 3-steel flexible joints, each \$1,072.

John McGuire was awarded the contract for treated wood block pavement on Yonge street, King street to Front street, at \$10,391. Other prices were, \$11,599; \$11,740; \$11,341 and \$12,537 (the city engineer's).

Tenders were awarded as follows for alterations to the main pumping station:—Carpentering, M. Hutchinson, \$3,877; painting and glazing, Faircloth Company, \$405; roofing, etc., Flowers & St. Leger, \$660. Other prices were as follows: Carpentering, \$3,249; painting and glazing, \$405, \$470; roofing, etc., \$660.

Contracts for the construction of the following asphalt pavements were awarded as follows: Dresden avenue Carlaw avenue to Pape avenue, \$2,368, the lowest; Galt avenue, Gerrard street to north end, Barber Asphalt Paving Company, \$3,136, the lowest; Shaw street, Essex avenue to C. P. R. tracks, Godson Contracting Company, \$8,663, the lowest. Contracts for bitulithic pavement on Delisle street, Yonge street to Deer Park Crescent, \$6,684; and also Farnham avenue, etc., \$2,889 to City Engineer; Marmaduke street, Sunnyside avenue to Indian road, to the Warren Bituminous Paving Company, \$2,345, the lowest. Other tenderers's prices respectively on above streets, were \$6,900, \$2,932 and \$2,355, the City Engineers.

Vancouver, B.C.

The following bids were made on paving and cement walk contracts: M. P. Cotton's tenders in all cases being accepted: Campbell avenue, Hastings to Barnard: M. P. Cotton, \$24,333; Palmer Bros. & Hanning, \$29,225. Campbell avenue, Powell to Hastings, M. P. Cotton, \$8,616; Palmer Bros. & Hanning, \$10,200; Fourth avenue, \$32,000; T. R. Nixon, \$34,000; Palmer Bros. & Hanning, \$35,453. Granville street: M. P. Cotton, \$32,000; T. R. Nixon, \$33,000; Palmer Bros. & Hanning, \$36,500. A. Morrison secured the grading on Sixteenth avenue from Bridge street to Oak at \$6,515, this work to be subject to the approval of the Point Grey Council. Palmer Bros. & Hanning's bid on this was \$9,063.

Walkerville, Ont.

C. H. Robinson, Clerk, sends us the following list of tenders for granolithic walk, etc., as per square foot: Thos. Chick, Windsor, 9½ cents; D. Todd, Windsor, 9 7-8 cents; Cadwell Silix Stone Company, 9 cents (accepted).

Weyburn, Sask.

Frank Rooney secured the contract to construct the waterworks power house and pumping station. McKenzie & Prevost, Estevan, also tendered.

Railroads, Bridges and Wharves

Berlin, Ont.

Tenders addressed to A. N. Warfield, are called until July 15th, for clearing and grading of 29 miles of railroad; also for material and equipment, etc.

Chatham, Ont.

Tenders addressed to J. Gosnell, county clerk, will be received until June 30th for

putting concrete floor on south approach to Kent Bridge. Plans, etc., at county clerk's office, this place. Jas. Bell, C.E., St. Thomas.

Elder's Bridge, Ont.

Tenders will be received up to June 27th by Barber & Young, engineers, Adelaide street, Toronto, for the construction of concrete abutments and reinforced concrete truss bridge over the Humber river. For further particulars see "Tenders and For Sale Department" of this issue.

Harriston, Ont.

Tenders addressed to W. D. McLellan, clerk of Minto, will be received until June 24th for concrete work required in the erection of five bridges. See advertisement in "Tenders and For Sale Department."

Halifax, N.S.

A charter has been granted to a company represented by J. B. Bartram, of Toronto, barrister; Thos. B. Fogg, of Toledo, Ohio, railway manager; G. H. Raw and S. Hirsch, of London, Eng. They will proceed to construct the railway east of Halifax, from Dartmouth to Guysboro and from New Glasgow to Country Harbor in the near future.

Lunenburg N.S.

Tenders are being called by the Public Works Department, Ottawa, for Little Tan-cook Island Breakwater until July 4th. Plans at offices of the district engineers at Halifax, Antigonish and on application to local postmaster.

Montreal, Que.

Tenders were received by the Harbor Commissioners up to 17th June for steel girders, span crossings for high level tracks.

New Richmond, Que.

Tenders will be received until July 11th for extension of wharf. R. C. Desrochers, Assistant Secretary, Department of Public Works, Ottawa.

Ottawa, Ont.

The Department of Railways are issuing a call for tenders for a bridge over the Saskatchewan river at The Pas. Tenders must be in by July 4th.

AWARDED.

Fort William, Ont.

The works committee awarded to Stewart & Hewitson contracts for the rock wharf and Hewitson contracts for the rock which will be used in the new Neebing river bridge.

Montreal Que.

The Foundation Company, Limited, have been awarded the contract for the construction of concrete piers for the new C. P. R. bridge at Lachine.

Toronto, Ont.

The contract for the construction of the C. N. R. line from Hawkesbury to Montreal, has been let to J. P. Mullarkey, Montreal.

Public Buildings, Churches Schools, etc.

Arnprior, Ont.

We are informed that the only tender received for improvements in connection with high school was that of W. H. Mills at \$12,970.

Berlin, Ont.

The Lyric Theatre here was damaged to the extent of about \$3,000 on the 15th inst.

Belleville, Ont.

Tenders for the various works in addition to the General Hospital will be re-

ceived by Mrs. L. H. Lewis, president W. C. A., until July 2nd. Plans at office of W. C. Mikel, K.C., this city.

Dartmouth, N.S.

The ratepayers will vote on the amount (about \$4,500) for the new school on July 2nd.

Dauphin, Man.

Tenders for the purchase of \$12,000 school debentures, 20-year at 5 per cent., will be received until July 15th. W. Smith Jackson, secretary-treasurer.

Elkhorn, Man.

A 6-room school costing \$20,000 will be erected here.

Fredericton, N.B.

Tenders addressed to the secretary, Militia Council, will be received until about June 27th for construction of concrete wall at the rifle range. Eugene Fiset, Colonel, Deputy Minister.

Gravenhurst, Ont.

Tenders addressed to J. M. Lyle, architect, Toronto, are being received until June 27th for erection of new Presbyterian church. Plans, etc., with Rev. D. A. Meekeracher, Gravenhurst, or with the architect.

Hillsboro, N.B.

The Baptist church and parsonage were destroyed by fire on the 13th inst. Loss about \$20,000.

Hamilton, Ont.

It has been decided to build a \$20,000 addition to St. Joseph's Hospital. The Dominion Power & Transmission Company are negotiating for a site for the new Temple Theatre.

London, Ont.

King Street Presbyterian congregation have decided to build a new church. Mr. William Reid, chairman of the Building and Site Committee.

Lloydminster, Sask.

Mollard and Hunter have plans for a \$15,000 building for post office and customs.

Meadow Lea, Man.

It is likely a new school will be built here. D. N. McIntyre, chairman of the Board.

Montreal, Que.

Mr. Jos. Venne, architect, is preparing plans for an extensive amphitheatre to be erected on Mount Royal in the interests of the Eucharist Congress, to be held in this city September next.

It is proposed that the city should acquire land on Park avenue between St. Viateur and Van Horne streets to be transformed into a public park.

It is expected that tenders will be called in the course of two weeks for the erection of a new and extensive school building for the Catholic Board of School Commissioners, "Dollard School." Messrs. Marchand & Haskell, architects.

Montreal West, Que.

The ratepayers have approved of a by-law for the purpose of erecting a \$30,000 municipal building. This will be built to accommodate the local civic offices, library and reading room and large entertainment hall.

Nanaimo, B.C.

The two Masonic Lodges of this city have decided to erect a new home at a cost of \$30,000. A block of ground has been secured on the east side of Commercial street, 80 by 100 feet, on which a large brick and concrete block will be construct-

ed. Work will be commenced on the structure as early as possible.

The members of Black Diamond Lodge, No. 5, I. O. O. F., of this city have decided to erect a brick and concrete structure on Commercial street, at an estimated cost of \$20,000. Tenders for the construction of the building are to be called for at once.

Newmarket, Ont.

Tenders will be received until July 1st for the extension of Newmarket High School. E. Finch is the architect. For further particulars see "Tenders and For Sale Department" of this issue.

Ottawa, Ont.

Tenders are being called by this city for the painting of Cartier Street and Evelyn Avenue Schools. Specifications at office of W. B. Garvoek, superintendent of buildings, Creighton Street School. C. Ross, secretary-treasurer.

Pense, Sask.

Tenders will be received until June 23rd for the erection of a town hall. J. F. Weiss, secretary-treasurer.

Smith's Falls, Ont.

Tenders are being called until June 27th for the trades required in connection with the erection of a public hospital here. For further information see advertisement in "Tenders and For Sale Department" this issue.

Toronto, Ont.

Tenders are being called until July 12th for the various trades required in the erection of fire station on Main street. For further particulars see advertisement in "Tenders and For Sale Department."

Tenders addressed to H. F. McNaughten, secretary, Public Works, were called until June 21st for supply of scrap iron, copper, lumber, etc.

The church of Friends on Carlton street has been purchased for about \$40,000. Six months are given in which to secure a new site.

Tenders will be received until June 28th for the erection of a new band stand in the Exhibition Grounds. G. R. Geary (mayor), chairman, Board of Control.

The congregation of Grosvenor Street Presbyterian Church have decided to remove, and a committee consisting of T. Gibson, Dr. Gibb Wishart, R. Kilgour, Dr. Cameron and others, were appointed to report on new site.

Vancouver, B.C.

A permit has been issued to W. C. Stevens for a 5-storey steel-concrete building on Westminster avenue. The contract will be let shortly.

Victoria, B.C.

The ratepayers will consider the expenditure of \$13,000 on schools shortly.

Tenders for the erection of a new large one-room frame school at Nanaimo Bay are invited until June 29th by the Public Works Department.

Wadena, Sask.

The school board are getting a loan of \$10,000 for a new school. L. C. Wurtz, secretary.

Woodstock, Ont.

Tenders addressed to B. McNichol, architect, will be received until June 30th for the addition, etc., to school building, section 4, West Oxford. Plans, etc., at office of the above.

Waskada, Man.

Tenders are called for erection of municipal and telephone office until July. Plans, etc., at office of the secretary, F. J. Davis.

Winnipeg, Man.

Leonard Kenwick, 15 Bannerman avenue, is the architect for the new St. John's Anglican Cathedral. The nave will be erected first at a cost of \$75,000. Noted in issue of May 18th.

The Dufferin avenue Presbyterians are contemplating the erection of a new church. Rev. Mr. McTaggart, pastor.

Plans have been approved for the Municipal Hall to be erected on the site given by F. Ness.

The board of directors of the Children's Hospital have purchased the old Ladies' College site on which, it is stated, they will erect shortly a new hospital. Cost of site and proposed building, about \$80,000. Mrs. J. H. Bond and Fletcher Andrews are interested.

Longueuil, Que.

It is again rumored that the Dominion government will establish a military school and farm in the vicinity of Longueuil. Previously mentioned.

AWARDED.

Davidson, Sask.

K. J. Roseborough secured the contract for the new town hall. Solid brick, cost \$14,000.

Edmonton, Alta.

A contract has been awarded for a new hospital building to the Connell-Spencer Construction Company at \$170,000.

Larkin, B.C.

The contract for the new school at Larkin has been awarded to W. A. Blair, at \$1,575.

Lytton, B.C.

The contract for the erection of the new lockup has been awarded by the Public Works Department to Mr. D. J. McRae, of Agassiz, at about \$2,750.

Portage la Prairie, Man.

The contract as awarded in bulk for the school includes Jeffrey Bros., masonry, \$13,350; McCaig & Elwood, carpentering; Jas. Grassie, tinsmithing and plumbing; C. W. Chapman, painting.

Rosthern, Sask.

Mr. Thos. R. Wood has taken the contract for a new Menonite church at Tiefengrund, at \$3,000.

St. Catharines, Ont.

J. B. McIntyre, secretary, St. Catharines General and Marine Hospital, writes that the contract for the new hospital here has been awarded to Newman Bros., this city as per specifications of Langley & Howland for \$46,000.

Toronto, Ont.

Tenders addressed to H. F. McNaughten, secretary, Public Works Department, will be received until June 28th for plumbing, etc., in Normal School, and also for heating, plumbing and electric wiring for the addition to Osgoode Hall. See advertisement in "Tenders and For Sale Department" this issue.

The contracts for the central wing of the Toronto Western Hospital have been awarded by the Board of Governors, and are as follows: Page & Company, stone and brick work; the Roman Stone Company supplying the stone; F. H. Curry, the carpenter work; Hamilton Bridge Company, the steel work; Boyce & Son, the plastering; Douglass Bros., the galvanized iron work, and A. M. Brown, the painting and glazing. The steam heating and plumbing has not yet been let. Cost of wing, \$50,000. Total proposed cost, \$500,000.

The successful tenderers for the Brown School were: Mason work, Teagle & Sons,

\$16,366; steel work, Reid & Brown, \$11,085; carpenter work, Frank Armstrong, \$8,833; roofing, Flowers & St. Leger, \$925; plastering, George White, \$2,150; plumbing, Keith & Fitzsimons, \$650; painting, J. Phinimore, \$1,245; heating and ventilating, Johnston Temperature Regulation Company, \$885. For the new Earlscourt School—Mason work, Teagle & Sons, \$13,200; carpenter work, Frank Armstrong, \$8,456; structural steel, W. A. Falter, \$964; roofing, Flowers & St. Leger, \$1,075; plastering, Beaver & Company, \$1,296; plumbing, Keith & Fitzsimons, \$1,345; heating and ventilating, Keith & Fitzsimons, \$5,500; heat regulation, Johnston Temperature Regulation Company, \$450; wiring, G. J. Beattie. For the Norway School—Mason work, G. T. Gayton, \$1,150; carpenter work, F. Armstrong, \$9,989; structural steel, Reid & Brown, \$1,523; roofing, G. M. Bryan, \$1,125; plastering, Beaver & Company, \$1,635; plumbing, Fred Armstrong, \$1,184; painting, G. F. Eagles, \$1,340; heating and ventilation, Johnston Temperature Regulation Company, \$749; electric wiring, G. J. Beattie, \$38.

Winnipeg, Man.

The contract for the erection of technical school on the Church Mackray site, has been awarded to John Saul at \$299,750; that for the school on the Academy road, to J. H. Tremblay & Company, Limited, at \$299,849, the lowest tenderers in both cases. These contracts are exclusive of heating, plumbing and ventilating.

Residences

Edmonton, Alta.

J. C. Calhoun has commenced the erection of an \$8,000 residence.

Hamilton, Ont.

A permit was issued to Thos. Lewis & Son, erection of a concrete stone dwelling, Holton avenue, \$2,350.

Montreal, Que.

Tenders have been received for the construction of a residence on Dorchester street for Mrs. A. C. Phillips. No awards have yet been announced. Mr. Theo. Droust, architect.

Tenders were received until June 16th for the construction of a residence on Aberdeen avenue for Wm. Waugh. Messrs. Hutchison, Wood & Miller, architects.

New tenders for the erection of a residence on Roslyn avenue for E. J. Coine, were received until June 21st. Messrs. Hutchison, Wood & Miller, architects.

Messrs. Peden & McLaren, architects, 20 St. Alexis street, have prepared plans and specifications for the erection of a residence for Mr. G. R. Woodburn. Tenders are invited up to the 27th inst.

Outremont, Que.

A permit has been awarded Mr. Fellows for the erection of three cottages on Wise man avenue; cost \$15,000.

Ottawa, Ont.

Mayor Hopewell has taken out a building permit for a \$10,000 brick apartment house.

Strathcona, Alta.

Wilson & Herald are the architects in charge of the residences to be erected for Dr. Tory and Prof. Edwards.

Toronto, Ont.

W. J. Dempster, architect, this city is preparing plans for ninety-six working-man's homes to be built by the Home Building Company of Toronto. They will cost in the neighborhood of \$120,000. Tenders for all trades will be called for at once.

Victoria, B.C.

Messrs. Parfitt Bros. have a permit for a 2-storey brick dwelling, corner Fernwood road and Gladstone, \$6,000; also Mrs. A. Porter, for a dwelling, \$4,500.

Building permits were issued yesterday to H. T. Knott for a dwelling to be erected on Trutch street, \$2,750; and to W. C. Vanmunster for a dwelling, on Medina street, \$3,500.

Tenders for the erection of a house for the caretaker at Smith's Hill reservoir were received from the following: T. Fredrickson, \$2,500; Robt. R. Scott, \$4,141; J. Holland, \$2,372; W. C. VanMunster, \$3,349; Harris & Northan, \$2,660; S. E. Matthews, \$3,400; T. Tubman, \$3,200; J. Smithers, \$3,200; Nelson & Company, \$2,925.

Winnipeg, Man.

Architect H. Rugh is preparing plans for a solid brick residence for P. Cancilla, costing \$7,000, and a residence for Mrs. J. P. McCrum to cost \$5,000.

Wm. Bruce, architect, will build a \$15,000 residence on Central avenue, Armstrong's Point. Architectural terra cotta and solid brick construction.

Alex. Macdonald, wholesale grocer, will have a \$50,000 residence built on Park road this year.

Boyle, Higgins & Company intend to erect twenty more houses and cottages.

Tenders addressed to C. W. U. Chivers, architect, 502 Keewayden block, will be received until June 27th for all trades, excepting plumbing and heating, required in the erection of residence for ... J. Christie. Plans, etc., at office of above.

A permit has been issued to J. Ryan, Jr., for a two and a half storey brick building, \$25,000.

AWARDED.**Dauphin, Man.**

Hafenbrak & Steen have been awarded the contract for R. Lily's \$6,500 residence. J. H. Bossons, architect.

Montreal, Que.

Mr. W. E. Doran, architect, has awarded the general contract for the erection of a two storey house on Belmont street for Mr. B. Tansey, to D. M. Long, contractor, 39 Windsor street.

Winnipeg, Man.

Sparrow Bros. secured the contract for an \$8,500 residence for J. A. Pottruff. Jas. Chisholm & Son, architects.

Business Buildings and Industrial Plants

Atikokan, Ont.

J. D. McArthur's mill on the C. N. R. was destroyed by fire on the 19th inst. Estimated value of plant, \$50,000. The mill will be rebuilt at once.

Brandon, Man.

The Dominion Bank will enlarge its premises by building an addition.

Permits for the Cecil Hotel being erected by H. Johnson, \$40,000, and to Dr. Eagles for new theatre, Tenth street and Princess avenue, \$12,000, have been issued.

Beaverton, Ont.

Until June 28th tenders for the purchase of \$5,000, 5 per cent. town hall debentures are being called. John McArthur, clerk.

Calgary, Alta.

St. Paul, Minn., capitalists will build a railway from Butte, Mont., to Calgary to develop mineral resources and will also establish a steel plant at Cowley, Alta.

Chas. Bell and J. Schiesel will build the King George Hotel, six storeys, solid brick and stone, fireproof.

Chilliwack, B.C.

Plans are prepared for the erection of a large building for W. J. Gillanders. J. Laughlin has the contract for the block being erected for F. Gillanders.

Cobourg, Ont.

Mr. Bull's Sawmill, at Skibbereen, about 12 miles from here, was destroyed by fire on the 16th inst.

Didsbury, Alta.

The Maple Leaf mill and elevator, which were recently destroyed by fire, will be rebuilt.

Fernie, B.C.

The Western Canada Wholesale Company are building a large addition to their warehouse.

Hamilton, Ont.

The county council have decided on the site for the poor house. Solicitor, J. L. Counsell.

Moose Jaw, Sask.

The Y. W. C. A. are negotiating for a building site.

Architect Bunyard has plans for a three storey brick and stone building, 65 x 100 feet, for J. E. Chisholm and A. Svaigher.

Montreal, Que.

Plans for the Dominion Express Building are nearing completion and tenders will be called in the course of two weeks. Messrs. E. & W. S. Maxwell, architects.

The plans for the new car barns for the Montreal Street Railway Company are now well under way and the architects, Messrs. Marchand & Haskell expect to call tenders for the construction of same shortly.

North Bay, Ont.

It is stated that the C. P. R. has promised to contribute \$5,000 and free site toward the erection of a Y. M. C. A. building here.

North Vancouver, B.C.

The bonus asked for by the Imperial Car & Shipbuilding Company has been granted and they will probably lay down a plant at North Vancouver.

Ottawa, Ont.

The Laurentian Mica Company's premises on Bridge street were gutted by fire on the 16th inst. Loss, \$9,000.

The directors of Slinn-Shouldis, Limited, have decided to erect a large bread factory. President W. H. Dwyer; secretary and general manager, E. Cushing. Capitalization, \$200,000.

Port Colborne, Ont.

It is reported that the big cement plant here will be doubled shortly.

Quebec, Que.

La Compagnie Jacques Cartier have purchased a large tract of land in Limoilou Ward with the object, it is stated, of transforming it into a large pleasure park, similar to those in Montreal and Toronto.

Regina, Sask.

It is reported that the Bank of Commerce will put up a new building. It is rumored also that the building is to be for the National Finance Company, of Vancouver.

Sharon & Tripp, architects, have plans completed for a new block for Smith and Foley. Solid brick, three storeys. Cost, \$13,000.

Sumnerland, B.C.

A fruit cannery will be erected at Sumnerland.

Saskatoon, Sask.

A four storey addition is to be made to the Michaels' Block for the Regina Trading Company.

F. C. Ball & Company, of Winnipeg, will build a large three storey brick warehouse to cost \$20,000.

Geo. Gray, of Hull, Que., a pork packer, is negotiating for site for a western branch factory proposed to be opened during the present year. Other plants at Hull, Peterboro and Montreal.

St. Stephen, N.B.

Tenders were called until June 22nd by J. W. Fraser, manager, Bank of Nova Scotia, for erection of branch building.

St. John, N.B.

Tenders addressed to G. Ernest Fairweather, architect, will be received until June 28th for masonry, carpentry, metal work and painting required for the extension of the St. John Exchange of the New Brunswick Telephone Company.

St. Catharines, Ont.

Tenders are being called for the work in connection with the alterations and improvements to the Merritton mill for McSloy Bros., on this city. Plans, etc., at office of the architect, T. H. Wiley, St. Catharines.

St. Lambert, Que.

The Parker Foundry Company, it is stated, have acquired a tract of land and will erect a large factory in the district. Two other concerns have also applied to the town for exemption from taxes for a number of years, which, if granted, will mean the erection of several factories. The Grand Trunk Railway Company are also planning to lay large terminal yards along the south side of their tracks to relieve the congestion of the city yards.

Toronto, Ont.

The planing mill of Scholey Bros. was gutted by fire on the 14th inst. Loss, about \$3,000.

Eustace G. Bird is the supervising architect for Messrs. Carriere & Hastings of New York, on the head office of the Bank of Toronto, corner Bay and King street. Noted previously.

It is reported that the International Harvester Company has purchased land on Dundas street for a building site for their sales office.

Messrs. Bond & Smith are the architects in charge of the erection of the building to be erected on Richmond street for the Toronto Engraving Company. Noted in last issue.

The Consolidated Plate Glass Company, of Canada, Limited, 73 Wellington street, have purchased a new site on Spadina avenue, between Grange and Sullivan streets, on which a new 5-storey factory will be erected.

It is announced that W. A. Murray Company has amalgamated with John Kay Company, and that it is likely extensions to the present premises will be made shortly. Capitalization of new concern, \$3,000,000. Watson T. Bradshaw, managing director.

Victoria, B.C.

L. B. Royce, of Fort Atkinson, Wis., is investigating as to the desirability of locating a Canadian branch of the carriage, waggon and chair factory, of which he is the representative.

It is stated that Charles Hayward will erect a three storey block on corner of Douglas street and Pandora avenue.

The Middlesbrough Steel Strip and Hoop Company is interested in a project for establishing iron and steel mills, including

blast furnaces and rolling mills, on Vancouver Island.

Vancouver, B.C.

The Wood-Vallance Company will extend their warehouse.

Messrs. Fremlin & Company have a permit for a \$25,000 4-storey warehouse. Contractor, F. Raymer; Messrs. Endacott & Perceval are interested.

Kelly, Douglas & Company, wholesale grocers, of Vancouver, New Westminster and Prince Rupert, will immediately commence the construction of a large warehouse at the Grand Trunk Pacific terminal. The structure will be five storeys in height and 50 by 168 feet in ground area.

French capitalists recently acquired 312 feet of east end waterfront property adjacent to the Vancouver Sugar Refinery, paying \$256,000. The waterfront is crown granted and extends into the inlet a distance of 1,500 feet. The selling price represents a little over \$800 per front foot.

Welland, Ont.

Plans are being prepared for the office building of the Page-Hersee Tube Works.

Winnipeg, Man.

Architect Bellhouse has completed plans for a \$25,000 addition to the Ashford block on Balmoral street.

Tenders addressed to Frank R. Evans, Somerset Building, will be received until June 25th for all trades (except heating) for the erection of block for Messrs. R. & J. Johnston. Plans at office of F. R. Evans, architect.

The C. N. R. will erect an hotel here, possibly on the site of the old Manitoba hotel.

Plans for the Gordon Mitchell Drug Company have been prepared and call for a three-storey, brick and millwork building to cost about \$25,000. Jordan & Over, architects.

J. J. Vopin is the contractor for the 3-storey stone building for the Logberg Printing Company, corner William and Nena streets.

The McClary Company will build an addition to their warehouse on Bannatyne avenue.

Chas. H. Hays, president of the G. T. P., is credited with the statement that a large hotel will be built here shortly.

Green & Company, millinery importers, will start on the erection of their block, corner Ellice avenue and Hargrave street shortly. Approximate cost, \$40,000.

AWARDED.

Coquitlam, B.C.

A contract for the erection of the pump house and engineer's residence at the Coquitlam Retreat has been let by the Minister of Public Works to the Westholme Lumber Company, at \$4,800.

Edmonton, Alta.

The contract for the construction of the Hudson Bay Company's barns has been given to the Charles May Construction Company.

Fort William, Ont.

Russell Bros. have the contract for the erection of a warehouse to be erected for Symes & Company, Hardisty and Leith streets, at \$17,000. R. E. Mason is the architect.

Melfort, Sask.

Sidney Smart secured the contract for the Bank of Hamilton's new brick building on a bid of \$11,750.

Montreal, Que.

The contract for the erection of a steel superstructure of the new Windsor Street

station of the C. P. R. Company has been awarded to the Dominion Bridge Company.

The contract for the erection of a new office and factory building for the Dominion Tobacco Company has been awarded to Mr. Joseph Dagenais, lowest tenderer at \$24,300. Mr. C. Dufort, architect.

General contract for the erection of new building for the Mount Royal Riding Academy has been awarded to Mr. F. M. Hartman. Steel work will be erected by the Structural Steel Company, of Longue point. The work has been placed under way. Mr. R. Montgomery Rodden, architect.

General contract for alterations to property at 633-638 St. Catherine street east for Mr. Chas. Gauvreau, has been awarded to A. Lavallee, contractor, 27 Breboeuf street.

General contract for alterations to property at 91 Notre Dame street west, for Mrs. Riddell, London, England, has been awarded to O. Lebleau, contractor, Board of Trade Building. Architect, Jos. Wechselsberger, 171 St. James street.

Prince Albert, Sask.

The Canadian Crocker-Wheeler Company, Limited, St. Catharines, Ont., are stated to have secured the contract for the equipment of the Big River Lumber Company's plant here.

Toronto, Ont.

The contract for the cornice and galvanized iron work at the building for Heintzman & Company, has been awarded to A. B. Ormsby, Limited.

Power Plants, Electricity and Telephones

Calgary, Alta.

Tenders will be received until July 12th for one 750 B.H.P. engine, 300 r.p.m., with condenser; also one 600 k.w.d.c. 600 volt generator switchboard, etc. H. E. Gillis, city clerk.

Port Arthur, Ont.

The bylaw for \$30,000 for extension and equipment of municipal telephone service and also for \$10,000 for extension of the electric lighting system were carried.

Saskatoon, Sask.

The Saskatchewan Power Company will build a generating plant 12 miles below the city at an estimated cost of \$1,000,000. Noted in issue of May 25th.

Shepherd & Taylor, of Edmonton, are considering the building of a street railway system in Saskatoon.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until June 27th for supply of wire; also until June 23rd for pole line supplies. Specifications obtained from the Toronto Hydro-Electric System, City Hall.

Winnipeg, Man.

The Board of Control has recommended that space be given for erection of a 350 steel tower and an office building for a wireless telegraph station on the Exhibition grounds. W. Beaton is the local manager.

Tenders addressed to the chairman of the Board of Control will be received until July 4th for supply and erection of two sets of line disconnecting switches, with mechanism. Plans, etc., at Power Engineer's office, this city. M. Peterson, secretary. See advertisement in this issue.

AWARDED.

Guelph, Ont.

The City of Guelph have awarded to the British Aluminium Company, Limited,

(Canadian agents, Parke & Leith) the contract for about 5 miles of No. 3/0 B. & S. gauge and 300,000 C. M., double braided weatherproof insulated aluminum cable to be installed between the sub-station of the Hydro-Electric Power Commission and the local sub-station here.

London, Ont.

Contract for a steel tower to be used in connection with electrical distribution was awarded to the Ontario Wind Engine and Pump Company, Toronto, for \$585 f.o.b. London, and \$175 for erection.

Minnedosa, Man.

Snyder Bros., of Winnipeg, secured the contract to build a dam on the Little Saskatchewan on a bid of \$41,528.

Montreal, Que.

The Swedish General Electric Company, through their Montreal sales manager, Mr. H. D. Bayne, has been awarded the contract for electrical equipment required for the Jacobs Building sub-station of the Dominion Light, Heat & Power Company. One 150 h.p. motor generator set and one 350 k.w. engine type generator will be installed. The latter to be directly connected to a Belliss & Morcom vertical engine supplied through Messrs. Laurie & Lamb.

The Canadian Westinghouse Company, Limited, has secured through the Montreal sales office, contract from the Quebec Railway, Light, Heat & Power Company for this season's transformer requirements. Also for 25,000 volt lightning arresters, disconnecting switches and choke coils.

G. W. T. Nicholson, general contractor, has received a contract from the Canadian Light & Power Company for the erection of superstructure of power house at Valleyfield.

James Ballantyne, general contractor for the plumbing and heating of the Saskatchewan University Buildings designed by Messrs. Brown & Vallance, has awarded sub-contracts as follows, in connection with the 600 h.p. lighting and heating plant which will be installed: Ross & Greig, representing Sheldon's, Limited, heaters and nine ventilating fans; Canadian Westinghouse Company, switchboard apparatus, one 30 k.w. generator, one 125 k.w. generator; Laurie & Lamb, one Belliss & Morcom 125 k.w. engine, Robb Engineering Company; three 250 a.p. boilers, one 225 h.p. boiler, one 30 k.w. high speed engine.

The Canadian Light & Power Company have awarded the contract for their complete transmission line requirements of high tension and other insulators to the Locke Insulator Manufacturing Company, of Victor, N.Y., through their Montreal representatives, the Engineering Equipment & Supply Company.

The contract for galvanized transmission towers, on the main line from Valleyfield to Montreal has been awarded to the Canadian Bridge Company of Walkerville. The special painted towers which will be employed at crossings, are to be constructed by the Dominion Bridge Company, of Lachine. Mr. Geo. T. Nicholson has been awarded the contracts for the erection of all superstructures for the power houses.

Quebec, Que.

We have been informed that A. C. Argall Company, of Montreal, have been awarded the contract for the reinforced concrete dam at the power station of the Deschambault Electric Company, St. Alban, at \$31,300. J. F. Guay, consulting engineer.

(Continued on page 29)

Tenders and For Sale Department

Newmarket

Tenders will be received up to the evening of JULY FIRST for extension to Newmarket High School.

Building, 40 x 70; two storeys and basement; stone and brick; slate and iron roof; modern plumbing in basement.

Tenders will be received in a lump sum or separately for the various trades.

Plans and specifications may be seen on or after June eighteenth (18th) at the office of the architects,

O. E. TENCH,
Queen Street, Newmarket.

26

Tenders for Road Pavement

Sealed tenders will be received at the Town Clerk's office, Lindsay, up to noon on MONDAY, JUNE 27TH, 1910, for the construction of approximately 6,950 square yards of Bituminous Pavements.

Plans and specifications may be seen at the office of the Town Clerk at any time during office hours.

Tenders to include concrete, base, curbs and surfacing, which may be made en bloc or separately.

The lowest or any tender not necessarily accepted.

F. KNOWLSON,
Town Clerk.

25

Hospital Board Smith Falls

Tenders Wanted

Sealed tenders (separate or bulk) addressed to the Secretary of the Board will be received until MONDAY, 5 P.M., JUNE 27TH, 1910, for the necessary trades in connection with the erection of a (brick and stone) Public Hospital in the Town of Smith's Falls.

Plans and specifications may be seen at the office of G. F. Martin, architect, Smith's Falls. Each tender to be accompanied by a marked cheque equal to 5 per cent. of same, payable to the Secretary of the Board.

The lowest or any tender not necessarily accepted.

F. WHITCOMB,
Chairman of the Board. W. PARK,
Secretary.

25

Tenders for Bridge Construction

Tenders will be received at the office of the undersigned up to six o'clock p.m. on MONDAY, JUNE 27TH, 1910, for the construction of Concrete Abutments and a Reinforced Concrete Truss Bridge of 73-foot span, over the Humber River between lots 15 and 16, con. 8, Township of Vaughan, known as Elder's Bridge.

Plans and specifications may be seen and all necessary information may be obtained at the office of the undersigned, 57 Adelaide Street E., Toronto.

The lowest or any tender not necessarily accepted.

BARBER & YOUNG,
Engineers,

Toronto, June 15th, 1910.

25

Town of North Bay

Tenders for Concrete Sidewalk

Sealed tenders will be received by the Town Clerk of the Town of North Bay, Ont., up to SATURDAY, 2ND JULY, 1910, for the furnishing of all materials and the construction of approximately 80,000 square feet of Concrete Sidewalk. Specification may be seen in the office of the Town Engineer, Town Hall, North Bay. A marked cheque for \$100 to accompany each tender. The lowest or any tender not necessarily accepted.

JAS. SINTON,
Town Engineer. M. W. FLANNERY,
Town Clerk.

25

Town of Dunnville Province of Ontario

Notice to Contractors

Sealed tenders, addressed to the Town Clerk, will be received until 8 p.m. on TUESDAY, 28TH JUNE, 1910, for the completion of a system of which have been partly constructed by contractors and by the corporation. Plans, profiles, specifications, etc., may be seen at the Town Clerk's office, Dunnville, or at the office of the engineer, Toronto.

ROBT. BENNETT, Esq., J. W. HOLMES, Esq.,
Mayor, Dunnville, Ont. Town Clerk,
Dunnville, Ont.

WILLIS CHIPMAN, Esq.,
Chief Engineer,
Toronto, Ont.

25



To Contractors

Sealed tenders, endorsed "Tender for Heating, Plumbing and Electric Wiring for the Addition to Osgoode Hall," and "Tender for Plumbing in Lavatories of the Normal School, Toronto," addressed to the undersigned, will be received at this Department until noon, TUESDAY, JUNE 28TH. Plans and specifications may be seen at this Department.

An accepted bank cheque, payable to the order of the Hon. J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tender, and the bona-fide signatures and addresses of two sureties, or the bond of a guarantee company, must accompany each tender.

By order,

H. F. McNAUGHTEN
Secretary, Public Works Department.
Department of Public Works, Ontario.
Toronto, June 17th, 1910.

Newspapers publishing this advertisement without authority will not be paid for it.

25

Town of Outremont

Tenders for Sidewalks

Tenders will be received by the undersigned up to FRIDAY, THE 24TH OF JUNE at 8 p.m. for the construction of about 10,000 running feet of concrete sidewalks. Specifications at the town hall. A deposit of 10 per cent. will be required. The lowest or any tender not necessarily accepted.

J. KRUSE,
Secretary-treasurer.

25

City of Winnipeg Hydro-Electric Power Development

Tenders for Line Disconnecting Switches

Sealed tenders on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope "City of Winnipeg Hydro-Electric Power Development—Tender for Line Disconnecting Switches," will be received at the office of the undersigned up to 11 a.m. on MONDAY, 4TH JULY, 1910, for supply and erection of two sets of Line Disconnecting Switches with mechanism.

Copies of plans, specifications and form of tender may be obtained at the Power Engineer's Office, Carnegie Library Building, Winnipeg.

Each tender must be accompanied by a certified cheque for one hundred and fifty dollars, which cheque will become forfeit to the corporation in the event of the successful tenderer refusing or neglecting to sign a satisfactory contract when called upon so to do.

The City reserves the right to reject any or all tenders or to accept any bid which shall appear advantageous.

M. PETERSON,
Secretary.

Office of the Board of Control, Winnipeg, June 16th, 1910.

25

City of Moose Jaw Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A," "Tender B," etc., will be received by the undersigned City Clerk until 8 o'clock, p.m., on MONDAY, JULY 18TH, 1910, for the following:

Contract "A." Supplying material for and constructing Sewage Disposal Plant complete, and laying Trunk Sewer.

Contract "B." (1) Supplying and installing a complete Air Lift System; (2) Supplying and installing one electrically-driven Centrifugal Pump and Auto Starter.

Contract "C." Supplying and delivering 3,000 cords of Field Stone.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw, and also at the office of the "Canadian Engineer" at the following addresses:

Toronto, 62 Church Street.
Montreal, B33 Board of Trade Building,
Winnipeg, Room 404 Builders' Exchange Buildings.

The lowest or any tender not necessarily accepted.

J. M. WILSON, W. F. HEAL,
City Engineer. City Clerk.

Moose Jaw, Sask., July 16th, 1910.

28

Notice to Contractors

Whole or separate tenders for the various trades required in the erection of a Municipal Building in the Town of Sudbury will be received by the undersigned up to 6 p.m., MONDAY, JUNE 27, 1910. Tenders to be accompanied by a marked cheque for 5 per cent. of the amount of the tender, made payable to L. O'Connor, Mayor, cheques to be returned to unsuccessful tenderers.

Lowest or any tender not necessarily accepted. Plans, etc., may be seen at the office of the architect, Jas. Thomson, 43 Victoria street, Toronto, or with George Elliott, Town Clerk, Sudbury.

Apply

L. O'CONNOR,
Mayor.

25

City of St. John

Tenders for Paving

For paving in Germain Street, between Princess and Queen Streets, according to plans and specifications to be seen and forms of tender obtained at the office of the City Engineer, Room No. 5, City Hall, duplicates of which are on file in the office of the "Contract Record," 504 Confederation Life Building, Toronto.

A cash deposit must accompany each bid, the amount being stated in the specification.

The city does not bind itself to accept the lowest or any tender.

All tenders must be addressed to the Common Clerk, Room No. 3, City Hall, who will receive bids until noon of TUESDAY, THE 28TH DAY OF JUNE, A.D. 1910.

ADAM P. MACINTYRE, WM. MURDOCH,
Comptroller. City Engineer.

St. John, N.B., June 17th, 1910.

25

Tenders

For New Fire Hall on Main Street— East Toronto

Bulk tenders, or tenders for the several trades mentioned below, in connection with the above building will be received by registered post only, addressed to the undersigned, up to noon on TUESDAY, 12TH JULY, 1910.

- 1.—Mason work, etc.
- 2.—Carpenter work.
- 3.—Galvanized iron and plumbing.
- 4.—Gas fitting and plumbing.
- 5.—Hot water heating.
- 6.—Electric wiring.
- 7.—Plastering.
- 8.—Painting and glazing.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents. The usual conditions relating to tendering, as prescribed by city by-laws, must be strictly complied with, or tenders may not be entertained.

Tenderers shall submit with their tender the names of two personal sureties or the bond of a Guarantee Company.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.

City Hall, Toronto, June 16th, 1910,

25

Tenders

will be received until MONDAY, 27TH INST.,
for the necessary

Brick, Masonry, Cut Stone, Fire- Proofing, Etc., Works

for a mansion to be erected on Davenport road, near Walmer road.

Plans and specifications can be seen and any other information obtained at the offices of the architect, 164 Bay Street.

E. J. LENNOX,
Architect.

25



Notice to Architects

The time for receiving competitive designs for the residence of the Lieutenant-Governor of the Province of Ontario, in the City of Toronto, has been extended to AUGUST 10TH, NEXT.

J. O. REAUME,
Minister of Public Works.

Department of Public Works, Ontario, Toronto,
June 21st, 1910.

For Sale

Steam Shovel

One Style "A" Marion Steam Shovel, 1½ yard dipper capacity, about 45 tons working weight, in first-class condition, with new extra heavy reinforced boom, latest style new independent crowding engines, all thoroughly overhauled, the boiler just re-tubed. Can be inspected where it is now working. Offered subject to inspection and acceptance before shipment, and subject to prior disposition.

Apply

F. H. HOPKINS & CO.,
New Imperial Bank Bldg., Montreal.

24

Positions Vacant

Advertisements under this heading two cents a word per insertion.

WANTED—TRAVELLING SALESMAN to represent firm manufacturing bank, office and store fittings. Must be competent to make sketches, etc. Man having experience in architect's office preferred. Apply, Box 974 "Contract Record," Toronto. TF

Miscellaneous

Advertisements under this heading two cents a word per insertion.

PINE PILING—Can supply large quantities pine piling, any length up to, say, 70 feet, on cars O. N. O. R. Apply to A. Prentice, 649 Bathurst Street, Toronto, Phone College 5729, or A. McPHERSON & COMPANY, Longford Mills, Ont. T.F.

FOR SALE—One 50 h.p. return tubular boiler; one 45 h.p. high and low pressure engine. Formerly run planing mill. Also several other boilers and engines of different sizes. THE EVANS COMPANY, Limited, Sudbury, Ont. 26

FOR SALE—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 foot x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail. —WM. LESSLIE, Walkerville, Ont. TF

Power Plants, Electricity and Telephones

(Continued from page 27)

Toronto, Ont.

The British Aluminium Company, Limited, through their Canadian agents, Messrs. Parke & Leith, have been awarded by the Hydro-Electric Power Commission of Ontario, a contract for about 500 miles of bare aluminium cable, ranging in size from No. 2 to No. 4/0 B. & S. gauge to be installed between the several stations.

Winnipeg, Man.

The contract for power and electric lighting wiring of the new workshop which the Dominion Bridge Company of Lachine are erecting here, has been awarded to W. J. O'Leary & Company. Approximately 1,000 h.p. in motors will be installed and the wiring will be in conduit.

Miscellaneous

Brandon, Man.

Building permits have been issued to:—Flavelle & Hills, 4 residences, \$10,800; C. Twiss, residence, \$4,800; Grace Mendham, residence, \$2,000; Hamilton Provident Loan Society, addition on 11th street, \$3,000; J. Forbes, brick veneer residence, \$2,800.

Hamilton, Ont.

Engineer Sing, of the Dominion government, has received instructions to prepare plans and specifications for the extension to the revetment wall and call for tenders for the work. Government estimates provided \$20,000.

Montreal, Que.

Recent building permits include: Mrs. D. Hart, 296 Sherbrooke West, alterations to dwelling, \$2,500; L. A. Herdt, 83 Durocher street, alterations to dwelling, \$4,200; G. Gaudreau, 640 St. Catherine street east, alterations to store and dwelling, \$8,500; M. Riddell, London, England, alterations to one house, \$5,000; Montreal Racquet Club, Concord street, alterations to club house, \$2,500; Catholic School Commissioners of Montreal, 85 St. Catherine street w., school building, \$1,600; also one school building, \$65,000; F. E. Riopelle, 1102 Rachel, two houses containing six dwellings, \$10,000; F. Guerin, 211 Esplanade, one house, \$3,000; Wm. Bedard, 421 Alwyin, one house containing three dwellings, \$3,000; George Rattleade, 276 Marquette, one house containing three dwellings, \$3,000; Jos. Gareau, 134 Coursol, one house containing three dwellings, \$4,300; J. P. Lacroix, 786 Marie Anne, one house containing six dwellings, \$3,800; R. Marsolais, 770 Dorion street, two houses containing six dwellings, \$6,000; E. Leveille, 9 Villeneuve, one house containing three dwellings, \$4,500; A. Vallee, Ste. Anne de Bellevue, one house containing three dwellings, \$5,000; P. Dubois, one house containing three dwellings, \$4,000; H. Vallee, 75 St. Elizabeth street, one house containing three dwellings, \$3,000; H. Kellert & Sons, St. James street, office and warehouse, \$106,000; B. Tansey, 10 Belmont, one house, \$5,500; Ideal Savings, Loan and Land Company, 290 St. Catherine w., two houses containing four dwellings, \$4,000; Montreal Light, Heat & Power Company, coal storage, \$54,000; A. Lacombe, 29 Bonaparte, one house containing four dwellings, \$6,000; E. Therrien, 1764 Esplanade, six houses containing eighteen dwellings, \$17,000; W. Piche, 1760 Manoe, two houses containing six dwellings, \$9,000; T. Chartrand, one house containing three dwellings, \$7,000; Blumenthal Est-

ate, one office building, \$150,000; P. Dore, 938 Colonial avenue, one house containing dwellings, \$3,000; T. G. Dugas, 2850 St. Lawrence, one house containing two dwellings, \$3,450; G. Duchesneau, 38 Laurier west, two houses containing ten dwellings, \$6,000; Trudeau & Cecise, 893 St. Lawrence avenue, two houses containing six dwellings, \$8,000; A. Marceau, 315 Visitation, two houses containing six dwellings, \$7,500; Protestant Board of School Commissioners, one school building, \$50,000; York-shire Insurance Company, 55 St. Francois Xavier street, one office building, \$100,000; A. Fortier, 1663 Hutchison street, one house containing three dwellings, \$9,000; J. L. Savignac, St. Cesaire, Que., one house containing three dwellings and one store, \$8,000; C. C. Ballantyne, of the Sherwin-Williams Company, one house, \$200,000; H. Forget, 1956 Dufferin street, six houses containing eighteen dwellings, \$18,000; Matthewson Sons, one warehouse, \$7,000; Mde. R. Roy, 65 Notre Dame street, Maisonneuve, two houses containing ten dwellings, \$5,000; C. Therrien, 37 St. Joseph, one house containing two dwellings, \$3,500; Clavel & Fils, 1317 Papineau, three houses containing six dwellings, \$3,000; J. Corbeil, 2510 St. Hubert, two stores, \$6,000; M. Draut, 287 Sanguinet, four houses containing twelve dwellings, \$12,000; Sovereign Lime Works, 1279 St. Denis, two houses, \$15,000.

Ottawa, Ont.

Recent building permits include: Donald Fraser, two brick veneer dwellings and shops, LeBreton street, \$5,500; E. M. Mavaut, brick veneer dwelling, Centre street, \$3,000; C. P. Wright, concrete shop, Rideau street, \$3,000; W. J. Campbell, brick veneer apartment houses, Laurier avenue west, \$16,000; A. Tracey, two detached brick veneer dwellings, Spruce street, \$5,000; F. W. Bum, brick veneer dwelling, MacLaren street, \$6,000; D. Skuce, double dwelling veneer, Gloucester street, \$2,500; T. D. McFarlane, brick factory, Laurier avenue west, \$4,500; W. J. Tyndall, double brick veneer dwelling, Laurel street, \$3,000; H. Hitchman, double brick veneer dwelling, Arlington avenue, \$4,000; Sam. McCormack, brick veneer shop and dwelling, Laurier avenue, \$6,000; C. A. Benoit, double brick veneer dwelling, spruce street, \$2,500; J. A. Low, brick veneer dwelling, Brighton avenue, \$2,500.

Toronto, Ont.

Recent building permits include: G. F. Bailey, pair semi-detached 2½-storey brick dwelling, Macdonnell avenue, \$5,000; Grimshaw Bros., 2½-storey brick dwelling, on Foxbar road, \$5,000; G. Griffin, 2-storey brick apartments, St. Vincent street, \$12,000; Dr. E. C. Burson, 2-storey and attic brick dwelling, St. Clair avenue, \$17,000; F. J. Aylward, 2-storey and attic brick dwelling, Highlands avenue, \$6,850; J. Macdonald, 2-storey frame and galvanized iron stable, Balmoral avenue, \$4,000; R. B. Storey, 2 detached 2-storey and attic brick dwelling, Geoffrey, \$6,000; R. O. Dickson, pair semi-detached 2½-storey brick dwelling, Empress Crescent, \$8,500; Wm. Robinson, 5 pair semi-detached 2-storey brick dwelling, Sheridan, \$20,000; Sinclair & Boddy, pair semi-detached 2-storey brick dwellings, Booth, \$5,000; H. F. Squires, 3 attached 2-storey brick dwelling, Clinton, \$6,000; G. C. Moore, 2-storey and attic brick dwelling, Whitney avenue, \$8,000; A. Roberts, 3 attached 2-storey brick stores and dwellings, College street, \$7,000; Morris Reid, 2 detached 2½-storey brick dwellings, Geoffrey, \$7,000; E. G. Switzer, 3 pair semi-detached 2-storey brick dwelling, Clendale, \$18,000; Sykes & Knox, 3 pair semi-detach-

ed 2-storey brick dwelling, Dufferin, \$12,000; Wilkins & Company, 6 pair semi-detached 2½-storey brick dwellings, Bathurst street, \$30,000; S. F. Harvey & Company, 3-storey brick factory, corner Dundas and Ritchie, \$18,000; Zinke & Johnston, 2½-storey brick dwelling, Mavety street, \$5,200; T. H. Wood, 1-storey brick addition to dwelling, Bloor street east, \$6,000; J. H. Lock, 2-storey brick apartments, Major, \$6,000; W. J. Ingram, 2½-storey brick dwelling, Logan, \$5,000; Kling Bros., 3 attached 2-storey brick stores and dwellings, Queen street east, \$8,000; Wm. Hodgkinson, 3 attached 2-storey brick front, rough-east dwelling, Tiverton avenue, \$5,000; F. Courtemanche, 2 detached 2-storey brick dwellings, Kelle street, \$6,000; F. Courtemanche, 2 detached 2-storey brick dwelling, Kelle street, \$6,000; R. Fasken, 3 attached 2-storey brick dwelling, Cobourg avenue, \$6,000; Alex. M. Stewart, pair semi-detached 2-storey and attic brick dwelling, Lansdowne, \$5,800; Davidson & Company, 3 attached 2-storey brick dwelling, Montrose, \$6,000; H. Thomas, 3 attached brick dwellings, Perth avenue, \$8,000; B. J. Case, 3 detached 2½-storey brick dwelling, Westminster, \$12,000; Robt. Brown, 3 pairs semi-detached 2-storey brick dwellings, Symington, \$8,000; Chappell & Joyce, pair semi-detached 2-storey brick dwellings, Campbell, \$7,500; Dr. J. McCollum, 2-storey and attic brick addition to dwelling, corner Jarvis and Shuter, \$6,000; A. T. Reid, 2-storey brick addition to dwelling, South Drive, \$5,000.

Vancouver, B.C.

Building permits were granted as follows: A. A. Arnold, 2426 Sixth avenue w., \$3,000; A. Knight, 2834 spruce street, \$4,000; S. W. Hopper, 2008 Marine Drive, \$3,000; Wm. Ellis, 2860 Marine drive, \$3,000; Bentley & Wear, 2263 Seventh avenue west, \$3,000; Mrs. M. Crawford, 1524 Fourteenth avenue east, \$3,000; D. Naiffzinger, 345 Eleventh avenue west, \$4,500; G. C. Coulson, 1065 Eleventh avenue west, \$4,500; A. McLellan, 1145 Lily street, \$2,700; C. P. R., frame shop on reserve, \$3,600; A. Mains, 725 Thirteenth avenue, \$2,500; a grand stand at the Exhibition grounds, architect, Donnellan & Donnellan, \$30,000.

Victoria, B.C.

Tenders for garbage tins were received from the following: A. Blygh, \$239½; W. Wilson, \$4; L. Peake, \$3.99; Geo. Powell, & Sons, \$3.10; Watson McGregor, \$2.75 and \$3; C. M. Cookson, \$2.95; P. R. Little, \$2.49; T. A. Johnson, \$2.55 and \$2.60; H. Cooley & Son, \$3; Hayward & Dadds, \$2.25 and \$2.65; A. & W. Wilson, \$5.50.

Winnipeg, Man.

Recent building permits include: A. C. Galbraith, ten houses on Newman street between Portage avenue and the river \$25,000; Patrie Manufacturing Company, warehouse, north side of Henry, apposite Tecumseh, \$22,000; Gallagher, Holman & Lafrance, meat market, King street, between Rupert and Pacific, \$20,000; Dunn & Wallace, house, west side of Home, between Buell and Bath, \$5,000; P. C. Keller, house, north side of Athol, between Main and Mac, \$3,500; J. M. Finlay, four houses, south side of Merriem, between Pembina and Nassau, \$8,000; W. W. Fleming, west side of Home, between Buell and Bath, \$4,000; G. O. Aulsebrook, north side of Fawcett, \$4,000; A. McDonald, two houses, south side of Arnold, \$6,500; B. C. Cockshutt, four dwellings, south side of Martin street, \$7,200; R. Butcher, dwelling, north side of McDermot avenue, between Emily and Monckman streets, \$4,000; L. Aysaias-ky, school building, north side of Mani-

toba avenue, between McKenzie and McGregor, \$4,000; S. A. McNab, dwelling, on west side of Ruby street, between Portage and Buell, \$5,000; J. Matthews, six houses north side of Morely, between Pembina and Hay, \$18,000; Smith & Kirkpatrick, two dwellings, west side of Arlington, between Buell and Bath, \$8,000; F. W. Harvey, house, north side of Bannerman, between Mac and Scotia, \$3,000.

AWARDED.

Ottawa, Ont.

The contract for the construction of section four of the Trent Valley canal has been awarded to Haney, Miller and Quinlan, at about \$1,000,000.

Quebec, Que.

Contracts for fire hose were awarded as follows: 1,000 feet "Red Cross," at \$1, to the Mechanic Supply Company, and 1,000 feet of "Arrow," at 95 cents to the Canadian Rubber Company.

Welland, Ont.

A contract for improvements in the Welland canal at Port Colborne has been awarded to M. J. Hogan, or Toronto. The figure is \$74,000.

New Companies

Western Plastering Company, Winnipeg, Man., capital \$20,000. Incorporators, Wm. McCartney, plasterer, and Geo. H. Elliott, accountant, both of Winnipeg, Man.

The Oliver Chilled Plow Works, of Canada, Limited, incorporated, capital, \$1,000,000. Incorporators: J. Doty Oliver, J. Oliver, E. Nicar, R. A. Smart, all manufacturers, of South Bend, Indiana, U.S.A., and W. A. McInerney, attorney-at-law, of the same city.

Canadian Steel Corporation, Hamilton, Ont., \$25,000,000, incorporated. Incorporators, C. S. Wilcox, C. A. Birge, B. Hobson, all of Hamilton; L. Harris, Brantford, all manufacturers; and H. S. Holt, C. E., Montreal.

Ontario Bridge Company, Limited, Toronto, Ont., capital \$40,000. Incorporators, F. W. Sage, contractor, and John H. Hutton, draughtsman, both of Toronto.

Cadwell Dredging Company, Limited, Windsor, Ont., capital \$50,000. Incorporators, Walter Cadwell, contractor, and Oscar E. Fleming, K.C.

Canada Steel Company, Limited, Hamilton, Ont., capital \$300,000, incorporated to manufacture, deal in, etc., all kinds of machinery, such as boilers, generators, plumbers' wares in iron. Incorporators, Jas. L. Ross and Arthur W. Holmsted, barristers-at-law, Toronto, Ont.

The Camden Independent Telephone Company, Limited, Newburg, Ont., capital \$7,500. Incorporators, Milton I. Beenan, physician, and Jas. H. Nugent, bank manager.

The Goderich Rural Telephone Company, Limited, Goderich, Ont., capital \$5,000. Incorporators, Chas. C. Lee and Walter W. Saults, merchants, Goderich, Ont.

The Western Canada Construction Company, Winnipeg, Man., capital \$30,000. Incorporators, Albert Thexton, and Clarence H. Thexton, contractors, St. Thomas, North Dakota.

E. B. Reese Engineering Company, Limited, Winnipeg, Man., capital \$50,000. Incorporators, Edward B. Reese, electrical and mechanical engineer, and Wm. J. Ireland, civil engineer and architect, Winnipeg, Man.

Contract Record

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Wholesome Lessons from Building Failures

The calamity at Montreal will doubtless prove a fruitful source of discussion later on when a further investigation has been made and more reliable facts are at hand. The feeling that has prevailed in all constructional quarters is, above all, one of intense sympathy with those connected with the disaster. Hitherto there has been a fine sense of delicacy and a general desire to refrain from making any insinuations, either by word or pen, that would tend to increase the cares of those connected with the work. Despite modern day progressiveness, and the tremendous strides that have been made in every branch of construction during recent years, we shall never be infallible. Buildings collapsed long before our day and generation, and it is pretty safe to predict that the calamity at Montreal will not be the last of its kind.

From every adversity, however, we should be able to take a helpful lesson. The Montreal affair is a notable instance. One of the first things that is emphasized by this calamity is the necessity for having the steel work supporting water tanks designed or checked by a properly qualified structural steel engineer. This is not intended and can hardly be construed as a reflection upon the architectural profession. It is an axiom. Although these water towers are apparently simple, their design is by no means so, for the reason that they constitute a class of structure quite different from the steel skeletons of buildings and bridges. The design of posts and cross struts for the former structures is another proposition entirely. The relatively small loads carried by these members gives rise to excessively light sections, having a slenderness ratio much above that of compression mem-

bers in buildings and bridges. For this reason their design must be on the basis of their buckling strength rather than on that of their crushing strength. The ordinary formulas, therefore, do not apply. In such instances it is obvious that the only method of figuring such struts is by employing Euler's formula for long columns. The experimental investigations of Tetmajer and others show that slender struts such as are generally employed in light towers of the kind under consideration, possess a strength very closely approximated by Euler's formula.

Again, while the factor of safety on ultimate strength for windmill towers and transmission line towers is frequently as low as $2\frac{1}{2}$, it should never be as low as this for towers supporting water tanks. In the case of the former structures the maximum stresses arise from the simultaneous effect of a number of conditions, but for water tank towers the maximum live load consists of the water and the tank and is supposed to be always present. It is not correct, therefore, to use higher working stresses for the dead load, live load and wind load than for merely the dead load and live load, since the dead load and the live load are always operating under low wind pressure or under the maximum wind pressure reached in the locality.

Lastly, the field connections should be rivetted and all members should be stiff members, i.e., angles and not rods. In no case should bolting be permitted, as this tends to make the structure flimsy.

A reflection that will surely come to many of our architectural readers is the unreliability of taking the plans of a building and, from an inspection of these, advising whether the walls or girders will carry the load of a sprinkling tank. The architect is only warranted in such a course when he has indisputable evidence that the work has been carried out according to the letter of the specifications, which in turn must bear expert examination. A case in point came to our attention quite recently. On a certain structure in Toroneo it was stipulated that the piers between curtain walls were to be solid brick, laid in cement mortar. Upon examination it was discovered that a shell of single brick had been made around the pier and the interior filled in with building rubbish, such as pieces of broken brick, lumps of old mortar, shavings, sticks and so on. It is apparent that if cases such as this were at all frequent, plans and specifications would be of little use for future guidance.

One is inclined to think that somewhat more stringent regulations tending to ensure the safety of structures during the process of erection and after their completion would be really in the interests of building. Within recent years not a few accidents have resulted from a non-observance of some of the most fundamental principles of construction. This, of course, does not apply to the collapse at Montreal, for the investigations made have already shown that such principles were observed, but at the same time, one cannot help thinking that a revised code of regulations would in many places prove an enduring advantage to building interests.

New Water Supply System Fort William

Methods Adopted in Construction of Submerged Pipe Line under the Kaministiquia River—Details of Organization and Cost*

BY H. S. HANCOCK, City Engineer, Fort William

The river at the point of crossing is 330 feet in width and only one sounding revealed a greater depth than 25 feet. At this time the draft of boats operating beyond the proposed crossing to the coal docks of the Canadian Northern Railway did not exceed 17 feet, but before the work was completed the erection of a grain elevator and the establishment of a rail dock by the Grand Trunk Pacific Railway, developed a large traffic by ships drawing as much as 21 feet of water. This traffic was still further increased by tugs hauling scows to the dumping ground in the lake from the dredges working on the upper reaches of the river. The river has frequently a considerable current, and usually carries a quantity of alluvial matter in suspension. The water is naturally of a dark brown color, owing to its passage through the muskegs and swamps that abound at the head waters of the river. As a result 50 candle power lights can only be seen through it as a beacon at a short distance, and are of no value as an illuminant.

The bed of the river is covered by several feet of

from the D. Y. Stewart Company, of Glasgow, some weeks prior to the award of the contract.

A special Y-connection was made with the pressure main on the south bank of the river, and two lines of hub and spigot pipe carried at a diverging angle of 45 degrees with the centre line until the ends were 100 feet apart; 45-degree bends then carried the two pipe lines parallel 100 feet centre to centre to the bank of the river, where they dipped by a one-eighth bend at an angle of 45 degrees to a grade line 28 feet below the normal water level of the river. This grade was maintained for 300 feet on both lines, at which point 45-degree bends were used to bring them to the surface, where a duplication of the arrangement on the south bank connected them at a second Y with the 18-inch main leading to the city. Every joint under water was a flanged joint. The flanged pipes were 12 feet long, of standard specifications, $\frac{7}{8}$ -inch thick, and weighing not less than 2,000 pounds per length. The flanges were $\frac{7}{8}$ x3 inches, supported by ribs, and provided with 12 $\frac{3}{4}$ -inch bolts on



Fig. 1.—Submerged Pipe Line and Proposed Tunnel

alluvial deposit and sand, overlying a bed of blue-gray clay, itself containing a small percentage of fine sand. Solid rock of uncertain character is found at a depth of from 55 to 58 feet below water level. Overlying the rock is a bed of from 2 to 5 feet in thickness of gravel and small boulders, bearing water under a head that rises in the boring tubes some 4 or 5 feet above the surface of the river.

The question of a tunnel through the clay bed under the river was seriously considered, but it was decided that pipe lines would be sufficient for many years, and that this expenditure could be deferred until the growth of the city enabled it to bear the cost with less difficulty. Owing largely to an incomplete knowledge of the nature of the material to be encountered, this cost was originally thought to be much greater than will actually be necessary. It was also anticipated that pipe lines could be laid in a much shorter time, and the much needed temporary water supply more quickly obtained.

It was the writer's original intention, when the pipe line had been decided on, to dredge two channels and lay a duplicate main of hub and spigot pipe, with a flexible joint at every fourth joint, as sufficient until such time as a tunnel became necessary. The majority of the board of commissioners objected to the flexible joints and also to the ordinary lead joint for use under water. They wanted every joint under water to be a flanged joint, and were quite willing to bear any additional expense incurred by this method of construction.

The material for this work was ordered by the city

a bolt circle of $2\frac{3}{4}$ inches diameter. Corrugated copper gaskets were used for all flanger joints, after the turned faces had been thoroughly cleaned and lightly smeared with "manganosite" paste. Concrete cut-off walls were built around the pipes lying on both sides of every bend, as a support for the vertical bends and to resist the thrust tending to move the horizontal bends. Two 18-inch valves with spur gearing were placed close to the south Y and two laid flat with bevel gearing close to the north Y.

For the purpose of protecting the pipe at the water line from frost and from the danger of contact with boats two 50-foot piles were driven 6 feet centre to centre, 18 feet from the points where the pipes emerged from the river, 6 feet nearer the shore, and 12 feet centre to centre, two more piles were driven, and two additional piles, 18 feet centre to centre, were driven close to the shore line. All these piles were securely tied together and into the bank with 8 x 12-inch walings and 12 x 12-inch internal cross bracing. Any tendency to slide into the river was overcome by attaching the whole structure to four $\frac{3}{4}$ -inch wire ropes anchored to dead men 50 feet from the river bank. A second line of waling was sunk on the inside of the piles at a depth of 6 feet; 3 x 10-inch sheet piling was then driven on the inside of the walings around the frame thus formed, and the enclosed space backfilled to an elevation 3 feet above the top of the pipe.

The specifications allowed the contractor considerable latitude as to the method to be adopted in laying this pipe. The essentials were that it be laid to grade on a solid bed; that it should bear a test pressure of 200

* Extracted from a comprehensive and interesting paper presented to the Canadian Society of Civil Engineers.

pounds per square inch; that the contractor should bear all loss from breakage or damage, until the final acceptance of the work, and the method of laying adopted was to be entirely at his own risk. He was also to provide all necessary appliances for laying the pipe, drive all necessary piling and furnish a satisfactory and permanent support for the pipe.

This somewhat indefinite clause was almost forced on the writer by the very short time available for the production of the specifications and lack of time and opportunity to test some of the unknown factors in the problem.

Deferred delivery of the pipe delayed the commencement of this section until late in the summer. A sub-contract was let to the Great Lakes Dredging Company, of Port Arthur, the only company in the district at that time possessing the necessary dredges, scows, and diving outfit, and it placed an experienced diver foreman in charge of the work. The original soundings indicated that the solid clay foundation would be secured at the required depth. Two trenches 15 feet in width were dredged across the river to a depth of 28 feet below water level. The bottom of the trench was carefully prepared by a diver, assisted by careful measurements, and a firm level clay bed reported. Four lengths of pipe were then bolted together on the bank and lowered into a position by a hoist operating over the leads of a scow pile driver. Thus every fourth joint was made by a diver under

took the position that the material supplied by the city was defective and that a tight joint could not be made with copper gaskets. This latter statement was easily refuted by an object lesson on the bank. The sub-contractors were in a rather strong position, as they owned the only available equipment within a large radius. However, after several weeks of acrimonious negotiation it was arranged that the chief contractors were to take over the work from the sub-contractors and that the latter would supply the necessary equipment at an agreed price per day. The chief contractors then arranged for the writer to directly handle the work, they to pay all costs.

Examination by an independent diver revealed the fact that, contrary to the report of the sub-contractors' diver, a clay bed had not been secured, and that there were holes filled with unsatisfactory material in the trench, varying from 1 to 3 feet below grade, and in some cases extending over three or four pipe lengths. There was a slight deflection either up or down at each joint made under water, and some bolts were missing and others were loose. Work was commenced by raising the east pipe line, three lengths at a time, care being taken that the joints that had been made under water should not be disturbed until they had been examined on the bank. This bank inspection revealed the fact that the previous diver, in his efforts to stop the leaks, had driven wood wedges between the flanges.

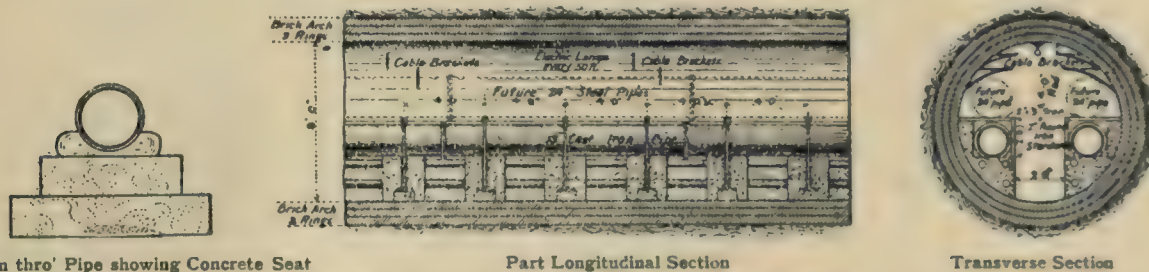


Fig. 2—Details of Submerged Pipe Line and Tunnel

water. Before the first pipe line was completed the writer contracted typhoid fever and tests were deferred until his recovery.

Some of the bends had failed to arrive before winter set in, for which the contractor was not responsible, and it was necessary to extend the time of completion to the spring. The west pipe line had, however, been laid across, and the most elementary tests proved it to be defective. The sub-contractors objected to doing any work during the winter, claiming, with justice, that the city had failed to supply pipe within the time contemplated by the contract. They finally, however, got their diver working, and just before the ice broke up, got the line in such shape that the loss could be approximately measured as not less than 2,000 gallons per minute at a pressure of 125 pounds. Immediately after the ice had left the river they made further attempts to improve the line by tightening the joints. The failure of their force pump and the impossibility of procuring another, led, pending its repair, to the use of the pressure from the reservoir for temporary testing.

One of the joints on the banks invariably blew out under this treatment, and some weeks were consumed in fitting a sleeve on this joint. When this had been fixed, gauges on opposite sides of the river showed a pressure loss in the crossing of 3 pounds, and it was quite obvious that the joints under water were so badly made that the whole pipe line must be moved to effect a closure. The contractors were therefore notified that the pipe line must be taken up and relaid. They then

forcing the copper gasket into the centre of the pipe.

There being no effective hydraulic dredge on Thunder Bay and the dipper dredges in service only working to a depth of 29 feet, it was impracticable to lower the grade line for the purpose of securing a firm bed, and it was decided to support the pipe throughout its length. The obvious solution was to drive a double row of piles and support the pipe on the caps joining the two rows. Suitable materials and equipment for this form of construction were, however, not available, and the following was adopted in lieu of it:

Concrete blocks, 1x3x5 feet, were cast on the bank, reinforced with four bars of $\frac{1}{2}$ -inch round steel each way. Two $\frac{3}{4}$ -inch inverted U-pieces of iron, with the points of the U hooked around the reinforcement, were placed in each block, so that when set two loops were exposed at either end of the block for the reception of the hooks of the hoisting chain. These blocks were laid at 12-foot centres, supporting the centre of each pipe. Often large quantities of silt had to be removed from the trench in order to reach clay. An 8-inch centrifugal pump was first used, with little success. Finally, two No. 4 Edson diaphragm pumps, attached to two lengths of hose, were found to work admirably.

Further assistance was furnished by a 2-inch hose with $\frac{3}{4}$ -inch nozzle, supplied with water from the reservoir at 125 pounds pressure. The diver directed the ends of the hoses and nozzle. When solid clay was reached and a bed levelled by excavation, a block was lowered and levelled by means of a 20-pound plumb bob

If the final elevation of the block was more than one foot below grade, a second block, 4 feet in length, was laid on the first, leaving a 6-inch step.

In three cases, three blocks were necessary to raise from solid clay to within 12 inches of the grade line. The elevation of the top block was then carefully measured, and a piece of flat, slaty rock of the necessary thickness was laid on the block to act as a temporary support for the pipe. A single pipe was then sent down and bolted up. A rich concrete of fine gravel was lowered in long sacks and worked between the pipe and the top of the block. The ends of the sack were padded up, so that when the concrete had set the pipe was supported by a cradle formed to the shape of the pipe. A blind gasket of $\frac{3}{8}$ -inch boiler plate was bolted to the open end of the pipe, and the whole line up to that point tested. A small hand force pump was the only pump available, and it refused to do better than 120 pounds per square inch. Ninety pounds was, however, easily secured after the pipe became full, the pump leaking badly above that pressure.

If there was any fluctuation in the time required to raise the pressure, the last joint laid was carefully gone over until the best test was secured within the capacity of the pump, this capacity being checked on four lengths bolted together on the bank. Every joint was in this way tested under water. When the line was completed, a $\frac{1}{4}$ -inch pipe from the pressure main was led through a blind gasket at the shore end of the river pipe. With the cock slightly turned, the river pipe held the same pressure, during a 24-hour test, as the pressure main on the shore side of the gate valve at the same elevation, or approximately a pressure of 125 pounds.

As concrete blocks were not considered in the original contract, an extra was allowed the contractor for this portion of the work. The personnel of the gang was as follows:

Foreman, at \$8 per day	\$ 8.00
Diver, at \$10 per day	10.00
Two helpers, at \$3.50 per day	7.00
Hoistman, at \$4 per day	4.00
Six laborers, at \$2.50 per day	15.00
One diving suit, at \$10 per day	10.00
One scow and hoist, at \$15 per day	15.00

Total per day of ten hours \$69.00

A record was kept of the time spent in excavating for and placing the blocks, and resulted in the city paying the contractors \$747 in addition to supplying the blocks. Thirty-five blocks were laid on this line under the horizontal 300 feet of pipe on the river bottom, and as each block cost \$4, the charges for material and labor amounted to \$887, or \$2.95 per foot.

The large river traffic greatly increased the cost of the work. The pipe lines were located at a bend in the river where light boats in a wind were swung over a wide range, and during the work in the middle of the river the passage of every boat meant a cessation of operation and the hauling of the scow well toward the shore line. This feature alone probably doubled the time spent on the work.

The summer was drawing to a close when the first line was completed and put in operation. It was therefore deemed advisable to defer the relaying of the second line until the river was frozen over. Work could then be conducted from the ice and the delays due to navigation avoided, these advantages promising to more than offset the difficulty of working in very cold weather.

Prior to recommencing the remaining portion, however, a settlement was effected between the contractors and the city, by which the latter took over the work for

an allowance of \$2,500, its estimated cost, exclusive of blocks. When about half completed in January, 1908, the Dominion Government announced its intention of dredging the river to a depth of 25 feet and a width of 500 feet, in the course of a five-year programme. In view of this, the advisability of abandoning the pipe line and driving a tunnel was seriously considered. However, the low position of municipal bonds in the market at that time indicated that it would be sound finance to complete the pipe line and drive the tunnel at some future time within the five-year limit set for government operations, when the financial conditions would probably be more favorable. The second line was then completed at a total cost, including blocks, of \$3,180. A slide at the north bank and an unexpected accumulation of sunken logs caused much trouble, but the cost only slightly exceeded expectations.

It is probable that a tunnel will be driven next year. While the main reason for this step is the contemplated widening of the harbor, it has become more necessary because of the rapid approach to a population of 30,000, foreshadowing the necessity of additional pipes, and to the fact that all large boats, in making this bend in the river, drag anchors if there is any wind, thus placing the pipes and cables (light and telephone) in constant danger.

Injury to the power cable seriously crippled the work on the Loch Lomond tunnel, and in November last a boat dragging a large fluke anchor picked two lengths of pipe from one of the lines and carried them up the river. Both pipes were broken close to a flange, the remainder of the line remaining intact. The pipes carried away were Nos. 5 and 6 from the south bank. The flanges between pipes 4 and 5 were left, but the flanges between pipes 6 and 7 were carried away. Pipe 5 was replaced by an ordinary flanged pipe, and pipe 6 by one with a flange at its junction with No. 5 and spigot end to join 7. The joint between 6 and 7 was then made by a special sleeve, 24 inches long, grooved and leaded and caulked under water with shredded lead. The pipe line is apparently as good as ever, having been in continuous operation since its repair.

The tunnel is to be 8 feet internal diameter, lined with three rows of brick. Three concrete benches, 2 feet wide, will support each 12-foot length of the first double line, either 18 or 24-inch pipe. A second double line can be laid above the first when necessary on a steel staging. Conduits for cables will be placed in the benches, and additional racks provided above the pipe. The Kaministiquia Power Company expects to carry its cables in the same tunnel in order to furnish power to the Grand Trunk Pacific Railway terminals and elevators.

As a protection against accident, large notice boards were erected on both sides of the river warning navigators not to drag chains or anchors. Similar boards warning navigators of the presence of the pipe were placed 400 yards up and down stream from the crossing. All boards are illuminated at night by red and white lights.

The cost to the city of the river crossing was as follows:

City Expenditure on River Crossing:

On pipe for river crossing	\$ 5,317.00
Valves for river crossing	628.00
Gaskets for river crossing	134.00
Labor on second line—pipe	2,670.00
Labor on second line—blocks	892.00
Cost of blocks, extra pipe, etc.	584.00
Pile driving and bank protection	415.43

Total..... \$10,640.13

The Lindsay Ozone Plant

Apropos of the report issued by the Provincial Board of Health in the above connection, the "Engineering Record, in a leading editorial upon the subject, published June 11th, expresses itself in part as follows:

The results of the tests conducted by the Provincial Board of Health indicate that the free ammonia in the raw water averages 0.022 parts per million, and in the filtered and ozonized water it is 0.023. The change in the albuminoid ammonia is from 0.238 to 0.228; that in the nitrates and nitrites is from 0.129 to 0.163. There is no change in the color, the total hardness is somewhat increased and there is no change in the oxygen consumed. A detailed examination of the figures in the report, which it is unnecessary to give here, shows that

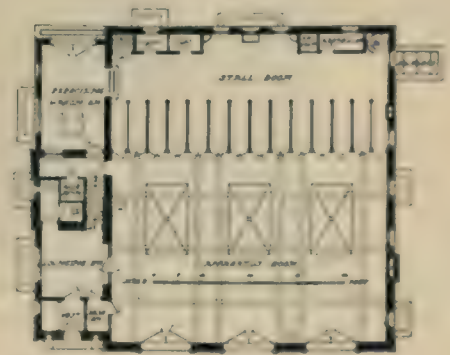
understood that at some places in Europe, where ozone plants are operated for water sterilization, the mechanical expense of forcing the ozone into contact with the water is heavier than the cost of producing the gas itself. At Lindsay, while ozone was actually produced, as before stated, although in a crude fashion, there was practically no mingling of the gas and the water. The aspirators which were relied upon to introduce the ozone into the water were so inefficient that no current could be detected in the pipe conducting the ozone from the generating apparatus to the aspirators. Apparently enough ozone was generated at the plant to sterilize the water, but practically none of it ever entered the water.

Attention is called to this plant and the results of the tests of it because the sterilization of water is now pass-

Satisfactory Plan for City Fire Department Building



SECOND FLOOR PLAN



FIRST FLOOR PLAN

Reproduced from the plans of Messrs Freeman & Wilcox for Firehall at Brookline, Mass.

the ozone has done absolutely nothing in the purification process, speaking chemically. From a bacteriological point of view the filters removed 90 per cent. of the bacteria in the raw water, and of the remaining bacteria the ozone in the water removed 8 per cent., giving a total reduction of only 95.8 per cent. These figures show that the plant is not as efficient as a well managed roughing filter, and indicate the absurdity of relying on such a plant as a protection against water-borne diseases.

The conditions found by an examination of the plant prove clearly that equipment of this character must be designed and installed with the greatest care, or otherwise it will fail to work. Ozonization has proved successful in a number of places, but it is by no means a cheap process. The manufacture of the ozone is not particularly troublesome, but the proper mingling of the ozone and the water is difficult of attainment, and it is

ing through one of those stages which recall to mind the condition of water filtration some 20 years ago. Undoubtedly ozonization, properly conducted, will prove very effective, but it is, so far as we know now, a very costly process. In order for it to be successful at any price the apparatus must be designed very carefully, so as to ensure certainty of action, and in the best plans all apparatus is duplicated, so that a failure of any one part will not require the shutting down of the plant. Moreover, the actual operation of such a plant requires careful supervision. The fact that Dr. Nasmith's assistant nearly lost his life in the course of the tests at Lindsay is a pretty good indication of the dangers to which even an experienced man is subject when ozone does not go where it is expected to. In short, this form of sterilization, while valuable as another resource of sanitary engineering, is manifestly something for specialists alone to prescribe and operate.

The Ancient Brick

The preparation of dried bricks in days gone by, said Mr. A. B. Searle in a recent lecture at the Royal Society of Arts, involved a large amount of physical labor, as the clay paste had to be beaten into a mass a few inches thick, and then trodden until it became homogeneous and uniform in composition. This was the method employed by Egyptian brick makers, and was still used in many important steel works in the manufacture of bricks for special purposes. The greatest discovery of the ancient Egyptians was the introduction of chopped straw, the primary object of the use of which is twofold: (1) to enable the workman to develop the distinctive nature of the clay paste and obtain maximum plasticity; and (2) the insoluble portion of the straw taken from the liquid used in making the paste served as a non-plastic medium, which enabled the bricks to dry without cracking. An American engineer discovered this five years ago. In the light of this knowledge the full extent of the punishment of the Israelites, when they were ordered to make bricks without straw, could be realized, for it meant they had to make from one and a half times to twice as many bricks to get the same result. Whereas the Egyptians in their moulds only made one brick at a time, Central Americans used to make several. In the latter case, a rough wooden frame about 24 inches long, 24 inches wide, and 9 inches thick, with a partition across the middle, was used. This was filled with paste, and when removed, left two bricks, about $\frac{1}{2}$ -inch apart. Even so the process was a slow one, and a man seldom made more than 150 bricks per day. The bricks were allowed to remain in the air until sufficiently dry, and were then turned on their edges for the sun to beat upon them. Such bricks, under favorable conditions, would last for a long time; indeed, in the absence of frost or moisture they would last indefinitely.

Calcium Chloride for Laying Dust

Calcium chloride for laying dust was used at Boston in 1908 under a contract with the Calceide Process Company for treating 268,000 square yards of macadam roadway, according to the last annual report of Mr. Guy C. Emerson, superintendent of streets. The price paid for five months was 4 cents per square yard. The chemical was brought to the roadway in 600-gallon carts filled with a concentrated solution of 40 per cent. calcium chloride, which was then emptied into five cans, each holding about 110 gallons, which were distributed along the stretch to be treated. In using the chloride the contents of one 110-gallon can was emptied into the 600-gallon cart, which was then filled up with water. This 600-gallon charge of the diluted solution covered about 1,900 square yards of roadway, so that 10 loads were sufficient for a mile of 32-foot roadway. During the first week in which chloride is used two applications are made, and thereafter the solution is applied on the average at 21-day intervals. The results of this treatment, according to the report, have been very satisfactory; no odor resulted, and the road surface was said to have been in much better condition at the end of the season's treatment than at the beginning.

The Vancouver carpenters had a celebration recently on the occasion of the golden jubilee of the Amalgamated Society of Carpenters and Joiners, which was organized at London, Eng., in 1860.

Good Roads Convention at Winnipeg

Plans have been made for the proposed Good Roads Convention to be held at the Winnipeg Industrial Exhibition. The actual sessions of the convention will be held on Wednesday, July 20th, commencing at 10 a.m. There will be headquarters open during the entire week of July 18th, with a representative of the Manitoba Good Roads Commission in charge. The speaker on July 20th will be Mr. A. W. Campbell. Those interested in the movement are considering the question of building a section of model macadam roadway at the exhibition grounds as an object lesson to visiting delegates. Every municipality in Manitoba will send two delegates to the Good Roads Convention.

News from the Wheat Fields

The greatest encouragement is to be derived from the crop reports that continue to come in. The C.P.R. has issued a report covering its widely extended system in the west, which shows, generally speaking, weather favorable and growth rapid.

In southern Saskatchewan, Yorktown district, Edmonton section and Moose Jaw section, abundance of rain is reported, with gratifying growth.

The general report gives evidence that prospects generally are regarded as better than ever before for a record-breaking crop.

The union carpenters in Fort William and Port Arthur, numbering 600, went on strike for an increase from 35 to 40 cents an hour.

Portage La Prairie, Man., is complaining of a shortage of bricklayers. The town is experiencing a particularly active building season.

The building permits issued at Edmonton, Alta., during May totalled \$220,000, as compared with \$368,000 for the corresponding month of last year.

Hon. William Pugsley states that plans for the new departmental block in Ottawa will not be reconsidered owing to objections made by several architects, but will be proceeded with on the lines proposed. Tenders will be called for this summer.

Building operations at Portage la Prairie are more active now than they have been since the boom of '82. A feature of the situation in the city is the number of new industrial concerns that are building factories. Scores of new residences are also going up.

Toronto is to be congratulated upon the appointment of a special committee of the city council to control and manage the water front. It is reported that the Commission has under consideration a number of important improvements in regard to the erection of docks at the east end of the harbor and the extension of wharves.

The 400 employees of the Government Printing Bureau at Ottawa have been feeling somewhat uneasy, in view of the terrible disaster to the Montreal Herald. Between 500 and 600 tons of type and paper are stored in a five-storey building, on the lower floors of which men are always busy on linotype machines. The matter is being taken up by the Allied Trades and Labor Association.

Vancouver's First Reinforced Concrete Apartment Block

The apartment building to be erected at Vancouver for the Hose Investment Company of Vancouver, is the first reinforced concrete structure for this class of building to be erected in the Pacific capital. The building contains 22 4-room suites, each of which contains bedroom, parlor, dining-room, kitchen, private hall, pantry, bathroom and balcony. There will also be 10 3-room suites, each comprised of living room, bedroom, kitchen with fitted pantry, and private hall. The janitor's apartments contain a parlor room and office adjoining the trades entrance. In the basement there will be a laundry and baggage room for tenants. A vacuum cleaning system will be installed for hallways and for each suite of apartments.

The structure will be of rusticated concrete walls to the first floor with brick facing over.

It is the same with hips and valleys, there are many who cannot readily determine the length of hips and valleys from plans. All this is easy by figures and we will put our brother carpenters next to this important knowledge in the building trade. We will take it for granted that our readers are familiar with square root, for that is the method by which the lengths of rafters are obtained by figures or mathematically, and the method is absolutely correct to the smallest fractional part of an inch.

For example, we will take a building 24 feet wide with a one-third pitch and figure the common rafter length. It is generally conceded that a one-third pitch is a rise of roof equal to one-third the width of the building, which in this case will be 8 feet. The run of rafter is from the plate line in to a point plumb under the top cut of the rafter and which in this case is 12 feet, hence we have a 12-foot run and an 8-foot rise to find the length



The New Apartment Building of the Hose Investment Company, Vancouver, B.C.

The general contract has been awarded to Adkison & Dill. Other contracts include: steam heating and plumbing (Standard Ideal fixtures), W. S. Ramsay; conduit wiring and telephone system, Electrical Construction Company; gas stoves (Ideal), Burnside Gas Appliance Company; passenger control elevator, A. & P. Steven, Glasgow, Scotland.

The superintendent for the work is Mr. B. S. Edwards, the building being erected according to plans and under supervision of Mr. Arthur J. Bird, Winch Building, Vancouver. The estimated cost is \$80,000.

Finding the Length of Rafters

It very often happens that when a carpenter or contractor is figuring a set of plans that it is necessary for him to know the length of rafter that will be required. This information is most needed when the carpenter is called upon to make out a bill of material from floor plans and has absolutely nothing at hand to show him what length of rafters will be required. If he cannot figure the length of rafters required then he cannot tell what length to order, the amount of sheathing and shingles for roof, etc. It is merely a guess if he does not understand how to figure.

of common rafter. The problem now assumes the shape of a right angle triangle, with the base 12 feet and perpendicular height 8 feet, and from these figures we can find what is termed the hypotenuse and which would represent the length of rafter. The hypotenuse is equal to the square root of the sum of the squares of the other two sides, namely the base and perpendicular, hence we have by figures $12 \times 12 = 144$; $8 \times 8 = 64$; $64 + 144 = 208$, and the square root of 208 feet = 14.422 feet, length of rafter.

It will be noticed that our answer is in feet and a decimal of a foot. To reduce this decimal to inches so we can readily apply it to the rafter length, simply multiply the decimal $.422 \times 12$ inches, because 12 inches make 1 foot, and we have 5.062 inches; now the decimal part .062 represents a fractional part of an inch and is really less than one-sixteenth, so we can discard this and we have 5 inches, thus the length of rafter is 14 feet and 5 inches.

Now, suppose we wanted to find the length of a hip or valley for this same roof with the same pitch and same run to correspond with the common rafter, the process is much the same, the rise in roof is the same, but the run of the hip or valley will be the diagonal of

a 12×12 triangle; so we simply take twice the square of 12 and add the square of the height; thus $12 \times 12 \times 2 = 288$; $8 \times 8 = 64$, and $288 + 64 = 352$, and the square root of $352 = 18.761$, the decimal $.761 = 9\frac{1}{8}$ inches, very nearly. Thus the length of a hip or valley to correspond with the common rafter would be 18 feet, $9\frac{1}{8}$ inches, and in ordinary practice the $\frac{1}{8}$ -inch could be disregarded.

For the benefit of those who are not versed in square root we will give the length of common rafter in feet and inches for one foot run and the corresponding hip or valley for the pitches most in use, then it is only a matter of simply multiplying the length of rafter for one foot run by the number of feet run to find the length of rafter required:

Pitch of roof		Length Common		Length Hip or Valley	
Rise	Run	Rafter 1 foot Run		1 foot Run	
		Ft.	In.	Ft.	In.
6	12	1	7 1/16	1	6
7	12	1	7 7/8	1	6 3/8
8	12	1	2 7/16	1	6 3/4
9	12	1	3	1	7 3/16
10	12	1	3 5/8	1	7 11/16
12	12	1	5	1	8 13/16

We will now take our figures for a one-third pitch and see how it will figure out in the building in question. Take the figures for one foot run common rafter, 1 foot, $2\frac{7}{16}$ inches, and multiply by 12 foot the run of rafter and we have $1\text{ foot} \times 12 = 12\text{ feet}$; $2\frac{7}{16}\text{ inches}$ multiplied by 12 = $29\frac{1}{4}\text{ inches}$, which is equal to 2 feet, $5\frac{1}{4}\text{ inches}$, length of common rafter. It will be seen that this varies only $\frac{1}{4}$ -inch in 12 feet, from the square root method, and is about as close as the average roof would ever be framed, even by the experts.

Now, we will take the hip figures for a foot run. 1 foot, $6\frac{3}{4}\text{ inches}$ and multiply by 12 feet the run of common rafter and we have $1\text{ foot} \times 12 = 12\text{ feet}$, and $6\frac{3}{4}\text{ inches}$ multiplied by 12 = 81 inches; 81 inches equals 6 feet, 9 inches, which added to the 12 feet makes 18 feet, 9 inches, length of hip rafter, differing only $\frac{1}{8}$ -inch in a 12-foot run from the square root solution and we believe the figures we have given are so nearly the mark that they are perfectly safe to be used either for estimating and making out bills or for the framing of the roofs.

Materials Required to make Concrete Brick

For brick of the ordinary class use 600 pounds of Portland cement and 40 cubic feet of sand and fine gravel; for fine face brick use 800 pounds of cement and 40 cubic feet of torpedo sand; for a cement brick, equal in every respect to the pressed brick of commerce, use 1,000 pounds of cement and 40 cubic feet of torpedo sand.

The following figures are also of interest:

A 1:3 brick takes 3.8 barrels of cement and 1.7 cubic yards sand per M.

A 1:4 brick takes 3.05 barrels cement and 1.8 cubic yards sand per M.

A 1:5 brick takes 2.55 barrels cement and 1.18 cubic yards sand per M.

A 1:6 brick takes 2.18 barrels cement and 1.9 cubic yards sand per M.

A 1:7 brick takes 1.9 barrels cement and 2 cubic yards sand per M.

An exchange gives the following method of testing sand for cement:

"The best practice requires that sand shall be suitable silicious material, passing a $\frac{1}{4}$ -inch mesh sieve, clean, gritty and free of impurities. A good test of sand is to rub it between the hands, using considerable pressure. The sharpness of the grains and the absence of foreign material may both be determined in this way."

Ventilation of School Rooms

The uniform distribution of air is one of the most difficult problems connected with ventilation, says the "Engineering Review." This difficulty does not arise from the inability to introduce a definite volume of air into a given space in a certain specified time, but in the prevention of the formation of air currents and eddies which interfere with efficient ventilation. Intimately associated with this question of uniform air distribution is the one of warming the incoming air sufficiently to prevent a sensation of chilliness on the part of the occupants of the room.

Prof. R. C. Carpenter in his book, "Heating and Ventilating Buildings," says: "It is quite generally agreed that the velocity of the entering air should not exceed 4 to 6 feet per second, unless it can be introduced in such a position as to make an insensible current."

Professor Carpenter further says:

"A most effective location for the air inlet is probably in or near the ceiling of a room. The advantages of introducing warm air at or near the top of the room are: (1) The warm air tends to rise and hence spreads uniformly under the ceiling; (2) It gradually displaces other air, and the room becomes filled with pure air without sensible currents or draughts; (3) The cooler air sinks to the bottom and can be taken off by a ventilating shaft.

"So far as the system introduces air at the top of the room, it is forced distribution, and produces better results than other methods.

"The outlet for air should be as near the bottom of a room as possible and it should be connected with a flue of ample size maintained at a temperature higher than that of the surrounding air, unless forced circulation is in use, in which case, the excess of pressure in a room will produce the required circulation.

"The conditions as to size of the outlet register are the same as those for the inlet."

Prof. S. H. Woodbridge in a pamphlet on "School-house Warming and Ventilation" states:

"The location of outlets and the concentrated or diffused movement of air through rooms are the chief determining factors of the problem of heating and ventilating. The location of the fresh and warm air inlet is of less moment than that of the outlet. It is wholly unnecessary to carry the entering air by flues to the vicinity of the outer walls. . . . The best location for the inlet is upon the inner wall at a point that shall be central with reference to the outside wall or walls."

An agreement between the employing plasterers and the Plasterers' International Association, local No. 334, to extend over a period of nearly two years, was signed at Winnipeg last week. The plasterers are at present paid 50 cents per hour, the rate which has prevailed for the past six years, and the new arrangement is that from June 1, 1910, to March 31, 1911, the rate will be 55 cents per hour, and from April 1, 1911, to January 31, 1912, it will be 60 cents.

The city of North Vancouver invited Mr. R. H. Thomson, city engineer of Seattle, Wash., to submit a plan for certain improvements, including a general regrading of the city. The mayor of Seattle, however, thinks that the salary of \$7,500 a year, which Mr. Thomson is now drawing as city engineer, is quite sufficient for an ordinary man, and refuses to let him submit a report for North Vancouver unless it is done gratis. At this rate North Vancouver will never see that regrading. United States engineers are not particularly philanthropic.

The Calamity at Montreal

Details of the Occurrence and Substance of the Investigations—Special to the Contract Record

On Monday, June 13, an hour before noon, the five-storey building occupied by the Herald Company, Limited, facing Victoria Square on St. James street, was, without a moment's warning, almost totally wrecked, the front walls and portion of floors along remaining intact. Within a short time of the first disaster, fire broke out, causing further destruction. A water tank weighing about 60 tons for use in connection with a water sprinkler system for fire protection, was precipitated from its position on the roof. Whether the accident was occasioned by the weakening of the tower supports or was due to supporting walls giving away is yet to be determined.

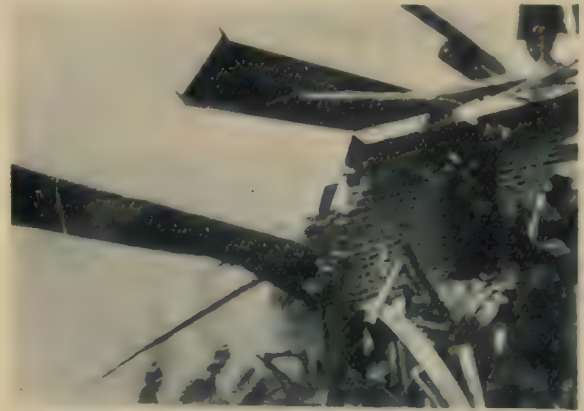
The civic authorities have called upon Messrs. J. L. Allison, representing Messrs. Ross & Holgate, W. H. Hutchison, the well known architect, and J. A. Jamieson, a prominent Montreal elevator contractor, to make a thorough investigation of the wreckage with a view to ascertaining the reasons for the catastrophe and if possible to fix the responsibility. These gentlemen are at present engaged on this task and will spare no effort to secure a thorough report.

In the meantime a coroner's jury has been empanelled and much interesting evidence pertaining to the case adduced:

Mr. John S. Archibald, of Messrs. Saxe & Archibald, the architect who prepared the plans for the remodelling of the building in 1905, stated that he had prepared plans for the alterations to the building. The water tank, with a capacity of 12,000 U. S. gallons, was situated on the roof and placed in such a manner that out of a total weight of 60 tons, 40 tons were supported by a centre wall of brick, 12 inches in thickness, while the balance, 20 tons, was carried by the eastern wall. The weight supported by the roof was 40,000 pounds. The civic by-laws allowed a weight of 46,800, the margin of safety being 16 per cent. in this case. Continuing, Mr. Archibald said that he had examined the tank

on Dec. 7, 1905, to see if there was any ice in it. The tank was again examined in October, 1907, and found to be all right. In June, 1909, there had been a small fire on the roof, and after that there had to be some repairs made, and it was then found that the supports of the tank were strong. In September last the repairs were finished and all was found to be in good order at that time.

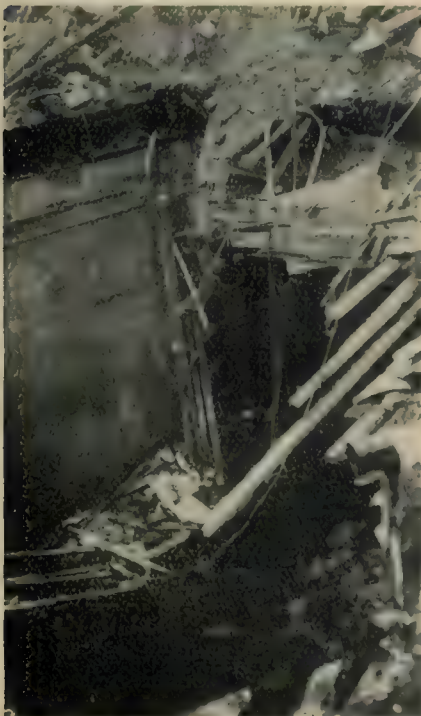
Mr. Archibald stated that the centre wall was finished level with the roof and that it was strong and quite plumb. The steel on the tank, he was satisfied, was good or it would not have stood so long. The examination which he had made of the building since the disaster had convinced him that it was not the fall of the tank which had caused the catastro-



The Steel Girders which supported the Tank.

phe, otherwise the tank would not have fallen in a place 50 feet southwest of that which it had occupied on the roof. If the tank had fallen first it would have gone down due west.

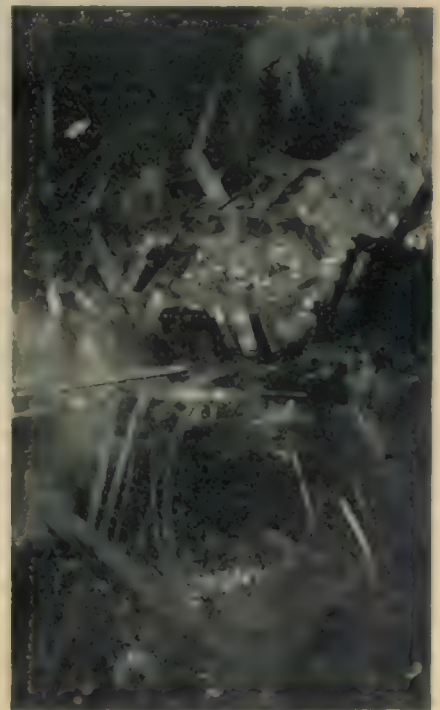
Mr. J. S. Brierly, president of the Herald Company, was next examined. He stated that the tank was erected about five years ago. He could not say exactly who had built it, but all the work was entrusted to W. J. McGuire & Company, under the control of Saxe & Archibald, architects. There had been no reports from either contractor or architects that had hinted at any danger of the collapse of tank. Witness



Collapse of Flooring.



Front View after Disaster.



Rear View 1st and 2nd Floors.

could not state whether a permit for its erection had been taken out or not.

Mainly, the rest of the evidence was descriptive of the work of erecting the water tower. The superintendent of the work corroborated the report that no permit had been obtained from the city authorities for placing the tank. He said he had never known such a tower to be placed over two walls so widely separated. The distance was 34 feet. The beams bearing the tower rested on the centre wall and pierced the east wall. It was generally declared that the centre wall was one of solid brick, but at the close of the session a reporter informed the coroner that his examination of the ruins had shown that the wall was not solid, but that it rested at each floor on timber beams. After this new phase of evidence, it was decided to have an expert examination made of what remains of the centre wall, and the inquiry was adjourned.

Mr. A. Chausse, building inspector, says the weight of the tank was not responsible for the accident. Its overturn must,



The Wrecked Herald Building—Note Dividing Wall upon which rested Supports of One Side of Tank.

he thinks, have been caused by some outside force. No permit for the construction of the tank has been found, and Mr. Chausse says there cannot be one, because he would not have allowed it to be issued, as the law does not provide for this.

In the light of the catastrophe in the Herald Building, it is interesting to recall that the executive of the Builders' Exchange three years ago made an urgent demand to the City Council for the immediate institution of a general system of inspection of roof tanks throughout the city. The committee was asked to appoint expert inspectors.

The Municipal Construction Company, of Vancouver, is making good progress with the contract of laying some 50 miles of water mains and connections in South Vancouver. The work was started about Feb. 1st. The wire-wound wood pipe is being made in the company's factory, and the quality is highly spoken of by the inspector.

Workingmen's Apartments, Montreal

A new departure in dwelling houses for working men is being made in Montreal. Lieut.-Col. J. Carson is erecting a block of apartments on Colborne street, especially adapted for this class of tenant.

The plan is arranged in four blocks of buildings, surrounding a rectangular court. In all there will be 50 suites or houses. Each house is planned to be self-contained on one flat. The accommodation will consist of a living room, kitchen, two bedrooms and a bathroom, containing a toilet, hot and cold water, lavatory and bath.

The buildings throughout will have fireproof basements with concrete floors, ceilings, etc., and will be used for storage purposes.

The dwelling apartments will be two storeys high. Each upper apartment will have a gallery looking out on the courtyard. Two stores have been provided for on Colborne street front.

In the finish of these houses, it has been considered sanitary and economical to include hardwood floors throughout, also fine ash trim.

The exterior walls will be lined with hollow terra cotta blocks. This ensures warmth in winter and coolness in summer. The entire exterior brick work will be the best quality plastic brick of plain design, giving the whole a substantial appearance.

It is the intention of the proprietor to supply the tenants with light, heat, hot and cold water and gas for cooking purposes. Accommodation for these supplies has been arranged for in a portion of the basement in the rear of the block, in which the necessary boilers, furnaces, meters, etc., have been placed. Ventilating flues to each kitchen and throughout basement have been provided for.

The courtyard and the private streets surrounding the block will be finished in concrete.

The necessity for such a class of building has been long felt in the neighborhood, and it is thought that there will be no difficulty in obtaining a high class of tenants for these apartments.

The entire scheme has been designed by Mr. R. Montgomery Rodden, architect, No. 8 Beaver Hall Square, and is being erected, under his superintendence, by Messrs. Lyall & Sons, Limited, contractors.

Automatic Water Sterilizer

For some long time, says "The Engineer," Dr. Nogier, of Lyons, has been experimenting with the mercury vapor lamp, finding that the ultra-violet rays emitted therefrom are very powerful in destroying any bacteria that may be present in limpid liquids, especially water. He has succeeded in removing the most virulent germs from drinking water without altering its chemical composition. One minute's exposure to the rays of the lamp suffices for the process of sterilization. He has now perfected an automatic water sterilizer, consisting of an aluminum tube containing a mercury vapor lamp, and controlled by an electro-magnetic tap, which at once stops the flow of water, should the lamp be put out of action. This method of sterilizing drinking water is claimed to be infinitely better—more certain, scientifically perfect, and cheaper—than the electro-ozone process.

The Greener Sun Company, of England, have opened a Montreal office at 63-65 Beaver Hall Hill, in charge of Mr. G. H. Oliver, who was formerly London manager for this company.

At a meeting of the City Council of Winnipeg, held last week, it was decided to advertise for competitive plans for a new city hall. The probable cost of the proposed structure is said to be in the neighborhood of \$2,000,000.

Concrete as a Fireproof Building Material

Recent Developments Warrant Still More Extended Use of Concrete —Standard Building Methods will Effect Further Reductions in Cost*

BY FRANK B. GILBRETH, General Contractor, New York City.

It has long been realized that, with the wood supply of the world constantly diminishing, wood was bound to become too expensive to use as a building material. But it is not so widely realized that the day when wood is as costly as non-combustible building materials is here. To-day, concrete structures, and in some localities other non-combustible structures, can be erected at no greater first cost than wooden ones; with an added element of safety to those who use the building which cannot easily be overestimated.

In order to hold the place it claims—that of the cheapest and best fireproof construction material—concrete must be able to show itself cheapest in first cost, as well as cheapest in the long run.

Concrete materials are obtainable, everywhere: Stone ledges, gravel, sand, burnt ballast, slag, brick refuse, terra cotta chips, stone cutters' refuse and cinders, are all good aggregates for concrete.

Cost Reduced to Minimum

As far as the cost of the labor of putting the material in place is concerned, much has been done toward reducing that to a minimum. With metal forms and certified concrete, concrete construction is cheaper to-day than that with brick, hollow terra cotta tile or any other material.

The development of the entire concrete building and of the parts of the concrete building have been slow, because it has taken a long time to learn to think in concrete. Each student brought his stock of experiences from another field to bear on the problem, but the problem was so new that few could understand it in all its aspects. The engineer, who knew how to design the strength, knew little about artistic features. The architect, who alone could give beauty to the building, was not an expert in the methods that make low costs. Progress was made more difficult by the fact that so few of the structural features and construction methods were standardized.

The contractor, having analyzed his costs, saw that the forms were the largest single item in the cost of the concrete. This fact had its effect on the design of the concrete building, in the trend toward straightway repetition form work and flat-slab ceilings, with as little beam and girder work as possible. A further benefit was in the fewer corners for fire to attack or for interruption of the action of sprinklers, saving also in the cost of the sprinkler system.

After the flat-slab ribless type of ceiling, with its low cost of forms, came standardization of the units of forms for walls and columns. With the use of these metal form-units a new problem faced us, namely, slight modification of design to agree with the cheapest labor requirements of the metal forms. The influence was also felt, of the fire protection design thoroughly worked out and standardized by Charles L. Norton, professor of heat measurements at the Massachusetts Institute of Technology and engineer in charge of the engineering experimental station of the Factory Mutual Fire Insurance Companies. Mr. Norton's recommended practice, which is now universally accepted, is so simple and apparently so obvious that we sometimes forget to give him the credit for his work.

The importance of the forms, from the standpoint of economy, in being able to build fireproof buildings for the price of brick and wooden mill construction, is clearly shown

by the fact that Charles D. Watson, of Syracuse, N.Y., on account of the reduction in the number and expense of forms, has been able to build a number of buildings from separately cast members and reduce the costs below anything ever cast in situ in wooden forms.

We come now to the latest developments, the metal form-units that have been perfected, densifiers for compacting the concrete, mechanical conveyors for displacing the wheelbarrow and hand tamping, and the concrete-producing factory, centrally located. These things have all arrived. Metal moulds have reduced the price of concrete to that of wooden construction.

Standard Methods of Construction

For the greatest saving in the cost per cubic foot of the completed building, the methods of construction, as well as the designs, must be standardized. This is rapidly being done. For example, the metal forms are set up and concrete is hauled in large quantities from a centrally located factory and poured at once for the entire storey of a building. This does away with the joints between the work of two different days, and permits of figuring the tensile strength of the concrete in design calculation, with a great consequent saving of reinforcement. Such calculations cannot be safely figured unless the whole storey is poured at once.

Figuring the cost of furring, lathing, plastering, interest, fixed charges, heating, and repairs, concrete is certainly cheaper than wood. If you also figure health, concrete is very much cheaper. A concrete building is cooler in summer and warmer in winter than any other kind. It can be cleaned out with a hose. It can be easily, quickly and thoroughly fumigated, room by room, or all at once. It is drier than any other, provided it is built with self-ventilating air spaces in all of the exterior walls. A concrete building is vermin-proof, and should germs or vermin get in the building, it may be easily rid of them.

Concrete as a Fire-Resister

It may seem that we have wandered from our subject of fires and their permanent elimination, but it was necessary to show that concrete is thus, from every standpoint, cheaper than wood, its only rival for low cost. Concrete construction is the best form for the elimination of fires, because it affords: (a) Least cause for fires; (b) least amount of damage to structural parts by fire; (c) least amount of damage to structural parts by water; (d) least amount of damage to contents of building by water; (e) least quantity of combustible structural materials in a room; (f) least speed of combustion of the contents of a room; (g) no concealed fires, all fires are in plain sight; (h) least spread of fire to adjoining parts of the same storey; (i) least spread of fire to storeys above; (j) least spread of fire to next buildings.

The causes of fires this paper will not discuss. The amount of damage done by a fire in a concrete building depends upon circumstances perfectly within our control and pre-determinable. With concrete made of properly selected fire-resisting materials, practically no damage is done, except by prolonged high temperature. The results of recent tests by Prof. Ira H. Woolson prove conclusively that a concrete building properly designed, with as few projecting corners as possible, will withstand long periods of the hottest hardwood fires, with no resulting damage that cannot be

* Paper read before the American Society of Mechanical Engineers.

thoroughly repaired with mortar and a plasterer's trowel. These tests were on full-sized rooms with walls of concrete made of different kinds of material.

Concrete for walls can be poured in metal moulds with sufficient accuracy to permit of painting or wall-papering without further plastering or smoothing. This means that the best of this fire-resisting material is brought to the very surface of the wall where the flames strike. With metal moulds all corners can be made rounded as cheaply as square, or metal corner beads may, if desired, be inserted and retained in the moulds. Now, if a fire does occur in a building made of concrete cast in smooth metal forms, the damage is less than in any other type of building and the danger of spreading is less.

A concrete building can be damaged by water less than any other form of construction. To begin with, water does not injure concrete; in fact, it improves its quality. There is no wood to swell, and afterwards to shrink and crack the plastering. Even the paint best suited to be used on concrete lends itself particularly well to washing down with water. There are no hollow spaces that the water can flow through, damaging the contents below. A concrete building is water-tight from floor to ceiling, and small quantities of water can be easily handled through small scuppers, either into the air space of the vaulted wall, or through the wall to the outside. The fire is never hidden by the construction; consequently no unnecessary streams of water are flooded into the building.

What Proper Fireproof Construction Means

In a concrete structure there need be little or no combustible material. Let us take, for example, the dwelling house, for it is the most difficult to make both cheap and fireproof. In a concrete residence there is little trim that cannot be made better and cheaper of Portland cement than of wood. The chair rails and picture moulding can be made of concrete. The trim around the windows and doors can be moulded in metal moulds as cheaply as straight members. Even the wire mouldings can be done away with, and the conduits buried in the concrete partitions, walls, ceilings and floors. Baseboards should be made of concrete or else omitted entirely—as they serve no useful purpose in a concrete building, except in following wooden precedents. Windows may have cement sashes, with wired glass, and self-closing shutters, or self-dropping shutters of rolled-up metal or asbestos. Metal furniture may be used. The paint and varnish used on buildings and furniture should be selected carefully, as these are great factors in determining the temperature at which a fire will start and the speed with which it will spread. There is also a great difference in the paints and varnish used for painting concrete.

The flooring need not be of wood. There are many first-class non-combustible materials beside Portland cement that will fill every good requirement of wood and still be fireproof. There are also parquet floorings, made of slow-burning wood, and much thinner than the old-fashioned hardwood floor, which makes the best flooring in case wooden floors are desired. In a concrete residence there is no excuse for wooden underflooring, nor for wooden screeds.

The best form of construction for the elimination of fires is one that keeps the fire in plain sight, once it is started. One of the greatest obstacles in fighting fire in wood construction is the difficulty of locating a fire after it is known to exist. Every second of time lost gives it accelerated fury. Holes cut through the walls, floors and ceilings to locate a fire oftentimes only furnish more drafts to feed the flames.

With hollow concrete blocks, or monolithic cast-in-place walls and partitions there are no chances for the fire to be concealed. There is no cause for cutting into the partitions, floors or ceilings. There is no damage to the structure from cutting, no injury from water. With such a building, if a fire starts in plain sight, remains in plain sight

at all times and can be attacked instantly before it has spread; and the water damage will be practically nothing. Fires in plain sight are usually extinguished before the arrival of the fire department.

From the Western Metropolis

Office of the "Contract Record."

Winnipeg, Man., June 17, 1910.

The building problem in this city has been considerably simplified by the advent of new brick and further receipts of shipments of outside supplies. Labor troubles are waning, and although the painters have not officially terminated their strike almost all the men are back at work.

It was the ambition of the city at the opening of the building year to lead the continent per capita, in building total for the season. Up to the past two weeks there was every prospect of attaining the object. Recently there has been a slight slump in the number of larger permits, but the office staff of the building inspector is now considering four big permits which will run the month's total close to the two million dollar mark. Unabated activity in the construction of residences has been the feature of the whole year to date, and with the assistance of these smaller items the city expects to pass the fifteen million dollar mark at the close of the year.

Permits have not yet been issued for the technical schools. These two buildings alone will cost in the neighborhood of \$600,000. The biggest permit of the month, so far, was for the interior finishing of the union depot at a cost of \$300,000.

Progress on the works now under way has been delayed by lack of material, shortage of labor and the absence of contractors, who have been so busy figuring on new work that they were unable to give proper attention to the contracts under way. With the slight let-up in the rush of large contracts the latter difficulty is being overcome, and the two former are almost entirely eliminated; so that work may be expected to go ahead with a rush now.

Regina is advertising locally for carpenters. There has been a strike in progress there for some time and labor is decidedly lacking. Winnipeg contractors with western contracts are shipping men out of the city to do the work, with the result that there are few idle hands here now.

C. P. R. in Western Canada

The Canadian Pacific Railway Company is preparing to continue the double tracking of the line between Portage and Brandon. J. C. Hargrave & Company, who recently completed subgrade work on the section of the line from Winnipeg to Portage, have been instructed to continue west and will proceed at once. This announcement was made last week by Mr. William Whyte, 2nd vice-president. The completion of this work will give the C.P.R. 522 miles of double track from Fort William west, and may be taken as one of the important steps in the solution of the railway problem of western Canada.

The entire reorganization of the western lines of the C.P.R. is now under way. The great increase in mileage of this portion of the system during the past ten years makes frequent changes necessary. This is the most radical of all. At the present time the western lines are operated as through grand divisions, and the plan now in hand is to reorganize them as four divisions. The total mileage of the C.P.R. is 9,800 miles, and of this 6,200 are included in the western lines operated from Winnipeg.

The new distribution will be practically according to the provinces, and the names of the divisions will probably be the Manitoba, Saskatchewan, Alberta and British Columbia divisions. Moose Jaw will be a divisional headquarters.

Vancouver and Coast Correspondence

Tremendous Activity in Building Trades—Contractors Hampered by Lack of Men—Current Prices of Building Material—Personal and News Notes

Vancouver Office of the "Contract Record."
Vancouver, B.C., June 15th, 1910.

The returns of building permits issued weekly by Building Inspector Jarrett go to show that the totals for last season are being swamped by the tremendous building movement that started early this year, and which has now attained astonishing proportions, the result being that contractors are being pushed as never before in the history of the city. An earnest effort is being made to supply the lack of homes complained of last year by newcomers, but so great is the rush of people from the Pacific coast States, Eastern Canada, the prairies, and many other points, that all new dwellings are sold or bespoken for rental before the plaster is dry—indeed, many are secured by deposit before the foundations are excavated. The prediction made in these columns in February last, that 2,000 new homes would be needed to provide for the people already here and to arrive, was very close to the mark. In proof of the scarcity of desirable homes even now—although hundreds have been rushed to completion already this season—the writer will cite several instances which came under his observation a week ago. A gentleman who had accepted a good position up-country, placed a "To Rent" card in the window at 1 p.m. By actual count 19 persons called to inspect the premises or make enquiries as to the rental price before the expiration of two hours! Another owner who was moving to his summer cottage up the North Arm, advertised his house to let in the evening paper. It was raining "cats and dogs," yet seven persons called in answer to the advertisement before bed-time. It is this sort of thing that is setting landlords by the ears and causing them to ask outrageous rentals for dwellings situated in the outskirts of the city.

The office men of the city are being well taken care of in the scheme of betterments planned by owners of business property "down town." Within the past twelve months, fully a dozen modern office buildings, with accommodation for perhaps 1,000 tenants, have been erected at central points, and the space in most of these has been all taken. Other tall fireproof office structures are under way, and by the time these are completed it is likely that the new agencies and businesses being constantly established will render these ventures a lucrative investment. The owners of premises vacated will suffer a serious loss in rentals for a time, and may be forced to fit up for other purposes, but these things adjust themselves very speedily in a go-ahead city like Vancouver.

Supply Firms Prepared for Busy Times

Warned by their experience of last year, when the unlooked for activity in house building exhausted various lines of supplies, thus causing a temporary stoppage of work and in some cases the use of substitute materials, the various contractors' supply firms laid in enormous stocks for this season, with the result that so far not the slightest hitch has been reported from this cause. Unfortunately, a supply of suitable men could not be arranged for beforehand, and contractors have suffered from a lack of laborers. Incompetent men constantly aspire to jobs concerning the duties of which they are entirely ignorant, and it is not unusual for a contractor in charge of the erection of a large building to "try out" 500 men during construction.

Vancouver is essentially a city of modern homes owing to the mildness of the climate, hence the unprecedented scope of

the building operations under way presupposes the filling of huge orders for lumber, shingles, sash, doors and all classes of interior finish. Still, lest our readers may run away with the impression that the more substantial materials are little used, we deem it well to point out that 50,000 tons of steel will likely be put into office buildings and warehouses, in addition to immense quantities of cement and considerable stone, while about 20,000,000 bricks will be built into new stores and chimneys.

Prices of Building Materials (Delivered on job.)

Building paper, tarred, per roll, 90 cents.
Building paper, plain, per roll, 70 cents.
Bricks, common, per 1,000, \$13.50.
Bricks, pressed, per 1,000, \$40 to \$62.
Cement (Vancouver), per barrel, \$3.10.
Roofing felt, per 100 pounds, \$2.45.
Fire brick (Scotch), per 1,000, \$45.
Fire brick, small quantities, \$48.
Lime, per barrel, \$1.35.
Sewer pipe, per foot, 4-inch, 18c.; 6-inch, 33c.
Plaster of paris, per ton, \$18.50.
Putty, per pound, 5 cents.
Tar, 4-gallon tin, \$1.25; per barrel, \$8.50.
Hard wall plaster, per ton, \$17.50.
Nails, base, \$3.25.
Nails, cut, \$4.25.
Mixed paint, gallon, \$2; ½-gallon, \$1.10; quart, 60c.
Boiled linseed oil, gal., \$1.40; barrel lots, per gal., \$1.20.
White lead (genuine), 100 pounds, \$8.50.
White lead, No. 1, per 100 pounds, \$8.
Varnishes, furniture, 80c.; \$1; hard oil, \$1.75; elastico-oak, \$2; elastico-floor, \$3.25.
Sash cord, per pound, 50 cents.
Sash weights, per 100 pounds, \$3.
Tacoma hair fibre, per ton, \$18.
Fire clay, per ton, \$20.
Plate glass (35 per cent. off local tariff).
Sheet glass (10 per cent. off local tariff).
Expanded metal lath (Hays') 27 cents per square yard.
Herringbone lath, 17 cents per square yard.
Ready roofing (Sendor brand), ½ ply, \$2.25; 1 ply, \$2.65; 2 ply, \$3.40; Malthoid, 1 ply, \$2.75; 2 ply, \$3.25; 3 ply, \$3.70.
Hexagon floor tiling, average 55 cents per square foot.
Wall tiling, average 60 cents per square foot.
Turpentine, per case, \$10.
Resin, per pound, 5 cents.
Elephant lead, per 100 pounds, \$8.50.

PIG IRON, ETC.:—

Pig-iron, Eglinton, No. 12, \$24.75 per 2,240 pounds, ex-wharf Vancouver.
Pig lead, \$90 per 2,240 pounds, ex-wharf Vancouver.
Tin plate, I.C., 14 x 20, per box, \$3.50, ex-wharf; Canada plates, local, \$2.90; polished, \$3.10.
Steel rails, 15-pound, \$50 per 2,240; 30-pound, \$45 per 2,240, ex-wharf Vancouver; 50-pound, \$45 per 2,240 pounds.

Notes

At a recent meeting the Vancouver City Council approved a recommendation of the Board of Works that a new garbage incinerator be provided, the capacity of the present

one being insufficient for the needs of the rapidly growing community. The tender of a Portland company for a plant to cost \$71,491 was accepted, the amount being divided up as follows: \$61,121 for the plant proper, \$6,370 for a clinker car system, and \$4,000 for foundations.

The steel skeleton of the Holden office building on Hastings street will be completed in a few days. The structure will consist of ten storeys and basement, and will be fireproof, the floors being of reinforced concrete. Messrs. J. Coughlin & Sons have the contract for the stone, brickwork and steel frame.

Messrs. Honeyman & Curtis, local architects, have completed plans for the Bank of Montreal branch on the north-east corner of Westminster avenue and Cordova street. The frontage will be 57 feet on the avenue and 68 feet 6 inches on Cordova. The structure will be built of Indiana limestone with local granite foundations and ferro-concrete floors and supports.

Hemphill Bros., well known dealers in contractors' supplies, recently incorporated as a limited company with a capital of \$25,000.

The steel frame of the new 10-storey Metropolitan Building on Hastings street, opposite the handsome Winch Building, is now well advanced. It is being built by the Wells Construction Company, and will be larger than the Dominion Trust Building, though not as high. The cost is estimated at \$300,000. Messrs. John S. Helyer & Son are the architects.

The council of Point Grey, the ambitious municipality to the south of Vancouver, has let contracts for over \$800,000 worth of roadway work, including clearing and grading, and will soon have a network of first class thoroughfares.

The National Paper Mills Company, which is erecting a plant near Fraser Mills, B.C., about three miles from New Westminster, has two mayors on its provisional directorate—Mayor J. A. Lee, of New Westminster, and Mayor L. D. Taylor, of Vancouver.

Fifty-six salmon canneries will be operated on the British Columbia coast this season. Nearly one-half of the plants will be on the Fraser river, most of the balance being located on the Skeena river, at Rivers Inlet and the Naas.

The paving of Columbia street, New Westminster's business thoroughfare, is now in progress, and already the property owners on other streets are taking the necessary steps to secure similar improvements. Specifications for about five miles of paved streets and two miles of cement walks are being prepared by the city engineer, both works to be carried out under the local improvement by-law. The work on streets, sewers and waterworks extensions contemplated and under way will call for a total expenditure of about \$800,000.

John W. Considine, of Seattle, the well known director of vaudeville circuits, who recently purchased the Vancouver Opera House on Granville street, proposes to erect on the lots occupied by that building a mammoth ten-storey office building. What will be unique in the proposed structure, as far as western building operations are concerned, is that the new block will be erected over and around the opera house. The proposed novel plan is necessitated by the fact that Mr. E. R. Ricketts, the present lessee of the opera house, has contracts which cannot be cancelled for two years.

A strong syndicate of Montreal capitalists has been formed to develop pulp and power industries in the vicinity of Prince Rupert. The enterprise will be known as the Pacific Pulp & Power Company, and it is proposed to generate 15,000 h.p. at Union Creek, about 16 miles from Port Simpson and 30 miles from Prince Rupert, the Pacific terminus of the Grand Trunk Pacific Railway, and which is now reported to have a population of 5,000 people. Four lakes can be tapped for power development purposes, while at the site for the dam there is a townsite of 114 acres available. The timber area

controlled by the syndicate is said to comprise about 15,000 acres in two blocks, both being heavily timbered with spruce, cedar and cottonwood. A Montreal power expert is now on the ground preparing a report, while three timber experts from British Columbia and New Brunswick are cruising the stands. The syndicate have in view the supplying of electric light to Prince Rupert and Port Simpson, and the construction of an electric railway between the two places. The sphere of operations may extend over a radius of 75 miles around the city of Prince Rupert.

Vancouver's Continuous Growth

The official statistics for May surprised even the most optimistic believers in Vancouver's future. Most noticeable are the increases in Customs, building receipts and land registry.

Customs—The returns for the month shatter all records, the revenue being \$470,000, or about \$9,000 more than April, which was the previous record, and an increase of \$195,681 over May, 1909.

Building—The value of the permits issued during May was \$940,000, or almost double the record for May, 1909. The permits for the first five months of 1910 reached a total of \$5,720,000, as against \$2,836,165 for the corresponding period of 1909, or more than double.

Bank Clearings—The returns for May for the past three years make instructive reading, the increases being phenomenal. They are: May, 1910, \$36,460,680; May, 1909, \$20,715,136; May, 1908, \$13,956,396.

Land Registry—Receipts in this department for May, 1910, were \$18,617.30, as against \$11,066.80 for May, 1909. For April of the present year—always a big month—the returns were \$21,454.60.

The Canadian Pacific Railway Company has purchased the Railway Block property adjoining on the west the uptown office block of the company on Hastings street, giving a combined frontage of over 75 feet. The front of the blocks will be remodelled and made uniform, and an addition may be built to the rear. For some time past the accommodation of the telegraph office and uptown ticket office of the C.P.R. has been woefully inadequate, and the acquisition of the adjoining block becomes a necessity.

The corporate limits of Seattle embrace an area of 109 square miles; the city of Portland an area of 51 square miles; Vancouver, excluding Stanley Park, slightly under nine square miles. The building permits in Portland's 51 square miles for the first four months of this year were approximately five millions of dollars. The permits within Vancouver's comparatively insignificant area of nine square miles for the same period, amounted to about a quarter of a million more than those in nearly six times the area at Portland. Had we the building statistics for 20 to 30 square miles of Vancouver instead of only nine square miles, the showing would have advertised to the world the superlative vigor of Vancouver.

Booms of logs are coming to the sawmills of Vancouver by almost every tide. Enamelled baths come in by freight trains from Ontario. High class plumbing brassware approaches us from the American side. Cement comes in by the shipload from England and other places. Bricks are being unloaded from scows daily—some of them from ocean-going ships. Nails converge here by the ton. All this means that building is going on in Vancouver at a faster rate than has ever been. If you put your ear to the ground you can almost hear the houses and office buildings going up. The speed with which the aforementioned materials are made into houses is astonishing.

Local improvement works on a large scale are in progress in Victoria, some 40 different works being under way. The city engineer requires 1,500 men in order to carry out the programme passed by the city council. Following the ex-

ample of the mountain millmen, who are in need of 1,500 additional employees to make their working gangs complete, the engineer is advertising in the eastern papers for laborers.

Mr. Herbert E. Law, vice-president of the Western Steel Corporation, Limited, visited Vancouver early in June. In conversation with leading members of the Board of Trade, Mr. Law said the site of the company's proposed British Columbia plant would be announced shortly. The company has a capitalization of \$20,000,000, and assets valued conservatively at \$43,000,000, including valuable iron, coal and timber properties in British Columbia. The plant to be erected will be in operation within two years; its initial capacity will be 350 tons of pig iron daily, to be increased as market conditions warrant.

Mr. Bogart, of the Pacific Coast Pipe Company, returned recently from a trip through the Okanagan and Vernon districts, where several water systems have been constructed of the company's wood pipe. Mrs. Bogart accompanied her husband.

Upwards of 1,200 men are on the city pay rolls at the present time, being employed on street improvements and sewer construction work. About \$3,000 per day is being paid out to them by the city treasurer.

The British Columbia Government has announced its intention to establish a provincial park in the vicinity of Buttle Lake, Vancouver Island. The decision is hailed with much satisfaction by Victorians and the officials of the Vancouver Island Development League, as it is felt that the preservation of such a magnificent scenic area will enhance the value of the island as a tourist resort, besides conserving a considerable tract of fine timber.

C. T. Cartwright, who on June 1st resigned his position as engineer of the Pacific division of the C.P.R. in order to practise his profession in a private capacity in Vancouver, was presented with a handsome set of office furniture by the engineering staff of the railway, including Vancouver, Victoria, Revelstoke and Nelson divisions. J. C. Rundle, assistant engineer of the central division, with headquarters at Winnipeg, has been appointed to the vacancy created by Mr. Cartwright's resignation.

A convincing proof of the steady growth of Victoria, the provincial capital, is exemplified in the increase in the value of realty as shown by the figures of the completed assessment roll, which are \$9,586,120 in excess of those of a year ago. The totals are as follows: Land, \$26,295,330; improvements, \$11,619,980; total, \$37,915,310. Last year's figures were: Land, \$17,960,980; improvements, \$10,368,210; total, \$28,329,190.

The Blue Funnel liner Keemun recently delivered at Victoria 2,000 tons of big steel pipes for the Esquimalt waterworks. The pipes weigh $2\frac{1}{2}$ tons each.

Mr. Alexander Robinson, C.E., representing the Robertson-McAlpine iron works of London and Glasgow, who is touring Canada with a view to establishing a central branch of the firm, spent a few days in Vancouver recently. Either Montreal, Toronto, Ottawa, Winnipeg, Vancouver or Prince Rupert will secure a prize in the shape of an industry which will employ some 500 men. Vancouver's chances are considered good.

Mr. H. M. Burwell, C.E., of Vancouver, has been engaged by the city council of Victoria, B.C., to survey and report upon the Sooke Lake water scheme and the possibility of diverting Leech river so as to give it an inlet into the lake, also the cost of a tunnel to convey the water to the city for consumption purposes. The present capacity of Sooke Lake is estimated at 23,000,000 gallons daily; by diverting the Leech river it is hoped to increase the supply to over 125,000,000 gallons daily, which would allow of extensive power developments. The present capacity of Sooke Lake is ample for a population of 250,000 people.

Canadian City Engineers

James Gray Lindsay, Belleville, Ont.

In many parts of the globe—and Canada is no exception—Irish birth is a strong recommendation to popularity. Canadian city engineers are recruited from several nationalities, and it would be strange indeed if Ireland had no representation among them.

James Gray Lindsay, city engineer of Belleville, Ont., was born in Belfast, Ireland, in 1870. He adopted the profession of a civil engineer and throughout his career has demonstrated marked ability in that calling. His early training was received from Mr. J. J. McDonnell, C.E., J.P., of Belfast, Ireland. After serving his articles, Mr. Lindsay held several appointments previous to commencing practise in the year 1895.

The city engineer of Belleville has had a great deal of experience in various parts of the world. He held an engagement with the contractors on the Belfast Main Drainage Scheme, a project involving an expenditure of £300,000, that is over $2\frac{1}{2}$ million dollars.

He has acted for the British Government in the West



City Engineer Lindsay, Belleville, Ont.

Indies, and was afterwards offered the position of Colonial Engineer on the Gold Coast of West Africa, which, however, he declined owing to climate; then as city engineer of Guelph in addition to his present work. It is of interest to note that Mr. Lindsay is a member of the Ulster Society of Architects, an association which is in alliance with the Royal Institute of Architects of Great Britain. In his architectural capacity, Mr. Lindsay has prepared and executed plans for varied and extensive building schemes. As city architect of Belleville, as well as city engineer, he has carried out various alterations to the City Hall buildings and the Isolation Hospital. Mr. Lindsay has also been prominently identified with the engineering work and general superintendence entailed in various railway and other projects. The expert knowledge which Mr. Lindsay has acquired as a result of his wide experience eminently fits him for municipal engineering in this country. City Engineer Lindsay knows his work and he has the confidence and initiative to apply his knowledge to the best advantage.

Mr. Allan MacDougall left Ottawa last week to take up his duties as assistant engineer on the Quebec bridge.

An Industrial Acquisition for Toronto

The accompanying view shows a portion of the structures to be erected for the new paint factory of Messrs. Pinchin, Johnson Company, Limited, Toronto. The building has a frontage on Carlaw avenue of 100 feet and a depth of 50 feet. It will be equipped with the most modern machinery and will



A Portion of Messrs Pinchin, Johnson Company's new Paint Factory.

afford every facility for the manufacturing purposes for which it is to be used. Readers of the "Contract Record" will be interesting in knowing that the above named company is the Canadian branch of Messrs. Pinchin, Johnson & Company, Limited, of London, Eng. The firm has been established since 1834 and enjoys an excellent reputation throughout the

British Empire and Continental Europe. The same brands that have made the parent company famous will be manufactured in Toronto. Of these may be mentioned Minerva paint and Satinette white enamel.

The officers of the Canadian company are as follows: Jas. E. Ebersole, Toronto, president and treasurer; Oscar Rosenberg, Chicago, Ill., vice-president; Gordon C. Scott, Toronto, secretary; P. P. O'Neill, superintendent of the paint plant.

Notes

Mr. Jos. Bourque, the well known Hull, Que., contractor, was married last week to Miss Fortier, daughter of the town clerk of Pembroke.

Mr. E. L. Cousins, resident engineer for the G.T.R., has been appointed assistant to City Engineer Rust, of Toronto, at a salary of \$200 per month.

We regret to report the death of Mr. Thos. Crowley, manager of the Great West Pipe Covering Company, Winnipeg, which occurred at Toronto last week.

In the case of Halley v. the Phoenix Bridge Company, an action for damages for injuries sustained in the collapse of the Quebec bridge, the plaintiff has been awarded the sum of \$20,000.

After lasting six weeks, the strike in the building trades at Regina, Sask., ended last week with the acceptance of the schedule drawn up by the Builders' Exchange. The men relinquished their claim for closed shop.

The death occurred recently, at Toronto, of Mr. Chas. E. Goad, a well known civil engineer and a member of the Canadian and American Societies of Civil Engineers. Mr. Goad's specialties were the preparation of maps for municipalities and fire insurance plans.



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The One Piece Frame and Bearings. No more shaky bearings from Bolts and Nuts working loose; much stronger, more rigid and neater than the old style bolted bearings.

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Railroads, Bridges and Wharves

Edmonton, Alta.

Tenders addressed to J. E. Schwitzer, assistant chief engineer, C. P. R., Winnipeg, will be received until July 20th for erection of substructure of bridge over North Saskatchewan at Edmonton. Plans, etc., at following offices: A. L. Hertzberg, division engineer, Toronto; C. N. Monsarrat, engineer of bridges, Montreal; N. E. Brooks, division engineer, Calgary, Alta.; H. Rindal, division engineer, Vancouver, B.C., and J. E. Schwitzer, assistant chief engineer, Winnipeg.

Fort William, Ont.

Tenders are being received until July 15 for the construction of piers, etc., for C. P. R. bridge over the Kaministiquia river here. For further information see advertisement in this issue.

Gordon, Ont.

Tenders addressed to A. C. Mailloux, township clerk, will be received until June 27th for construction of concrete abutments of a bridge, township of Anderdon. Plans, etc., at office of above.

London, Ont.

Tenders have been called for three reinforced concrete bridges on the boundary line between the counties of Middlesex and Lambton.

New Westminster, B.C.

On July 14th a bylaw will be voted on to issue \$30,000 4½ per cent. bridge debentures. W. A. Duncan, city clerk.

Natasquan, Que.

The Department of Public Works, Ottawa, asks for tenders for the construction of a wharf here, until July 19th. Plans, etc., obtained at the department, or at the office of A. D. Decary, district engineer, Post Office Building, Quebec, and on application to the local postmaster.

Ottawa, Ont.

The Department of Railways and Canals are calling for tenders until July 14th for the construction and erection of the superstructure of the La Pas bridge over the Saskatchewan river. For further particulars see advertisement in this issue.

Quebec, Que.

The City Council have accepted the offer of the Transcontinental Railway for the purchase of the Champlain market site. Two million dollars will be spent on workshops, railway station and warehouses. Noted previously.

Tenders are being called by the Department of Railways and Canals, Ottawa, Ont., until September 1st for the superstructure of bridge across the St. Lawrence river. L. K. Jones, secretary. For further information see advertisement in "Tenders and For Sale Department," of this issue.

Strathcona, Alta.

The issue of debentures to the amount of \$50,000 has been authorized as the city's share of high level bridge.

Sorel, Que.

Tenders will be received until July 18th for the construction of a breakwater. R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa.

Victoria, B.C.

U. L. Parasew, C.E., with crew, has been dispatched to survey the country for favorable routes for the C. N. R. Garret Hughes, engineer-in-chief, for the railroad's interests on Vancouver Island.

AWARDED.

Cornwall Centre, Ont.

Were informed re Township of Cornwall highway bridges, south branch drainage scheme, that the tender of Quinn & Chisholm, St. Andrews West P.O., for the construction of the five reinforced concrete bridges was accepted by the council. Price, \$5,400. Other tenders were: McCoy & Wilford, Lindsay, \$6,930; Chisholm & McLean, Glen Walter, \$5,500; Meepaw & McDonald, St. Andrews West, their tender being by the cubic yard, price \$14; D. G. McMillan, Finch, Ont., also by the cubic yard, price \$19.25.

Edmonton, Alta.

The contract for the first section of the C. N. R. from Edmonton to the Pembina river, a distance of seventy miles, has been awarded to McMillan Bros.

Ottawa, Ont.

Burns & Charleston, of Ottawa, were given the contract for wharf extensions at St. Charles de Caplan, Que.

Summit, B.C.

The Canadian Pacific is erecting a cold storage and wharves for which one of the contracts has been awarded to Nelson Bros. of Summerland. Total expenditure, \$40,000.

Stewart, B.C.

The contract for the first 21 miles of the Portland Canal Shore line has been awarded to Mr. Sol. Cameron, of the Westholme Lumber Company, the cost of clearing the right of way and grading being estimated at \$500,000.

Winnipeg, Man.

The contract for 25 miles of the Kootenay Central Railway has been awarded by the C. P. R., holders of the charter, to Foley, Welch & Stewart.

Waterworks, Sewerage and Roadways

Belleville, Ont.

The council decided to call for tenders for both turbine and triplex power pumps, etc.

Foam Lake, Sask.

Tenders addressed to the secretary-treasurer will be received until June 30th for the construction of about 13,000 square feet of concrete sidewalks. Plans, etc., at office of above or at that of F. A. McArthur, Yorkton.

Moose Jaw, Sask.

The ratepayers will vote on July 15th for an expenditure of \$412,000, which al-

lows for sewerage disposal plant, construction of a fire storage reservoir, providing a filter at Snowdy Springs, the further development of these springs and for extensions of sewers and water systems. \$375,000. Construction of concrete sidewalks, \$12,000. Permanent improvement work on roads and highways, \$20,000, and construction of plank walk, \$5,000.

Montreal, Que.

New tenders will be received by City Surveyor Barlow for the construction of the sixth section of the Sherbrooke street sewer. Former tenders having been rejected.

New Westminster, B.C.

The following paving tenders were received: Hassam Paving Company, \$82,100; the Rudolph H. Bohn Company, of Chicago, \$65,690; Warren Construction Construction Company, of Seattle, \$66,903. Referred to City Engineer Blackman.

North Toronto, Ont.

At a meeting of the council, Engineer James was instructed to at once build a large well at the northeast of the pumping station, and to install the sterilizing plant.

Ottawa, Ont.

Tenders addressed to the Chairman, Board of Control, will be received until June 30th for asphalt pavement on Mutchmor street from Bank to Canal Driveway. Specifications at office of City Engineer, N. J. Ker.

Quebec, Que.

At a meeting of the civic road committee \$175,000 was voted toward permanent repairs to city streets.

Tenders addressed to J. Gallagher, W. W. Engineer, will be received until July 4th for the trenching required for the extension of water and drainage in the new Limolion ward and in certain streets in St. Malo ward.

Revelstoke, B.C.

A bylaw to raise over \$20,000 for water works will be voted on shortly.

Regina, Sask.

Tenders will be received until July 11th for the following ½ per cent debentures: \$115,000 15-year pavement; \$10,000 20-year sidewalks and \$280,000 40-year trunk sewer.

Stettler, Alta.

John Galt Engineering Company have charge of the installation of the waterworks system.

St. Boniface, Man.

There is some talk of new waterworks being installed shortly.

Souris, Man.

Ratepayers will vote on July 8th on a \$95,000 bylaw for waterworks construction.

Stewart, B.C.

The government has granted \$20,000 towards the installation of a sewerage system, the remaining \$10,000 to be subscribed by the townsite company. W. Manson, M.P.P.

South Vancouver, B.C.

Tenders will be received until July 13th for the following debentures: \$200,000 road, \$170,000 school, \$30,000 sidewalk debentures. G. H. Peake, C.M.C., Drawer 1, Hillcrest P.O., B.C.

Strathcona, Alta.

The call for tenders for the season's programme of paving resulted in but one tender, that of the Bitulithic Company at \$3 per square yard, 20 cents per yard less than last year. The total cost for the areas proposed to be paved, \$28,740. Award deferred.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until July 26th for construction of section No. 6, high level intercepting sewer. Specifications, etc., at the Main Drainage Department, city engineer's office. See advertisement in this issue.

Victoria, B.C.

The tender of the Pacific Coast Construction Company for sidewalk construction on Maple, Quadra, Blanchard, Work and Caledonia streets for the price of \$17,532, will probably be accepted.

Vancouver, B.C.

Granatoid pavement on Westminster road to cost \$57,400, and a tile drain to cost \$21,810, are among the constructions planned by the Board of Works for the season.

The plan of paving Davie street from Granville to Denman, with granatoid pavement was endorsed. The estimated cost of the work is \$110,058.

Wallaceburg, Ont.

This municipality is considering the installation of a waterworks system. D. A. Gordon is interested.

Winnipeg, Man.

Tenders are called until June 30th by the Board of Control for construction of sewers in the following: Basswood Place, Erin street, Downing street, Newman street, Wolseley avenue, Wellington avenue, Redwood avenue, Andrews street; M. Peterson, secretary.

Yorkton, Sask.

Tenders are being called by this municipality for the construction of sewage disposal works and sewers. F. T. McArthur town engineer. For further particulars see advertisement in "Tenders and For Sale Department" this issue.

AWARDED.**Lethbridge, Alta.**

A contract for 130,000 cubic yards of grading was given to H. Margnardt, at 30 cents per yard, for 1,000 feet haul, and 33 cents for 1,500 feet haul. Other award noted in issue of June 15th.

Longueuil, Que.

At a recent meeting of the council the construction of an 80,000 gallon structural steel tank to cost \$5,500 was given to the Structural Steel Company; the 2,300-volt switchboard to the Canadian Electric Company; also street lighting equipment. The pumping outfit complete with motors, piping and valves, costing \$3,431, to the McDougall Company and Allis-Chalmers-Bullock, Limited. Longueuil's agreement with the Montreal Light, Heat & Power Company is that the town pay the company at the rate of 30 cents per horsepower with 100 horsepower guaranteed for fire protection. It means that the town gets its total power at an outlay of \$1,800 per annum.

Fernie, B.C.

R. Potter, city engineer, sends us the following list of tenders for the construction of 1910 extensions to the water supply system:

Length material.	Depth in feet.	1	2	3	4
11440 feet 3 inches W. I. Pipe....	4—6	.22	.30	.22	.34
500 feet 4 inches W. I. Pipe....	4—6	.24	.30	.22	.34
6770 feet 6 inches Wood Pipe ..	4—6	.25	.30	.34	.34
37 Valves on 3-inch pipe line, each....		3.00	1.00	2.00	2.00
1 Valve on 4-inch pipe line, each....		3.00	1.00	2.00	2.50
6 Valves on 6-inch pipe line, each....		5.00	1.50	5.00	3.00
12 hydrants, 15-foot wood pipe.....		15.00	3.00	20.00	8.00
Total of tender		\$4,653.30	\$5,696.00	\$5,274.60	\$6,551.90

The above prices to include the making of the necessary connections with the present lines, also the connecting up the various lines as shown on the plan for same.

No. 1.—R. Potter, city engineer (on behalf of the City of Fernie), (successful tender).

No. 2.—Hugh Macdonald, Victoria, B.C.

No. 3.—Depew, McDonald & McLean Company, Fernie.

No. 4.—Broley & Martin, Fernie.

The following is the list of tenders for construction of a system of storm water sewers:

Concrete Pipe			Per Foot.		
Size.	Feet Deep.	Total Feet	1	2	3
30-inch	0—6	250	\$ 2.15	\$ 1.00	\$ 1.75
30-inch	6—8	1050	2.30	1.50	2.25
24-inch	6—8	690	1.90	1.40	1.95
24-inch	8—10	240	2.00	2.25	2.25
24-inch	10—12	400	2.10	2.60	2.65
20-inch	0—6	850	1.40	.90	1.40
20-inch	6—8	175	1.50	1.30	1.80
20-inch	8—10	200	1.60	2.25	2.35
20-inch	10—12	320	1.70	2.40	2.60
15-inch	8—10	1440	1.40	2.25	2.00
15-inch	10—12	140	1.55	2.40	2.40
6-inch	0—6	700	.90	.60	.70
6-inch	Underdrain	6300	.10	.15	.10
Manholes, 20, each			50.00	70.00	55.00
Catch basins, 20, each			40.00	40.00	30.00
Timber left in ditch, 50,000 ft. B. M. per M.			10.00	15.00	12.00
Totals			\$13,703.00	\$14,716.50	\$15,411.00

1.—J. J. Wood, contractor, Fernie, B.C. (successful tenderer).

2.—Hugh McDonald, Victoria, B.C.

3.—W. M. Dicken & J. P. Horn, contractors, Fernie, B.C.

Port Hope, Ont.

The tender of R. Curran, of Orillia, for the construction of cement walks at 9 1-8 cents per superficial foot and 7 cents for laying tile drains, was accepted. Total amount, \$9,861.07.

Quebec, Que.

Mr. A. Leofred, C.E., and constructing engineer, has closed a contract with the Chaudiere Curve Town Council for a waterworks plant to cost when completed, \$250,000. Mr. Leofred will start work early in July, and it will take two years to complete the systems. This plant will answer the requirements of more than half a dozen railroads, which are going to cross over the Quebec bridge near Chaudiere Curve.

Strathcona, Alta.

The contract for the sewer and water extensions for this year was given to Hulbert & Wilson at \$13,847.95, the third lowest tender submitted.

Toronto, Ont.

The contract for a new pavement in the Union Station has been let to the Warren Bituminous Paving Company. Estimates place it at \$2.50 per square yard, or \$20,000 for the 8,000 yards to be paved.

Uxbridge, Ont.

M. H. Crosby, clerk, writes that two tenders were received for cement walks, viz., R. Curran, Orillia, at 10 cents per square foot; H. Shurter, Peterborough, at 12½ cents.

Vancouver, B.C.

Evans, Coleman & Evans were awarded the contract for supplying the First Nar-

rows main pipe at \$41.20 per long ton. Other tenderers: Robertson, Godson & Company, \$41.60; A. G. Langley, \$45.60; Porter, Worsnop & Company, \$45.11; Western Oil & Fuel Company, \$45.44.

Westmount, Que.

The Mineral Rubber Company of Toronto have been awarded the contract for permanent paving for several streets at \$145,000. Other awards noted previously.

Winnipeg, Man.

We are officially informed that the contract for supply of sewer pipe and junctions has been awarded to W. F. Lee, of Winnipeg, for the sum of \$20,120.25. The contract for supply of from 25,000 to 30,000 barrels of cement was also awarded to W. F. Lee, at the price of 75.45 cents per 100 lbs., including sacks.

**Public Buildings, Churches
Schools, etc.****Antigonish, N.S.**

Tenders are being called immediately for the plastering of the new Science Building, F. X. College, also for the tar and gravel roofing of the same. Plans, etc., at J. A. McDonald's, Barrington street, Halifax, or on application to the above college.

Brandon, Man.

Architect Elliott submitted plans for the new fraternal temple; a site committee, representing Odd Fellows, Knights of Pythias, etc., has been appointed.

Fergus, Ont.

Tenders addressed to R. C. Desrochers, assistant secretary, department of public

works, will be received until July 13th for construction of post office here. Plans, etc., at office of W. Mahoney, architect, Guelph, at local post office, and at the above department.

Guntton, Man.

A bylaw will be voted on July 2nd by the ratepayers to issue \$10,000 school debentures.

Goderich, Ont.

Plans for the post office enlargement have been prepared and tenders will likely be called for in a few weeks. Government estimates provide \$10,000.

Edmonton, Alta.

The bylaws for \$175,000 for new public hospital; \$75,000 for exhibition grounds; \$25,000 for library site, were carried.

It is stated that J. H. Rudy is preparing plans for the new theatre, which will cost about \$70,000. H. Fraser, of McDougall & Secord, is interested.

Eganville, Ont.

Tenders addressed to J. R. Campbell, secretary Public School Board, will be received until July 15th for erection of an 8-room school. Plans, etc., at office of above.

Elora, Ont.

Tenders addressed to R. C. Desrochers, assistant secretary, Department of Public Works, will be received until July 13th for the construction of post office here. Plans, etc., at office of the architect, W. Mahoney, Guelph, at local post office, and at above department.

Lambert, Que.

The erection of a post office to cost \$7,000 is assured. Mr. Desaulniers is interested.

London, Ont.

City Architect Nutter's plans for the Colborne Street school were favorably considered by the Board of Education. Noted previously.

King street congregation have approved of the site on Dundas street for their new church. Noted in last issue.

Moose Jaw, Sask.

The bylaws to provide \$10,000 for fire station on South Hill, \$10,000 for isolation hospital, \$30,000 for produce market and \$10,000 for improvements to exhibition grounds, were carried.

The city clerk has been authorized to call for tenders for the market; also for sub fire station on South Hill; also for construction of isolation hospital, all to be in by July 4th.

Medora, Man.

Tenders will be received until July 2nd for erection of new brick veneer school. A. N. Middleton, secretary-treasurer.

Montreal, Que.

Messrs. Peden & McLaren, architects, are preparing plans and specifications for the erection of a town hall at Montreal West. Noted in last issue.

Work has been commenced on the construction of the Church of St. Matthias, corner Cote St. Antoine and Churchill avenue, Westmount. The foundation work for this building was completed last year. D. M. Long has contract for carpentering work, and P. J. Brown has contract for brick and masonry work. Messrs. Ross & Macfarlane, architects.

Messrs. E. & W. S. Maxwell were the successful architects in the recent competition of the Art Association of Montreal, and their plans for the new art gallery to be erected on the Holton property corner Ontario avenue and Sherbrooke street have

been accepted. Mr. Edmund M. Wheelwright, judge of competition.

New Westminster, B.C.

A bylaw will be voted on July 14th to issue \$12,000, 4½ per cent. fire hall debentures. W. A. Duncan, city clerk.

Owen Sound, Ont.

Tenders addressed to Forster & Clark, architects, will be received until July 2nd for the erection of school house, No. 1, Keppel. Plans at residence of R. Hewitson, Con. 8, Keppel.

Ottawa, Ont.

It is expected that tenders will be called for in a few weeks for the new departmental block on Mackenzie avenue.

It is announced that the Bennett Theatrical Enterprises of Canada, Limited, will erect a new theatre here and in Montreal. G. Greening, Canadian manager.

A building permit has been issued for a Hebrew day school, at \$4,800.

Princeton, B.C.

The hospital board have decided to call for tenders for their new hospital. Plans furnished by C. Graham, call for a cottage 38 by 53 feet, with large verandahs.

Regina, Sask.

Tenders will be received until July 11th for the following 4½ per cent. debentures: \$18,000 30-year Isolation Hospital; \$26,000 30-year Collegiate Institute; \$25,000 30-year General Hospital; \$10,000 40-year Children's Shelter.

Rosthern, Sask.

W. W. LaChance, architect, of Saskatoon, has plans prepared for the remodeling for the Alexandra Hospital. Estimated expenditure, \$6,000.

Toronto, Ont.

The Synod for Diocese of Toronto is stated to have received a donation of \$20,000 toward the erection of an addition to St. Albans Cathedral.

Tenders are being called by the school board until July 4th for the several trades required in the enlargement of Howard school; alterations to Pape avenue school; midsummer repairs; iron stairs for sundry schools, etc. For further information see advertisement in "Tenders and For Sale Department" of this issue.

The purchase of \$7,000 site for firehall to serve Wychwood and Earls court was recommended by the Board of Control.

The time for receiving competitive designs for the residence of the Lieut.-Governor, has been extended to August 19th. Advertisement in issue of June 8th.

Tenders addressed to H. F. McNaughton, secretary of Public Works, will be received until July 29th for marble work, tiling, roofing, conductors, prism lights, plumbing, etc., in connection with the reconstruction of the west wing of the Parliament Buildings. Plans, etc., at office of the architect, E. J. Lennox. J. O. Beaulieu, Minister of Public Works.

The Property Committee have decided on two new fire hall sites: one on Claremont street, and one on Birch avenue.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until July 12th for lighting fixtures required for the new fire hall on Perth avenue. Plans, etc., at office of City Architect.

Victoria, B.C.

Tenders are called until June 30th for alterations to office annex, Parliament Buildings. F. C. Gamble, Public Works engineer.

The executive of the Union Club are con-

sidering plans for the erection of a clubhouse to cost about \$100,000.

Vancouver, B.C.

The civic building committee have approved plans for alteration at City Hall. Estimated cost, \$5,500. Building Inspector Jarrett.

The Daughters of the Empire propose a home for convalescents as a memorial to the late king. J. Tupper, regent; Julia W. Henshaw, secretary-treasurer.

A campaign has been started to raise \$100,000 for the new Strathcona Sailors' and Loggers' Institute. Rev. A. Hall, of Toronto, is interested.

Among the permits granted recently were two covering new eight-room schools, each costing \$50,000, to be located at Fourteenth avenue and Alder street, and Tenth avenue and Cypress street.

Wolfville

Tenders addressed to J. D. Chambers, chairman of committee, will be received until June 29th for installing a heating plant in the public school here.

Winnipeg, Man.

Two blocks in Transcona have been purchased for His Grace the Archbishop of St. Boniface. It is understood that a church and school will be erected on the property.

Tenders addressed to R. C. Desrochers, assistant secretary, Department of Public Works, will be received until July 7th for fittings, examining warehouse. Plans, etc., at above department, and at the office of Mr. J. Greenfield, resident architect.

The school board obtained a permit for the erection of one of the proposed technical high schools, \$330,000. It will be of brick and stone, while the floors will be of reinforced concrete. The space occupied will be 219 feet by 180. Architect, J. B. Mitchell.

A permit was issued for the new Catholic hospital which is now being erected at a cost of over \$15,000. Also for the construction of a fire hall and drill tower on the northwest corner of Burnell street and Sargent avenue at a cost of \$23,000.

AWARDED.

Brantford, Ont.

The contracts for the new Separate school, Brantford, were awarded as follows: Building and construction, J. C. O'Neil, \$15,900; heating and plumbing, Howie & Feely, \$3,880; electric wiring, Lyons Electric Company, \$185.

Ottawa, Ont.

It is stated that the contract for the extension to the eastern departmental block has been awarded to Doran & Devlin, this city, the lowest tenderers, at \$222,800.

Montreal, Que.

The general contract for the erection of a church building for the parish St. Joliceur at St. Catharines, County Portneuf, Que., has been awarded to Mr. J. B. Page. Mr. R. A. Brassard, architect.

Messrs. Sparrow & McNeil, contractors, have been awarded the general contract for the erection of a church building for the Church of the Ascension, Park avenue. Mr. H. E. Stone, architect.

The contracts for the erection of the St. Leon school for the Catholic School Commissioners of Westmount, have been awarded as follows: Masonry, J. Lessard; plumbing and heating, T. Lessard & Son; electric wiring, J. A. St. Amour; brickwork, J. Norri; carpentering, J. Pradeau; steel work, Dominion Bridge Company; plastering, J. Fadien; tiling, Robt. Reid. Mr. Jos. Sawyer, architect. Estimated cost, \$20,000.

Contract for the erection of a two-storey girls' school for the Catholic School Commissioners of St. Paul, corner Church and Auger avenues has been awarded to J. B. Barbeau, contractor, plumbing and heating to K. Barrette & Company. Alphonse Venne, architect.

Vancouver, B.C.

The official list of tenderers for incinerator received confirms that published in issue of June 15th, except in one item, the last, which should read: Hughes & Sterling, London, Eng., per J. E. W. Macfarlane, Vancouver, \$54,020. The contract was given to Public Engineering Company, Portland, O., at \$61,121, with the following additions, \$6,370 for car system, and \$4,000 for the cost of foundation, making total cost, \$71,491.

Residences

Brantford, Ont.

Permit has been issued to Mr. P. Gant for a brick dwelling on Dufferin avenue to cost \$4,500.

Hamilton, Ont.

Building permits have been issued to D. Mahony, brick house on Fairleigh avenue, \$2,500; S. McPhie, brick house, Main street and Spadina avenue, for E. Carleton, \$3,000.

Montreal, Que.

Plans and specifications have been prepared and tenders will be received up to June 30th for the erection of a residence in Outremont for T. Berthiaume. Mr. Theo. Daoust, architect.

Tenders will be received until Thursday, July 7th, for the erection of two houses for Mr. G. A. Campbell. MacVicar & Heriot, architects.

Plans and specifications have been prepared for the erection of a residence for Mr. Herbert Redpath at Ste Anne de Bellevue. Tenders will be received until June 30th. Messrs. Hogle & Davis, architects.

Victoria, B.C.

H. F. Shade has a permit for a dwelling on Queen's avenue, to cost \$3,500.

Winnipeg, Man.

E. Curre, it is stated, has invested \$32,000 in lots in Transcona, on which he purposes erecting dwellings.

A new apartment block, to be erected on Main street north of the C.P. R. tracks, is being built by Sharpe and Machray. The contractors are Dunn and Wallace and the architect, A. W. Northwood. Cost, \$60,000. F. Ashford was granted permission to proceed with the erection of a three storey annex to his apartment block on Balmoral street, \$19,000. The Wilson apartments will be constructed on the north side of River avenue, 139 feet deep, with a frontage of 45 feet. Plans have been prepared by John D. Atchison. Amount of permit, \$100,000.

The plans for a residence to be built for D. R. Dingwall at a cost of \$8,400, on the north side of Harvard, near Wilton, were approved.

AWARDED.

Montreal, Que.

Contract for the erection of two apartment houses on Dorchester and MacKay streets for Mr. J. B. Stephenson has been awarded to the Hilder Daw Construction Company. House of Brown, Limited, architects.

The Hilder Daw Construction Company have been awarded the contract for the erection of a residence on Querbe street for Mr. A. E. Munday.

Messrs. T. A. Morrison & Company have

been awarded the contract for supplying Roman stone requirements, residence for Mr. Ferguson, Ontario avenue. Mr. Kenneth G. Rea, architect.

Messrs. Church, Ross & Company have been awarded the contract for reinforced concrete work on "Magic" apartments which are being erected corner Guy and St. Luke streets for J. S. Prince. T. A. Morrison & Company will supply the Roman stone; brick work contract awarded to A. Brouillard. Mr. Wm. E. Doran, architect.

Toronto, Ont.

A. B. Ormsby, Limited, has been awarded contract for the galvanized iron, slating and duck roofing on the residence for Mr. Jas. Brown, Russell Hill road.

Business Buildings and Industrial Plants

Amherst, N.S.

The Hotel Belmont at Maccan Station, owned by J. Legere, was destroyed by fire on the 20th inst. Estimated loss, \$6,000.

Aldergrove, B.C.

It is understood that the Dominion Shingle Company will at once replace the shingle mill destroyed by fire on the 13th inst.

Brandon, Man.

It is announced that Mr. R. Lane will shortly commence construction on his proposed block on Eighth street, which will have eventually a frontage of 75 feet by a depth of 120 feet.

Duncan, B.C.

R. Marpole, vice-president of the E. & N. Railroad, is authority for the statement that a branch from here to Cowichan lake will be erected to connect the \$750,000 lumber mill, which is to be erected on tide-water. W. E. Marsh, representing the American Finance & Securities Company, is interested.

Fort William, Ont.

The plans for the new Bank of Commerce to be located on Victoria avenue, have been approved by local manager, A. A. Wilson, and sent to head office for approval. Expenditure, \$60,000. Work will start in a few weeks' time.

Farnham, Que.

The contract between the corporation and the Dominion Vault and Safe Company has been signed. The company will occupy the buildings of the defunct C. P. R. shops, besides building a large foundry.

Joliette, Que.

The Copping sawmill here was destroyed by fire on the 21st inst. Estimated loss, \$75,000. It is stated that the mill will be rebuilt at once.

London, Ont.

The plant of the Wortman-Ward Manufacturing Company was damaged to the extent of about \$20,000 on the 26th inst.

Midland, Ont.

The Roller Rink, owned by W. H. Bennett, and other buildings were destroyed by fire on the 26th inst. Estimated loss, \$8,000.

Megantic, Que.

The ratepayers have passed a bylaw to issue \$10,000 20-year 5 per cent. debentures as a bonus to the furniture factory about to be started. F. X. Marceau, town treasurer.

Montreal, Que.

Tenders were received up to June 27th for the construction of an office and fac-

tory building for the Montreal Smallwares Company, Limited. This is to be a three-storey structure of mill construction. Mr. H. C. Stone, architect.

Tenders for the construction of the new Dominion Express Building to be erected at the northwest corner of St. James and St. Francois Xavier street, will be received until July 4th at the office of E. & W. S. Maxwell, architects.

Plans and specifications are being prepared for alterations to the premises of E. M. Renouf, Limited, on McGill College avenue by Messrs. E. & W. S. Maxwell, architects.

Tenders were received up to June 27th for the erection of an office and factory building for the Diamond Whitewear Company at Three Rivers, Que. Messrs. T. Pringle & Son, Limited, architects.

Plans and specifications are being prepared for the erection of business block, corner Garnier street and Mount Royal avenue for Mr. W. U. Boivin. R. A. Brassard, architect.

New Westminster, B.C.

The erection of a \$40,000 cold storage plant is under consideration by the B. C. Packers' Association. Probable site on C. P. R. water frontage or adjoining Cleeve cannery.

North Bay, Ont.

The sawmill, etc., of Chas. Mitchell at Powassan were destroyed by fire on the 23rd inst. Estimated total loss, \$7,000.

Ottawa, Ont.

G. Bryson and Russell Blackburn have a permit for alterations, etc., to Crown hotel property to cost \$30,000. C. P. Meredith, architect.

Quebec, Que.

The old vinegar works at St. Malo, belonging to Mr. Alfred Robitaille, were destroyed by fire on the 19th inst. Loss, \$10,000.

Port Arthur, Ont.

The Bank of Nova Scotia, it is stated, will erect a stone building, corner of Arthur and Cumberland streets. Estimated cost, \$40,000. A. Mooney, local manager.

Penetanguishene, Ont.

The ratepayers will vote on July 18th on a bylaw to raise by way of debentures \$25,000 for the establishing of a stove foundry.

Pilot Mound, Man.

Fire destroyed on the 24th inst. the McKay block and J. H. Marshall's paint shop. Loss, \$25,000.

Preston, Ont.

A bylaw to grant \$12,000 to the J. Ballantine Company, etc., in return for which the company promise to double the capacity of their plant as soon as possible, has been carried.

St. John, N.B.

It is reported that the plans for the drydock and shipbuilding plant to be erected here, being prepared by the company with which Sir Robt. Perks is connected, are nearly completed and will be submitted to the government shortly.

Strathcona, Alta.

The council has entered into a provisional agreement with the company known as the Western Clays, Limited, capital, \$350,000, as to the establishment of a tile factory here. Mr. H. Richards of the Northern Crown Bank, and Mr. S. H. Smith are interested. For information apply to Dr. L. L. Fuller, 9 Whyte avenue.

South Bay, Ont.

Tenders for the erection of the plant for the Canada Woodenware Company have been called. W. Brown, representative. Noted previously.

Toronto, Ont.

The C. P. R. will come into possession in August of 3 King street east, by means of which they will be able to extend their present offices. It is stated that they will erect a modern office building.

Victoria, B.C.

Dinsdale & Malcolm have drawn plans for a new block for Mr. J. Valo. Noted previously.

Vars, Ont.

Tenders addressed to the Traders Bank of Canada, will be received until July 2nd for the erection of a brick veneer building.

Vancouver, B.C.

A permit has been issued to S. McClay, of Mt. Pleasant, for a \$75,000 steel building, corner of Seventh avenue and Westminster road, of five storeys in height, 85 feet by 75 feet, and triangular in shape. A. J. Bird is the architect; permit was also issued to cover erection of hotel block of concrete construction at 915 Westminster avenue, costing \$57,000. The proprietor of the Queen's hotel will occupy the building.

Plans were presented to Inspector Jarrett for the building to be erected by the Bank of Montreal at the northeast corner of Westminster avenue and Cordova street. The building will be of stone, two stories in height. Permit was given to Kelly, Douglas & Company for the extension of their present headquarters on Water street. The addition will be seven storeys in height and cost \$37,000. G. T. Wallace will erect a four storey brick warehouse at 281 Harris street, costing \$15,000.

Winnipeg, Man.

J. H. Pollock will erect a \$30,000 block here on Tenth street, which will be used for a billiard room, bowling alleys and baths.

Tenders addressed to James Chisholm & Son, architects, Enderton Building, will be received until June 30th for the erection of a reinforced concrete building on Market street for Gowans, Kent Western, Limited.

Wallaceburg, Ont.

Additions are being considered to the glass factory and the sugar factory. J. L. Wilson & Son, architects.

AWARDED.**Edmonton, Alta.**

Messrs. Pheasy and Batson have secured the contract for the erection of Ross Bros.' new four-storey warehouse.

Ottawa, Ont.

The contract for the heating and plumbing of the Chateau Laurier in Ottawa has been awarded to the Garth Company, 26 Craig Street, Montreal, at about \$190,000. Architects, Ross and Macfarlane, Montreal. General contractors, Geo. A. Fuller Company, Limited, Ottawa.

Montreal, Que.

Contract for the alterations to the premises of Messrs. Jackson & Savage, wholesale boot manufacturers on 81 St. Peter street, has been awarded to the Hilder Daw Construction Company.

Simpson & Peel, general contractors for the additions and alterations to the St. Lawrence Hall, Craig street, have awarded the sub-contract for painting and decorating to Alex. Craig, 41 Jurors street. Finley & Spence, architects.

Sub-contract for the painting and decor-

ating of the Quebec Bank Building, has been awarded to Alex. Craig, 41 Jurors street. General contractors, Simpson & Peel. Brown & Vallance, architects.

The contract for the heating of the alterations to the St. Sulpice property, 103 St. Xavier street, has been awarded to Mr. H. A. Brosseau, 106 St. Louis street. Architect, Eugene Payette, 15 St. James street.

Preston, Ont.

The contracts for the new I. O. O. F. block have been let, totalling \$5,795; building to be completed by October 15th. The following were the successful tenderers:—Wirsching Bros., mason work; Lang & Rosenberger, painting and glazing; Jas. Eagle, carpenter work; Jos. Deemert, electric wiring; Metal Shingle Company, tin work; iron and steel to be supplied by the Hamilton Bridge Company.

Toronto, Ont.

A. B. Ormsby, Limited, have been awarded the contract for the galvanized iron, roofing, doors and windows on the new Nasmith Building.

The Sanitary Flooring Company have been awarded the contract for laying composition flooring, etc., in the new building of Messrs. Lever Bros.' soap factory.

Victoria, B.C.

The contract for the erection of a brick block, on Douglas street, to cost approximately \$20,000, was awarded to Dinsdale & Malcolm, by the Drake Hardware Company.

Power Plants, Electricity and Telephones

Edmonton, Alta.

The bylaws to grant franchise to radial railway and franchise for Pintsch gas plant were carried.

Egmondville, Ont.

Tenders are being called until July 9th for the extension of telephone system or the Tuckersmith municipal system. Plans, etc., at residence of Thos. G. Shillinglaw, president, near this place.

Moose Jaw, Sask.

The bylaw to expend \$35,000 on extension of lighting system, was carried.

Nelson, B.C.

The \$31,000 contract for the second unit of the city's power plant at Upper Bonnington has been accepted. E. M. Breed is district manager for British Columbia, of the Allis-Chalmers-Bullock Company, the engineering company that built and installed the two units for the city.

Ponoka, Alta.

The ratepayers will vote on a bylaw on July 3rd to issue \$6,000 electric light and drainage debentures. J. A. Jackson, secretary-treasurer.

Prince Rupert, B.C.

An electric light plant to cost \$70,000 has been recommended. V. W. Smith, chairman of committee.

Peterboro, Ont.

It is stated that a well-financed company has bought the Healy Falls, Burleigh Falls and the Auburn (Peterboro) Falls. At Auburn a new concrete dam and power house will be built. The same syndicate has acquired the Peterboro Light and Power Company interests and also the Peterboro Radial Railway, and will build several miles of new street car tracks in the city and vicinity.

Sherbrooke, Que.

Preliminary work has begun at the site of the street railway's new power house.

Stettler, Alta.

This municipality is to install an electric light plant of which, it is stated, the John Galt Engineering Company have charge.

Seaforth, Ont.

The town council has decided to submit a bylaw to the people for the purpose of purchasing 400 horsepower electric current from the hydro-electric commission.

Vancouver, B.C.

Plans have been announced by the Vancouver Power Company, a subsidiary organization of the British Columbia Electric Railway Company, which contemplate the development of 100,000 horse power of electrical energy. To fully develop the two sources of power the B. C. Electric Railway Company will expend ten million dollars. The company has several engineering companies now in the field near the new sources of water power, and state that it is possible operations on the new plants will be started during the present season. Additions to the equipment will be installed as necessities demand.

Windsor, Ont.

The ratepayers decided to grant franchise to the Electric Distributing Company to bring Niagara power into Windsor.

AWARDED.**Seaforth, Ont.**

The contract for the large street transformers was awarded to the Packard Electric Company, of St. Catharines, and for the small transformers to the Westinghouse Company, of Hamilton.

Miscellaneous

Cornwall, Ont.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, will be received until June 30th for dredging Cornwall canal.

Hamilton, Ont.

Recent building permits include: Thos. Launders, two brick dwellings, Wentworth street, \$3,800; Chas. Brayley, three frame dwellings, Wilkinson street, \$3,600; Giles & Beck, brick dwelling, Locke street, for D. Forest, \$2,500; James Bryers, brick factory building, Queen street, for Laidlaw Litho. Company, \$4,100; Seymour & McKay, two brick dwellings, Burris street, \$3,000; Richard Quinn, two brick dwellings, Catharine street, \$3,400; Springer & Company, two brick dwellings, Birch avenue, for O. Guldhang, \$3,200; E. B. Patterson, five brick dwellings, Young street, J. M. Gibson, \$3,500; R. E. Jones, two brick dwellings, Wilson street, \$2,800.

Montreal, Que.

Tenders addressed to L. W. Senechal, secretary Board of Control, for the supply and delivery of lead pipe, pig lead and tin, and for the purchase of scrap iron, steel, lead, etc., were received until June 28th. Full information may be obtained at the office of the Board.

New Hamburg, Ont.

Tenders will be called up to July 18th by Wm. Millar, clerk, for the purchase of \$5,000 4½ per cent. debentures. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Outremont, Que.

Tenders for the purchase of \$200,000 4½ per cent. debentures for local improvements will be received until July 6th. J. Kruse, secretary-treasurer.

(Continued on page 29)

Tenders and For Sale Department

NEW HAMBURG

Debentures for Sale

Tenders will be received by the undersigned up to 2 o'clock p.m., JULY 18TH NEXT, for the purchase of \$8,000 4½ per cent. Electric Light Debentures of the Village of New Hamburg, payable in thirty equal annual instalments.

WM. MILLAR, Clerk.

New Hamburg, June 23rd, 1910.

28

For Sale

Steam Shovel

One Style "A" Marion Steam Shovel, 1¼ yard dipper capacity, about 45 tons working weight, in first-class condition, with new extra heavy reinforced boom, latest style new independent crowding engines, all thoroughly overhauled, the boiler just re-tubed. Can be inspected where it is now working. Offered subject to inspection and acceptance before shipment, and subject to prior disposition.

Apply

F. H. HOPKINS & CO.,
New Imperial Bank Bldg., Montreal.

24



To Contractors

Sealed tenders addressed to H. F. McNaughten, Secretary of Public Works, Parliament Buildings, Toronto, will be received at this department until noon of SATURDAY, JULY 9TH, for the marble work, tiling, roofing, including copper work, conductors, prism lights, and slating, etc., plumbing, heating ventilation electric wiring, plastering, painting and glazing, iron staircases and wrought iron work, in connection with the reconstruction of the west wing of the Parliament Buildings.

Plans and specifications may be seen and other information obtained at the office of the architect, E. J. Lennox, 164 Bay Street, Toronto. An accepted bank cheque, payable to the order of the Hon. the Minister of Public Works, for 5 per cent. of the amount of the tender and the bona-fide signatures and addresses of two sureties, or the name of a guarantee company, approved by this department, prepared to give a bond for the due fulfilment of the contract, must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance. The department will not be bound to accept the lowest or any tender.

J. O. REAUME,
Minister of Public Works, Ontario.

Department of Public Works, Ontario,
Toronto, June 22nd, 1910.

Newspapers publishing this advertisement without authority will not be paid for it. 26

Newmarket

Tenders will be received up to the evening of JULY FIRST for extension to Newmarket High School.

Building, 40 x 70; two storeys and basement; stone and brick; slate and iron roof; modern plumbing in basement.

Tenders will be received in a lump sum or separately for the various trades.

Plans and specifications may be seen on or after June eighteenth (18th) at the office of the architects,

O. E. TENOH,
Queen Street, Newmarket.

26

Sealed Tenders

marked "Tenders for Bridge," will be received by me at my office, in the County Buildings, in the Town of Cornwall, until 12 o'clock noon, of MONDAY, THE 18TH DAY OF JULY, 1910, for making the necessary excavation and the construction of a reinforced Concrete Arch Bridge over the River De Lisle, on the Military Road about one and one-half miles north of the Town of Alexandria, in the County of Glengarry; also the grading of approaches and the construction of wing-fences. The estimated quantities are as follows:

95 cubic yards reinforced concrete.

232 cubic yards excavation.

4¼ cubic yards rock excavation.

760 cubic yards grading.

342 feet of wing fence.

Plans, specifications, etc., may be examined and forms of tender procured at my office, or at the office of Magwood & Walker, Civil Engineers, Cornwall.

A marked cheque or cash deposit equal to 10 per cent. of the tendered price must accompany each tender.

The lowest or any tender not necessarily accepted.

A. I. MACDONELL, Counties' Clerk,
Stormont, Dundas and Glengarry,

27



Notice to Contractors

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, endorsed "Tender for Section No. 6, High Level Interceptor," will be received by registered post only, until noon of TUESDAY, JULY 26TH, 1910.

The sewer consists approximately of 1,340 lineal feet of reinforced concrete pipe sewer, 5 feet internal diameter, extending from Defoe street at Stanley Park in a northerly direction to a point about 500 feet north of Queen street.

Specifications can be obtained from and original drawings will be on file and can be seen at the Main Drainage Department, City Engineer's Office.

For the convenience of contractors, sets of blue prints have been prepared and will be issued to contractors upon the deposit of \$5.00, which amount will be refunded upon return of blue prints in good condition within thirty days of receiving tenders.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained. The lowest of any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto, June 23rd, 1910.

26

Canadian Pacific Railway

Central Division

Tenders are hereby requested for the construction of Piers, Abutments and Pedestals for Bridge over the Kaministiquia River at Fort William. Plans, specifications and forms of proposal can be seen at the office of the Engineer of Bridges, Montreal; Division Engineer, Toronto, and Division Engineer, Winnipeg. Proposals must be made out on the Company's standard proposal form, and sealed in an envelope, plainly marked "Proposal for Kaministiquia River Bridge, Fort William." These must be delivered at the office of the Division Engineer, Winnipeg, by 12 o'clock JULY 15TH. The right is reserved to reject any or all proposals.

(Signed) FRANK LEE,
Division Engineer.

28

Sealed Tenders

will be received by the Secretary-Treasurer for the Town of Yorkton, Sask., until 6 p.m., JULY 12TH, 1910, for the following:

Contract No. 1.

Construction of a Sewage Disposal Works for the Town of Yorkton.

Contract No. 2.

Construction of the following sewers:

Approximately 2,900 feet of 20-inch sewer.

Approximately 3,200 feet of 15-inch sewer.

Approximately 1,700 feet of 10-inch sewer.

Approximately 2,800 feet of 8-inch sewer.

Contractors may tender on either or both of the above. Plans and specifications may be seen and forms of tender obtained, at the office of the Town Engineer. A marked cheque for 5 per cent. of the amount of the tender must accompany each bid. The lowest or any tender not necessarily accepted.

F. T. McARTHUR,
Town Engineer.

Town of Yorkton, Sask.

27

City of Moose Jaw

Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A," "Tender B," etc., will be received by the undersigned City Clerk until 8 o'clock, p.m., on MONDAY, JULY 18TH, 1910, for the following:

Contract "A." Supplying material for and constructing Sewage Disposal Plant complete, and laying Trunk Sewer.

Contract "B." (1) Supplying and installing a complete Air Lift System; (2) Supplying and installing one electrically-driven Centrifugal Pump and Auto Starter.

Contract "C." Supplying and delivering 3,000 cords of Field Stone.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw, and also at the office of the "Canadian Engineer" at the following addresses:

Toronto, 62 Church Street.
Montreal, B38 Board of Trade Building,
Winnipeg, Room 404 Builders' Exchange Buildings.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer. W. F. HEAL, City Clerk.

Moose Jaw, Sask., July 16th, 1910.

28

Board of Education

Tenders Wanted

Sealed tenders, addressed to the Secretary-Treasurer, will be received until

Monday Noon, July 4th, 1910

for the several trades required in the

**ENLARGEMENT OF HOWARD SCHOOL,
ALTERATIONS TO PAPE AVENUE SCHOOL,
MIDSUMMER REPAIRS,
IRON STAIRS FOR SUNDREY SCHOOLS;**

also for

**SCIENCE APPARATUS AND SUPPLIES,
FLAGS,
EXPRESSAGE.**

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, Chairman of Committee. W. C. WILKINSON, Secretary-Treasurer. 26

Toronto June 28, 1910.



Department of Railways and Canals, Canada

Quebec Bridge

Tenders for

Superstructure

Notice to Contractors

Sealed tenders, addressed to the undersigned and endorsed "Tender for Quebec Bridge Superstructure," will be received at this office until 12 o'clock noon, not later than SEPTEMBER 1ST, 1910, for the superstructure of a Bridge across the St. Lawrence River near the City of Quebec.

Plans and specifications may be seen and forms of tender obtained on and after July 1st, 1910, at the office of the Quebec Bridge Board of Engineers, Canadian Express Building, Montreal, and at the Department of Railways and Canals, Ottawa.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$500,000, made payable to the order of the Minister of Railways and Canals of Canada, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted and in accordance with the terms stated in the form of contract accompanying the specifications.

Cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The lowest or any tender not necessarily accepted.

L. K. JONES, Secretary.

Department of Railways and Canals,
Ottawa, 17th June, 1910,

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 28

Department of Railways and Canals

Hudson Bay Railway

Saskatchewan Bridge

Notice to Contractors

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Superstructure of La Pas Bridge," will be received at this office until 12 o'clock noon of the 4TH DAY OF JULY, 1910, for the construction and erection of the Superstructure of the Bridge, over the Saskatchewan River on the line of the Hudson Bay Railway.

The Bridge will be composed of a Swing Span of 262 feet and four fixed spans of 147 feet each. Plans, specifications and form of contract to be entered into may be seen, and full information obtained on and after this date, at the office of the Chief Engineer, of the Department of Railways and Canals, at Ottawa, Ont., or at the office of the Chief Engineer of the Hudson Bay Railway at Winnipeg, Man.

Tenderers must submit designs of superstructures with stress sheets, all to be in accordance with the general specifications for steel superstructures of bridges and viaducts of the Department of Railways and Canals of the Dominion Government, 1908. The class of load to be used is that designated "heavy" in the said specifications.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$10,000, made payable to the order of the Minister of Railways and Canals, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,

L. K. JONES,

Secretary.

Department of Railways and Canals,
Ottawa, 20th June, 1910,

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 26

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE—One 50 h.p. return tubular boiler; one 45 h.p. high and low pressure engine. Formerly run planing mill. Also several other boilers and engines of different sizes. THE EVANS COMPANY, Limited, Sudbury, Ont. 26

FOR SALE—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 foot x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail. —WM. LESSLIE, Walkerville, Ont. TF

It is reported that Isenberg & Abramovich, builders, Winnipeg, Man., have dissolved.

Menard & Falstrault, lumber manufacturers, Longue Pointe, Que., Arthur Menard and Victor Falstrault, registered.

Claresholm Lumber and Grain Company, Limited, Claresholm, Alta., name changed to Western Canada Grain Company.

Miscellaneous

(Continued from page 27.)

Ottawa, Ont.

The city bonds total \$471,707, and include \$100,000 for the civic electric plant, \$210,000 for local improvements, \$60,000 for the city hall renovation, and \$30,000 for fire stations. The school debentures amount to \$148,800.

Recent building permits include: Miss V. Lees, frame dwelling, Riverdale avenue, \$2,500; F. Wilson, brick veneer dwelling, Mutchmor street, \$3,000.

Tenders have been called for the construction of the first units of the Canadian navy. It is stipulated that the vessels must be constructed in Canada. It is made clear that none but British firms, either Canadian or English, shall be allowed to compete; and it is also stipulated that the vessels must be constructed on the sea coast, which gives the quietus to any aspirations which lake ship builders might have had for competing. The department calculates that the increased cost of construction in Canada will be at least 25 per cent. over the cost if built in Great Britain, but it is felt that this will be compensated by the industrial development which will follow the introduction into Canada of a number of expert shipbuilders.

Quebec, Que.

The Department of Public Works is asking for tenders for dredging River St. Charles, to be received until July 5th. Specifications, etc., obtained on application to the assistant secretary, Department of Public Works, Ottawa.

Winnipeg, Man.

Recent building permits include: R. G. Owens, house, east side of Chestnut, \$3,500; D. R. Dingwall, dwelling, north side of Harvard street, \$8,400; E. G. Evans, dwelling, east side of Chestnut street, \$3,500; Parcor Bros., three houses, north side of Dorchester street, \$12,000; B. Kessnikoff, store and dwelling, north side of Selkirk avenue, \$2,800; Moss-Hutton Company, three houses, west side of Lipton street, \$3,700; Foley Bros., additions to warehouse, north side Market east of Main, \$20,000; J. C. McNab, double dwelling, west side Ruby, \$5,000; J. Matthews, six dwellings, north side Morley, \$18,000; Smith & Kirkpatrick, two dwellings, west side of Arlington, \$8,000; Mrs. J. P. McCrum, three houses, north side Grosvenor, \$9,000; H. Halderson, four houses on Horne street, \$12,000; H. Galbraith, five dwellings, Basswood place, \$15,000; Newton Stewart, dwelling, southwest corner of Shesnut and Buel avenue, \$8,000; L. Rosenblatt, terrace, Alfred avenue, between Brown and Sinclair, \$2,500; C. Russel, two dwellings, Lipton street, \$2,850; T. Eaton Company, shipping shed, Donald street, \$4,000; A. C. Stewart, house, northeast corner of Bucklin Row and Park road, \$15,000; H. P. H. Galloway, alterations to dwelling, 661 Broadway, \$6,500.

AWARDED.

St. John, N.B.

It is understood that A. & R. Loggie, the lowest bidders, have been awarded the contract for dredging in Miramichi Bay at 11 cents per yard. Over 1,000,000 yards are to be removed.

Walkerville, Ont.

O. McKay, C.E., writes that the contract for dredging for the Little River drain, has been let to the Detroit Dredging Company for \$5,640, and a further sum of \$500 for moving two bridges. The total length of dredging is about 1 5-8 miles. The quantity, 56,500 cubic yards.

Pile Driver Electrically Operated

The application of electricity in the building trades is becoming greater and the portable or semi-portable steam engine is yielding in part to the electric motor. The small size for a given horse power of the electric motor, its portability, flexibility in operation, readiness to start or stop at any time without trouble, economy in working both in current consumption and cost of attendance, are all in its favor.

One of the latest applications of the electric motor, that of operating a pile driver, has recently been introduced with success by an English firm. This apparatus is fitted with a revolving frame and swivel leaders.

The mechanical gripping device for the monkey is replaced in this electric pile driver by an electro-magnet, the top of the monkey being made smooth and level to afford a good contact surface. The hoisting crab is operated by an electric motor the circuit of which also includes the magnet, the switch for the latter being attached to the crab.

The whole arrangement is decidedly neat and workmanlike, and the many advantages of the electric pile driver will undoubtedly bring it into favor with contracting engineers.

Reinforced Beams and Girders

Reinforced concrete girders, beams and slabs should be designed in accordance with the following assumptions and requirements, says Mr. P. T. Leshner in "The Building Age."

1. The adhesion or mechanical bond between the concrete and steel must be sufficient to make the two materials work together as a unit.

2. The common theory of flexure is to be used.

3. The steel to take all the tensile stresses.

4. Where the upper flange of a beam or girder is a T-section, with a portion of the slab acting as the flange, the width of this slab flange shall not exceed 20 times the thickness of the slab.

5. The junction between the beam or girder and the slab must be of sufficient section or strength for the horizontal shearing stresses, or flange increment taken by the slab. If necessary, stirrups or other metal reinforcements may be introduced to accomplish this purpose.

6. Particular care must be taken so that the slab portion of the T-section of a girder may not be required to act also as a slab, without careful consideration and provision for not exceeding the safe compression on the concrete acting jointly for both purposes.

7. All concrete beams and girders should be made of stone or gravel concrete. All slabs, excepting those between steel beams or girders, not exceeding 8 feet centre to centre, should also be made of stone or gravel concrete. Slabs under 8-foot span between steel beams or girders may be made of cinder or slag concrete.

8. The concrete for the girders, beams, slabs, and columns should be what is known as a "wet mixture," and should be in the proportion of approximately one part Portland cement, two parts sharp sand or gravel, and four parts of broken stone or gravel of the proper size. The stone should be of such size that it will pass through a 1-inch ring, and at least 25 per cent. of the stone should pass through a 1/2-inch ring. The gravel should be of a corresponding size.

9. The minimum thickness of concrete outside of the reinforcing members of beams and girders should be 2

inches on the bottom and 1 1/2-inch on the sides of the beams or girders. The minimum thickness of concrete under slab rods should be 1-inch.

10. Reinforced concrete girders, beams and slabs should be calculated and designed for upper and lower flange stresses, vertical shear, horizontal shear, and proper adhesion or mechanical bond between the (steel or iron) reinforcement and the concrete.

11. In testing concrete construction it is usual to make the test with twice the live load. That is, if the live load per square foot of floor is 150 pounds, it is usually sufficient to test the construction with 300 pounds live load. This keeps the test within the elastic limit of the materials.

Cleansing Soot from Stonework

Mr. John Mortimer, an old-time Scotch stonecutter, writing to "Stone" says:

"I had some experience in cleaning smoke and soot from house fronts in Dundee, Scotland, sixty years ago. At that time I counted ninety chimney stocks in that town (it is a city now), from the lower hill above the town, so that I presume it was one of the smokiest towns in Great Britain, and a fitting place in which to find a real sooty house front on which to operate. Our employer was John Barrie, who kept a monumental yard and general jobbing shop at the head of Reform Street, and was a real genius for invention and knowledge of stone in its relation and affiliations with other substances and their action and reaction on each other. We were sent to clean a house in Wells street. It was a blue freestone, generally of six or eight-inch ashlar, rather black with sooty matter and also encrusted with a gray moss generated from the sea dampness from the River Tay, on whose northern bank the city stands.

"To remove the sooty matter we used only 'spirits of salt,' or what is now known as ammonia, and clean water. We used a shallow iron vessel with a handle, for the ammonia, so that we could hold it near the stone, while we wet the stone with a rag on the end of the stick, as it is best to keep the hands clear of the fluid. The stone steamed a little on the application of the ammonia, and all the dirt became loose in a few minutes, so that it could be washed off with a rag and clean water. As to the removal of the moss, that was more difficult, and it frequently had to be cut off with a chisel. But I presume that is a matter foreign to this inquiry."

Does Steel Embedded in Concrete Rust?

The effect of concrete in preventing the rusting of steel embedded in it has been the subject of so much controversy that the light thrown on the matter by the electrolytic theory of corrosion is instructive. According to this theory, iron can pass into solution only when an equivalent amount of hydrogen passes from the ionic to the gaseous state, and if the hydrogen concentration is reduced the rusting of the iron will be diminished. This is achieved by adding a strong alkali to the water which is in contact with the steel. According to Dr. W. H. Walker, the caustic lime given off by Portland cement in setting and hardening has this action, and iron or steel embedded in concrete will not rust so long as this caustic lime is present. Unfortunately it is soluble in water, and it is therefore desirable to make the concrete containing steel reinforcement very dense since by so doing the protective properties of the concrete will be maintained for the longest time.

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Wanted—An Expert to Plan a Greater and Better Toronto

Toronto, mainly owing to its natural advantages, is called the "Queen City." Toronto has a population of 350,000, which in another decade will be 500,000. Toronto has wealth within its borders. Toronto has the example of other cities—and she has a committee selected from the Guild of Civic Art and City Council that has done practically nothing but *discuss* improvements the carrying out of which is absolutely vital to the city's future.

One cannot help wondering why Toronto is so short-sighted, why so lacking in initiative. Of what use are advantages, natural or otherwise, if there be not the ability to turn them to their best use; or of opportunities, if those to whom the chance come, have not sufficient ambition to grasp them?

If Toronto does not pretty soon get busy on some enlightened system of civic improvement, the next generation, coping with a task that will have become colossal in comparison with the present one, will anathematize roundly the unpardonable stupidity of their predecessors in having no more regard for posterity than to defer the day of expansion in face of such development.

The problem before Toronto to-day is one that must neither be botched by speculators nor fooled with by amateurs. It is one the proper solution of which can only be worked out by an expert, whose skill is attested by neighboring cities.

Now, why Toronto does not engage such an expert and get something visible and attractive for the citizens to ponder over is hard to understand. The people of Toronto know they have a great city, and one with a greater future, and they will support any good scheme that works systematically, year by year, for a Greater and Better Toronto. Why not get a start on a good plan right now and take Time by the forelock?

There has been enough discussion about the cleaning

up of narrow streets, the laying out of new boulevards and parks, the widening of thoroughfares, provision of better transit facilities, playgrounds and so on. It is time now that something was doing—and Toronto is big enough and, in some respects, *ugly* enough to know it.

The Speculative Contractor

The contractor, in his time, like all the rest of humanity, plays many parts—including that of the speculator. How far does and should the element of chance enter into the business? Perhaps it would be better to ask, firstly, What are the desired qualifications of a contractor? To become a success at the business it is necessary to possess, besides engineering knowledge, keen financial views and business habits; and, what is equally important, the power to resist the temptation of accepting a contract merely because some money will at once be forthcoming which may be useful to patch up the financial liabilities of the last engagement.

It is a great question whether many speculative contractors have retired as rich men. Those who have secured the great prizes in contracting have been those who, whilst, perhaps, taking a few shares in an undertaking because they could not very well help it, have yet generally managed to leave the profit safe to cover even a loss of 50 per cent. on their shares. Yet the speculative contractor seems to some extent to be a necessity, for as enterprise among the public languishes, and the subscriptions to new schemes become less and less in amount, the more shares the contractor has to take up to float the company, and thus many works have been executed the shares of which have afterwards been sold to the public, and finally have risen to a premium. But this is naturally a dangerous game, for the contractor no longer remains a contractor, but a speculator, and this under very peculiar circumstances, for it is his desire to secure the contract which makes him take the shares, and not at all the enterprise. He hopes to sell his shares, and therefore becomes accustomed to treating in these matters quite irrespective of whether the enterprise is likely to be remunerative or not, hence he no longer views schemes with the critical eye with which he would view them if he were merely going to speculate in their success or failure as commercial undertakings. Here he digs his own pit, becoming so accustomed to taking up anything in which he sees a contract, that he at last takes up something which proves an engineering and commercial failure, and is thus left perhaps to bear the whole loss on his own shoulders.

No doubt many useful works have been carried out by contractors thus taking upon themselves the principal weight of the speculation, but it is doubtful whether, if the good and evil of the system could be measured, the balance would not be on the evil side, and whether if contractors looked to pure contracts with cash payments more, we should not see less of those schemes carried through which eventually lead to a great waste of money. Because, although perhaps not exactly objectionable in themselves, these schemes are launched at a wrong time, the contractor taking as payment shares which are created for a much larger nominal capital than would be required if the capital were all subscribed by the public and the contract let for cash to the lowest tenderer. These companies rarely get their shares to par, and very often end in a total failure. Still, to our contractors with their energy, skill and enterprise, we owe much, and there are many who have passed away whose principles and practice may with honor be followed by those of the rising generation who intend to adopt the business.

Waterworks Extension at Owen Sound, Ont.

Details and Plans of Unique and Economical Scheme—Complete Supply Obtained by Gravitation—An Increased Pressure of 24 Pounds

The present water supply at Owen Sound is obtained by gravitation from springs having their source from the Sydenham river, and affords a maximum pressure of 70 pounds. The amount of water available is 650,000 gallons a day, the actual consumption of the town. With the developments of the last few years and with the constantly growing demands of an augmented population, it has become necessary to have a considerably increased supply. In order to obtain this, and as no more springs are available, recourse has been had to retaining the present supply from Inglis Springs for use in the valley and in bringing, from the Sydenham river, an increased supply under higher pressure as a domestic

leads from the sedimentation basin to the filter beds, the water flowing by gravity. From the filter beds the water will be carried by an 18-inch main down the travelled road, a distance of 2,900 feet. At this point a roadway leads westerly to the present springs. A "T" and shut-off valve will be placed here for future connection with the present 12-inch main leading from the springs. On 8th street a 12-inch main will be laid easterly, along 8th street, to the new reservoir. This main will be connected to the present system at two points, one at 10th street and the other at 8th street.

In one of the accompanying views Mr. McDowall's assistant is shown weiring the flow of the stream. In



Filter Beds in Course of Construction



Weiring Flow of Stream

supply on the hills, also for street watering and flushing purposes in the valley, and, in case of fire, as a high pressure system through the town. The Sydenham river has a drainage area of 70 square miles and is fed by springs. The river has neither towns nor villages on its banks and flows through purely agricultural country.

A brief description of this work, which is now under construction, will doubtless be of interest to many of our readers, inasmuch as a system of this kind for a town of 12,000 population is, in Canada at least, a somewhat unique proposition. From an economical standpoint the people of Owen Sound may well congratulate themselves upon the natural advantages of their location, which have enabled them to dispense entirely with pumps and, incidentally of course, the expenses connected therewith.

In acquiring the riparian rights of owners of mill privileges on the Sydenham river, the damages were arrived at by arbitration. The total amount disbursed in this connection was \$15,000.

In order to conduct the water into the filter beds, a sedimentation basin, containing two million gallons, has been formed by the construction of a dam across the river, 1,100 feet from the filter beds. A 24-inch pipe

the construction of this dam it was found necessary to resort to coffer-damming. Two coffer-dams were erected, one section at a time over either half of the stream. The dam is of concrete built on the solid rock, a channel 18 inches deep being excavated in the bed of the stream to form the foundation.

The water from the river has been analyzed and found pure, but in order to eliminate all danger of bacterial germs reaching the watershed it was found advisable to have a filtration system. Under this system the river water is passed through two slow sand filtration beds. The area of each bed is one quarter of an acre, and the filtration capacity two million gallons per day. These beds are situated four miles from the centre of the town of Owen Sound.

A main water pipe of 18 and 12 inches diameter leads from the filters to the reservoir. The reservoir is situated within the town limits and has a capacity of five million gallons. The elevation of the filter beds above the harbor in Owen Sound is 290 feet and of the reservoir 240 feet. Under the new system, when the present extensions are completed, the town will have a maximum pressure of 100 pounds.

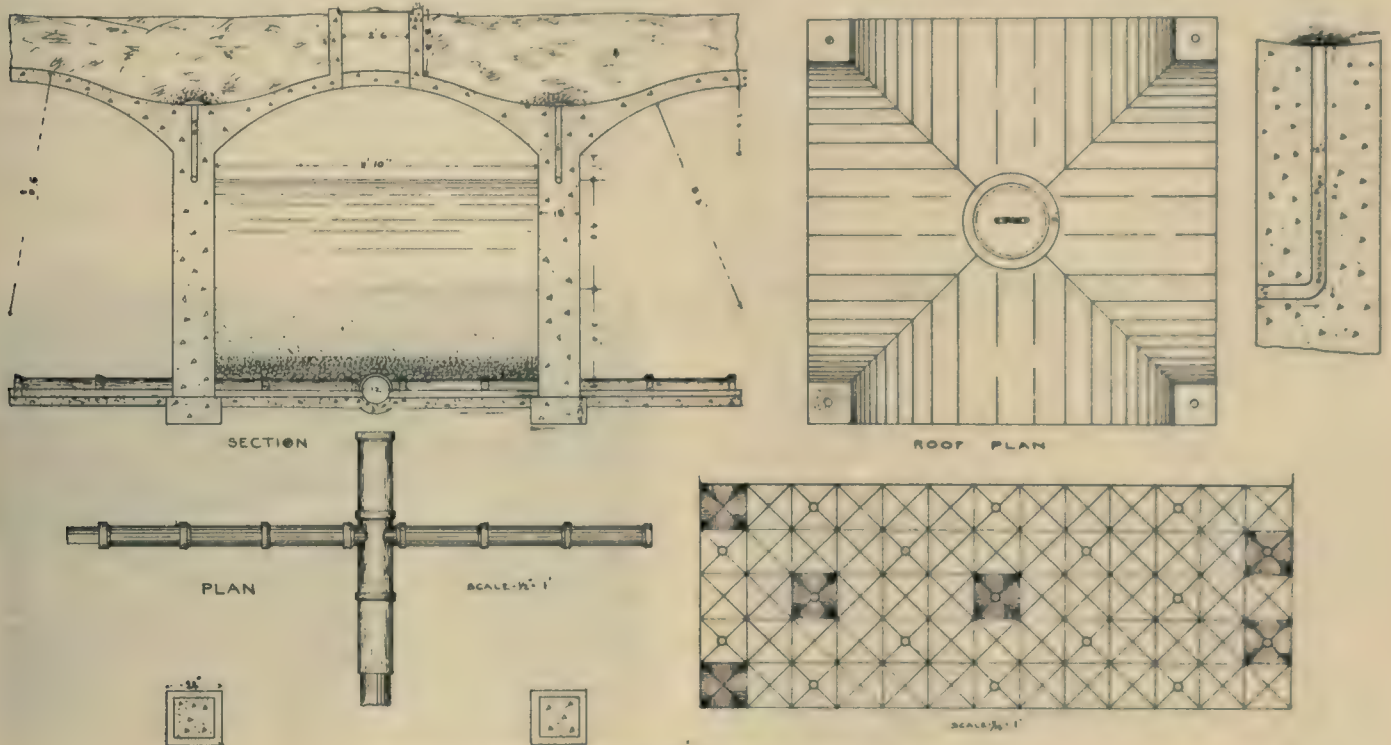
The filter beds are to be built entirely of concrete—

walls, floor, columns and roof. The excavation for the filter beds proved to be sand for 9,000 cubic yards and rock for 700 cubic yards. A circumstance which is somewhat gratifying to the engineer is that the foundation for the beds is solid rock throughout. The roof of the filter beds will be grooved arches and covered with two to three feet of earth. Upon the floor will be a grid-iron of vitrified tile, ranging from 12 inches to 6 inches in diameter. The tile will be laid with open joints. Over the floor and the grid-iron of pipes will be laid a layer of one foot of broken stone thoroughly washed; and upon

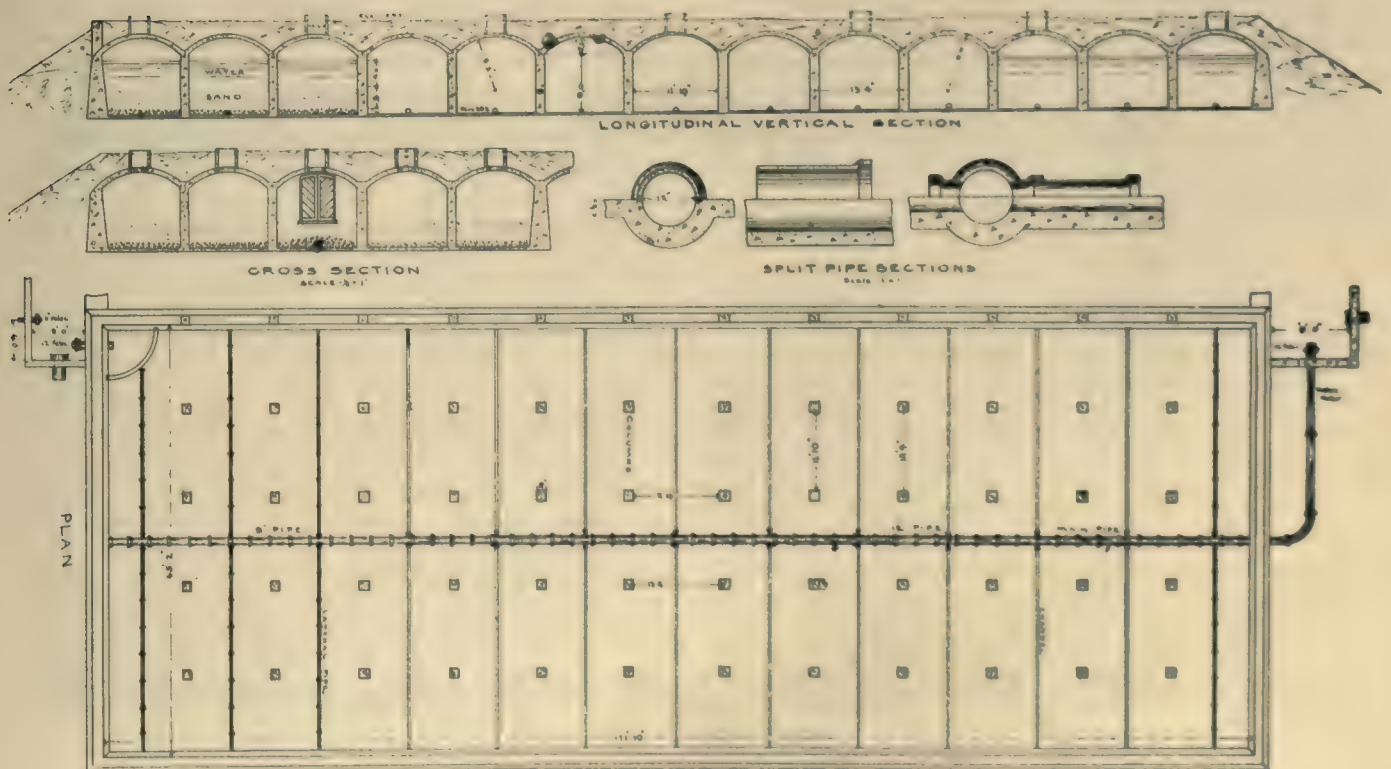
the layer of stone, a bed of sand three feet in depth. The water to be filtered will cover the sand layer to a depth of four feet. The maximum daily filter capacity is placed at two million gallons.

An explanation of the filtration process is scarcely necessary. Suffice it to say that the water percolates slowly through the sand layers. From the filter the water passes downwards through the beds and into the pipes, thence into a collecting basin and from there to the main, leading to the town.

Loss of head gauges and rate of flow gauges will be



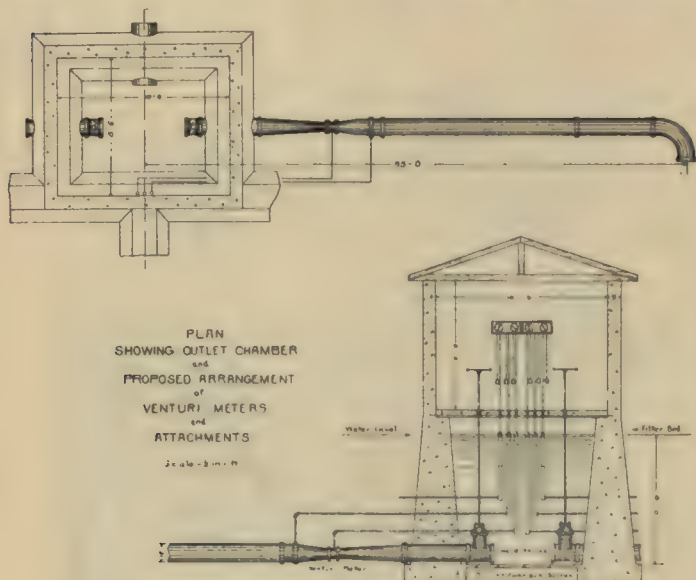
Plan and Details of Filter Beds, Owen Sound Waterworks



installed in the collecting chamber. When the loss of head gauge shows four feet the percolation is too slow and the filter requires cleaning. The rate of flow gauge registers the amount of water filtered.

Both the filter beds and the reservoir are being built in two separate units so that one can remain in use while the other is being cleaned. In cleaning a filter bed one-half-inch of the top surface is shovelled off with flat shovels and the sand wheeled away and washed. The bed will then require to be renewed to its original depth of four feet. The cost of cleaning filters is about \$1.65 per million gallons filtered.

Good progress has been made with this work. Operations were commenced last summer and there is every prospect that the whole project will be completed by the end of August. At present the excavation of the filter beds is completed and the columns are nearly finished. Work will be commenced shortly on the roof.



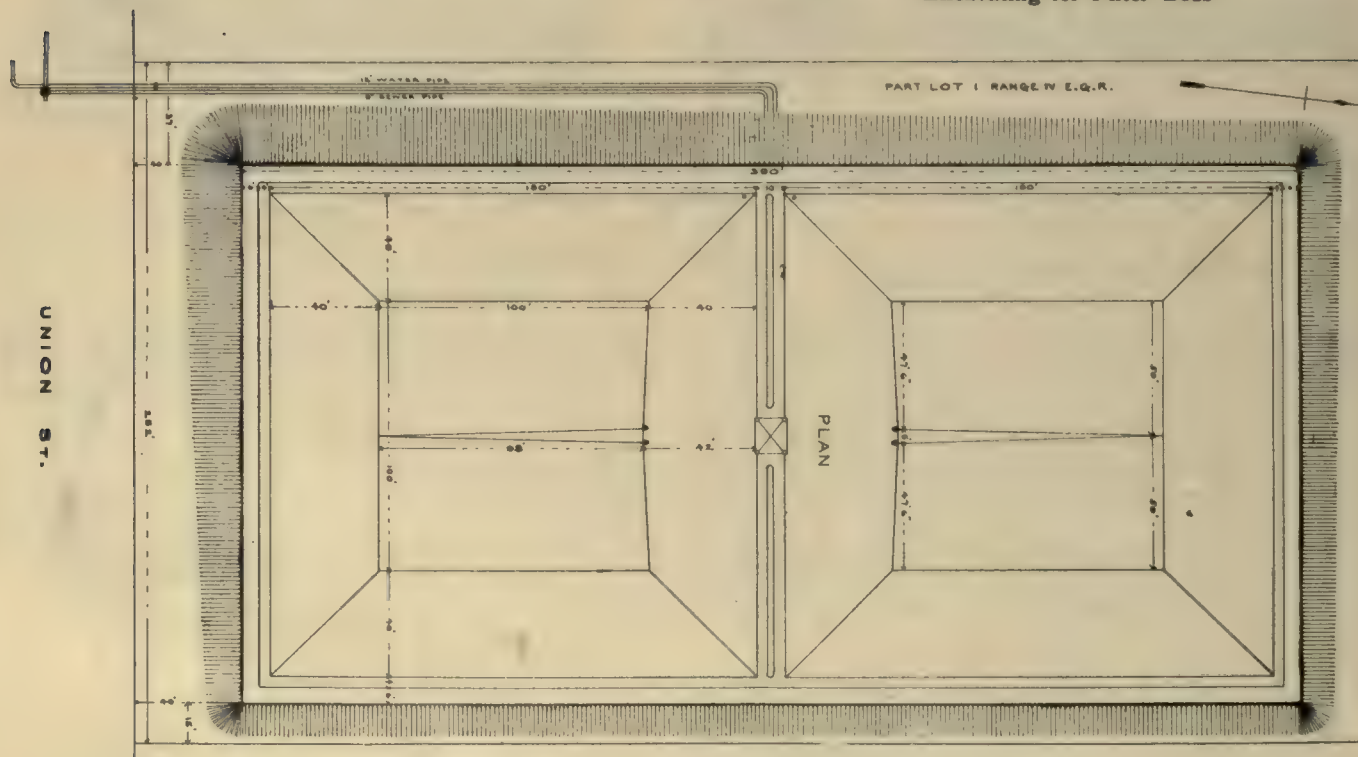
At the reservoir, the excavation has been completed and concrete work is now under way.

The capacity of this reservoir will be five million gallons. It is being built in two parts, each having a capacity of 2,500,000 gallons. The sides of the reservoir will be of earth embankments, one-half ten feet excavated and the other half filled. The floor and side slopes will be lined with six inches of concrete with clay puddle at the back. A valve chamber is installed which will contain a system of valves for governing the flow of water, and opening, filling or emptying either or both of the separate reservoirs. An overflow pipe will be laid from both portions to the sewer so as to have at all times a current flowing in and out of each compartment.

The additional fire pressure which these extensions will give the town will be a valuable asset to Owen Sound. The present extensions will increase the pressure throughout the system 24 pounds. At 10th street and 2nd avenue, where the present pressure is 74 pounds, it will now be increased to 98 pounds per square inch. In case of fire in any part of the town where higher



Excavating for Filter Beds



Reservoir, Capacity 5,000,000 gals.—Owen Sound Waterworks

pressure or an increased quantity of water is required, the hydraulic valve at 8th street and 2nd avenue is opened at the fire hall by turning a small hand valve. The whole system will then be connected with the new reservoir and new supply, and will be cut off entirely from the present system. The fire out, the valve is closed and the system returns to the supply from the springs. During the progress of the fire and until the pipes are emptied, the system will be using Sydenham river water.

The total estimated cost of these extensions is \$107,000. In a later issue we hope to deal with the remaining stages of the work and to publish detailed costs, which will doubtless be of interest to the engineering profession.

The whole work was planned and is being carried out under the personal supervision of the town engineer, Mr. R. McDowall, C.E., to whom we are indebted for many courtesies upon a recent visit to the scene of operations.

Methods of Washing Filtering Material*

For washing of contact clinker beds after being in use for about five years, the washing plant used may be briefly described as follows: It consists of a movable washing tray and riddle, with inclined screens for grading the material, and which is actuated by steam. The ashes are brought from the beds, and are tipped on an elevated platform approached by an inclined roadway or may be elevated by other means and tipped into the jigg-riddle (actuated by a vertical eccentric shaft) which has the first part so made as to retain the ashes and water. The water is applied here until the jigg-ing or shaking motion, assisted by bafflers, removes the undesirable matter which the medium contained and which becomes of the same consistency as very liquid sludge. As the material passes on and over a perforated portion so constructed to suit the sizes of media required, water is sprayed on, and so rinses or thoroughly swills away the sludge along with the material which can pass through the size of mesh. This sludge and water immediately drops on to another inclined plane of corrugated iron, and then on to a smaller mesh wire gauze which retains the smaller particles, say $\frac{1}{8}$ -inch, and by a mechanical contrivance carried into a wagon ready for removal. The larger material which has had the sludge and fine media removed, which passing, say, a $\frac{1}{4}$ -inch mesh, passes on to an inclined grating formed by parallel bars, say, 2 inches apart, or whatever size is required, the larger material passing on, and the smaller (say less than 2-inch) passing through into a wagon ready for removal, as before described. The fouled media is therefore not only washed, but graded into three different sizes, each size being placed into a different wagon. The sludge and fouled washing water passes from the washer into a wagon which retains the heavier matter which it contains, while the water and light sludge overflows and passes away by means of channels into specially constructed pits or tanks, where the sludge readily settles, and can be drawn away without disturbing the working of the tanks. The sludge, on being drawn away by means of valves, is conducted to the ordinary sludge channel, and is of the consistency of sewage sludge. This sludge, I may say, readily presses. The water may be used over and over again (if required) after passing the tanks.

The machines are made by Messrs. Ransome, Ver Mehr Machinery Company, Caxton House, Westminster,

who describe it as a machine for washing and simultaneously grading all classes of material used in the various districts for sewage filtration.

Methods and Cost of Cleaning Sediment from Waterworks Reservoir

The reservoir, known as Reservoir No. 1 of the Cincinnati, Ohio, waterworks, had been in constant service for over two years. It was taken out of service on March 20, 1909, and allowed to stand for four days in order to allow complete sedimentation before drawing the water. The original turbidity of the water was 75 parts per million; after four days it was found to be 47 parts for a depth of 80 feet and 50 parts at a depth of 40 feet. On March 30th the water was drawn off for a depth of 3 feet during the night and allowed to stand during the day, when the mud was washed off the exposed slopes by hose streams under pressure of flushing pumps in the wier house. The following night the water level was again lowered to stand during the day, when the slopes were washed down. This procedure was repeated every 24 hours until April 9th, when the water had become very turbid. The 30-inch drain was then opened, drawing off all the water and such mud as it carried. The deposit of mud remaining on the slopes and bottom was then disintegrated and slid to the drain opening by means of $1\frac{1}{2}$ -inch hose streams under heavy pressure. The depth of accumulated mud was found to be from 12 inches to 36 inches, and the total amount removed was estimated as 30,000 cubic yards. Some 35,494,600 gallons of water were wasted in draining the reservoir and 16,902,600 gallons were used for removing the mud, or about 565 gallons per cubic yard of mud removed. The cost of cleaning was as follows:

16,902,600 gals. water, at \$3.28 per mil. gals.....	\$ 55.44
22,032 k.w. electric power, at 1.1 ct.....	242.36
Labor operating pumps	57.94
Labor cleaning reservoir	427.27
Total	\$783.01

The cost per cubic yard of mud removed was, for cleaning proper, 2.61 cents. Charging in the 35,494,600 gallons of water lost in draining the reservoir at \$3.28 per million gallons we have an additional item of \$116.42, or 0.39 cent per cubic yard, making a total cost of 3 cents per cubic yard. The cleaning was completed May 1, 1909, and water was turned back into the reservoir on May 8. These data are computed from figures given in the report of Geo. H. Benzenberg, chief engineer, water works, Cincinnati, Ohio.

A fire in an ornamental gable in a Milwaukee public school building recently has led to the decision not to use gabled roofs in public schools there hereafter. The fire is supposed to have started at about the second floor, and to have followed through the walls to the garret, where it was exceedingly hard to handle, being filled with supporting timbers of various kinds, making it almost like a lumber yard. This sort of adornment is therefore to be banned hereafter.

The Prince Rupert Board of Trade has sent a protest to the Dominion Government respecting the regulations governing the immigration of labor. They contend that to shut out all aliens who come from the States, or who do not come direct from their native land on a "through ticket," will injure Prince Rupert and greatly retard the work of completion of the Grand Trunk Pacific.

*Extracted from a paper by A. B. Ogden, read before the Institute of Sanitary Engineers.

Data on Steam Roller Practice of English County Councils

In a recent issue of the "Surveyor" (London), Mr. Walter J. Fletcher, county surveyor of Dorset, gives some data on the general practice of English councils as to steam road roller work. The following extracts may be of interest:

Buckinghamshire owns six rollers, the initial cost being \$2,480 each for a set consisting of roller sleeping van, water cart and scarifier. The average cost of rolling is 22 cents per cubic yard, this including attendants, fuel, repairs and water carting. The average numbers of day's work per year per roller is 200. This county also lines rollers to assist in its work.

Bedfordshire owns four steam rollers, the initial cost being \$2,480 for a set consisting of roller sleeping van, water cart and scarifier. The rollers are worked from the beginning of November to the end of June. In addition the county council hired rollers the past year for a total of 429 days at \$4.80 per day.

Carnarvonshire owns three steam rollers. The initial cost was \$2,644 for rollers, sleeping, two water carts and road wagon. The set of three rollers and plant cost \$7,932. The total yearly cost of the upkeep was \$3,645, including driver's wages, repairs to rollers, fuel and oil. This is \$1,215 per roller per year. Coal cost \$4.32 to \$6.24 per ton. The rollers were worked all the year round except when undergoing repairs and during frosty weather. Cheshire county owns four rollers, the initial cost being \$2,678 for rollers, sleeping vans, water cart and hose. The total yearly cost of upkeep is \$1,458 per roller, this including wages, fuel, interest and depreciation, etc. The rollers are worked all the year. During the past year the county council also hired rollers at a cost of \$1,458.

Durham county owns two sand rollers, the initial cost of the plant being as follows:

Two 15-ton compound steam rollers	\$4,991
One Morrison scarifier	428
One traction wagon	170
Two water carts	257
One sleeping van	267

The total cost of upkeep per year is about \$1,215 for each roller, this including depreciation, repayment of capital and interest, driver's and assistant's wages, repairs, fuel and water for rolling. The coal costs \$2.88 to \$3.48 per ton. The council also hires rollers at \$5.40 per day, this including driver's wages, fuel, oil, stone, water and use of water cart.

Derbyshire owns seven rollers, a plant consisting of roller, scarifier, water cart and sleeping van. The average cost of upkeep in 1909 was \$1,157 per roller, this cost including wages, fuel, repairs, etc. The driver was paid \$1.20 per day and the flagman 84 cents per day. Coal cost \$3.84 to \$4.32 per ton. The rollers are worked all the year, being stopped only in the case of frost and snow. The council also hires additional rollers, paying \$4.32 per day and furnishing fuel.

Essex county owns ten steam rollers. The average initial cost of a roller with scarifier attached is \$2,040. Sleeping vans cost \$243 each and coal wagons cost \$97 each. The working expenses for the year ended March 31, 1909, were \$9,370, or \$937 per roller. The rollers are worked practically all the year, being idle only for cleaning purposes. The county also spent for the year over \$17,000 for hired roller.

Gloucester county owns 18 steam rollers, the initial cost of the plant, including rollers, water carts, Dobbin carts and pumps, being \$45,684. The cost last year of working 17 rollers was \$19,027, or \$1,119 per roller.

This cost includes wages, fuel, etc. The cost of coal varied from \$2.88 to \$6 per ton. The rollers are worked all the year, except when idle for repairs. Practically all of the rolling is done by the rollers owned by the county; but rollers are occasionally hired at \$5.88 per day.

Kent county owns ten 12-ton compound steam rollers, the initial cost of the rollers being \$23,814, or \$2,381 each. The vans cost \$2,695. The average daily cost of working the rollers, including repairs, coal, waste, scarifying, driver and attendant is \$4.80. The average cost of coal is \$5.28 per ton. The rollers are worked the year round. About 9/10 of the rolling in this county is done by county rollers. Rollers are hired at about \$5.40 per day for the rest of the rolling.

Middlesex county owns three steam rollers. The initial cost of a single cylinder roller with Morrison's scarifier was \$2,480. The total cost of rolling, including sweeper, in this county, has been 30 cents per ton. Coal costs \$3.12 to \$4.20 per ton. The cost of operating the rollers has been about \$3.84 per day. The county also hires several rollers, paying \$5.76 per day.

Notts county owns four steam rollers, the initial cost of the plant being as follows:

Rollers, each	\$1,700
Sleeping van	237
Watering cart	143

The total number of tons consolidated by the rollers was \$6,858, the cost per ton being 17 cents. The four rollers worked 1,211 $\frac{3}{4}$ roller days during the year, the average cost per day being \$5.19. Coal cost from \$2.64 to \$3.84 per ton.

Northamptonshire county owns two rollers and has one other on order. The initial cost of the roller plant was as follows:

12 $\frac{1}{2}$ -ton compound roller	\$2,040
Scarifier	340
Travelling van	364
Two water carts	267

The average cost of upkeep per year, including wages, fuel, repairs, etc., has been \$875. Coal has averaged \$3.60 per ton. In this county one roller serves for 90 miles of road. The average number of tons rolled per year is 9,000 for each roller. This would make the cost of rolling about 9 cents per ton.

Norfolk county owns 12 rollers, the initial cost of the roller being \$20,200. The average cost of the upkeep per year for the 12 rollers for the past six years has been \$2,410. The average cost per year of each roller has been \$212.

Staffordshire owns seven steam rollers. The initial cost of the plant, which includes seven rollers, six coal wagons, six sleeping vans, 12 water carts and six roller sheds, was \$19,000. The average cost of upkeep per year of the plant, including wages, repairs, fuel, etc., has been \$6,850, or about \$978 per roller. Coal costs from \$3.84 to \$4.08 per ton. The rollers are worked all the year, except when stopped by frost or repairs. It should be borne in mind that wages in England are much less than in this country, roller engineers receiving about \$1.25 per day and laborers about 87 cents.

To prevent spalling at the joints of a concrete floor of a warehouse where the trucking would be heavy, the Aberthaw Construction Company, of Boston, laid the floor with butt joints, leaving no groove. The slab work was stopped against a vertical dam, and the next panel cast solidly against the joint. This scheme has resulted in reducing the spalling to an insignificant amount.

The Handling and Drying of Clay Products

Some Elucidation by a Canadian Machinery Expert—Manufacturers of Clay Products must Improve the Article and Reduce Cost of Production

At the recent convention of the Canadian Clay Products Association, Mr. B. E. Bechtel, Waterloo, Ont., delivered an address which contained many points of interest and value. Mr. Bechtel offered some especially helpful hints regarding drying methods, and we quote the following from his remarks:

"Enough exhaust steam goes to waste from your engine to dry, inside of well constructed buildings, all of your product. You can then work winter and summer, taking little or no thought as to whether the atmosphere be wet or dry. Your drier will work satisfactorily under any condition of weather, and the cost of building a drier is no greater than the erection of the usual outdoor drying apparatus; in fact, in some cases, it is not so expensive, and the up-keep of a good exhaust-steam drier is certainly less than the usual run of outdoor apparatus.

"Solidity and permanence of construction are the keynote in the whole business, and there is no question but that they tend to economy in the long run.

"Another advantage derived from the use of permanent buildings and machinery and inside exhaust steam driers, lies in the fact that you can hire help more cheaply and keep them more permanently, when you work eight or nine months in the year instead of for the usual five months. Another advantage lies in the fact that where you have only a certain demand to supply, you can do much more of the work yourself, and hence do not need to keep so much help, thus again reducing the cost of manufacture.

Improve the Product

"It is not at all likely that the use of brick will be superseded by other materials, but it is certain that the proportion of brick buildings, as compared with other materials, will be diminished, unless we avail ourselves of the stores of technical knowledge which have been gained by those among us who have spent their time and substance in experimenting with a view to improving the product and cheapening the cost of its manufacture. No one to-day should expect to do everything for himself. That course was good enough in bygone years, but we have now grown too complex in our civilization. The man succeeds best in this day who best knows how to avail himself of the knowledge which has been gained in the past, and who starts out in the light of other people's failures and not in the darkness of their beginnings.

"In southern countries, such as the range of States along the Gulf of Mexico, where nearly every day is bright and sunny, with a dry air and tropical sun, the drying of brick is a very simple process and can be made a question of common labor solely. It is also very little a question of technology, because nature has done and will continue to do almost all the work with very little artificial assistance; but in the cool, moist atmosphere of Canada, where frost interferes with outside drying for the greater part of the year, and where frequent rainy and cloudy days break into the summer months, the drying of brick must become an artificial process, if we wish to obtain economic results at all commensurate with the necessities of our requirements.

"The fundamental considerations here are therefore the generation of heat by the combustion of fuel, the use of this heat in the vaporization of water, the relative volumes and weight of gases under all sorts of condi-

tions, the movement of bodies of gases by stacks and fans, the amount of air to do a given amount of drying work, and the allowance necessary to be made for the friction of walls, the turning of the flues and the surface of the wares to be dried. But above all this comes the recognition of the peculiarities of the clay itself, its physical factors, its fineness of grain, its plasticity, its shrinkage, its moisture-retaining qualities, its surface characteristics, its capillarity, its tenacity, its absorption, and all the factors of safety which these considerations entail in the design and operation of a drier for clay wares.

"The testing of various kinds of clay as regards these qualities, divides them, generally speaking, into what may for our present purpose be defined as two classes: 1st, those which dry easily and without cracking or checking; 2nd, tender clays, or those which require to be handled carefully in order to prevent cracking or checking.

"Generally speaking, clays which are mild and contain a large proportion of sand are not tender clays; they dry without much appreciable shrinkage. Clayworkers who have this kind of clay do not require an elaborate system. They can use the simplest form, and therefore the most compact and least expensive form of drier. Let it not be supposed, however, that any kind of drier will do for this kind of clay, if you can wish to get the best results. A great many mistakes can be made and are made by those who rush headlong into the construction of a drier, without first taking into consideration all the peculiarities of their own particular kind of clay.

Assembling of Machines

"The assembling of the various kinds of machines and appliances must be carefully considered by the engineer, in the light of the knowledge of the particular kind of clay to be dried. All of these parts must be chosen by one who has a practical knowledge of their working qualities in the internal economy of the drier which they are intended to fill. The failure of any one part means the failure of the whole, so far as the satisfactory working of the drier is concerned, in the same sense as the strength of the chain is the strength of its weakest link. The size of the buildings, number and size of flues and their construction as compared with the capacity of the machinery, must be taken into consideration. All must work harmoniously together, with the least possible amount of friction, in order that economy in drying may be the result.

"The drying of tender clays, however, is a much more difficult problem. While the builder of your drier must make special provision for the handling and drying of your particular product, much more depends upon your own careful handling of the means placed at your disposal.

"Your problem is a more difficult one, but that is not the fault of the drier, but the fault of your particular kind of clay, and it becomes your duty to make the most of that with which you have been provided.

"If a hot, dry air is forced among brick of tender clay as soon as they are made, they will crack and check, as they will crack and check in the sun and wind. The temperature of your air and its humidity is a vital con-

sideration. If your air is too dry it is a very easy matter to fill it with moisture. Hot air filled with moisture will not crack or check tender clay, even if the blast is strong, but it will if continued long enough raise the temperature of your brick to the desired heat. Now the humidity of your air may be lessened, and the process of drying begin without danger of checking and cracking of the product. Necessarily it takes considerably longer to dry brick made of tender clay, and the expense is therefore greater, but the careful brickmaker soon learns the peculiarities of his clay and tempers his blast so as to get the most satisfactory results.

"A method of handling tender clays to make them less liable to crack in the process of drying, is to mix, where possible, a proportion of sand, and, if this is not procurable, grog may be used. This is easily made from broken brick and tile, or even from burned clay, which may be very cheaply made if your kilns are properly constructed with that object in view. The use of slack coal or sawdust is also a valuable adjunct, and, if sparingly used, will not detract from the value of the product materially, either in strength or appearance. It possesses the additional advantage of assisting in the burning of the ware, if care is taken to supply a sufficient quantity of oxygen to the kiln during the process of burning."

Building Rules for Water Tanks

The following is the clause in the Toronto by-law governing the erection of water tanks:

"Water tanks erected over roofs of buildings shall be supported on sufficient brick bearing walls or beams, and pillars of metal, and the erection of a water tank on any old or new building shall not be commenced until plans and specifications of the tank and its supports have been submitted and approved of, and a permit obtained to erect same from the inspector of buildings."

At Vancouver, B.C., the regulations covering the point are as follows:

"Tanks containing more than 500 gallons of water or other fluid hereafter placed in any storey, or on the roof of any building now or hereafter erected, shall be supported on iron or steel beams of sufficient strength to safely carry the same.

"All the beams shall rest at both their ends on brick walls or on iron or steel columns or piers of masonry.

"Underneath any said water tank, or on the side near the bottom of the same, there shall be a short pipe or outlet not less than four inches in diameter, fitted with a suitable valve having a lever or wheel handle to same to discharge the weight of the fluid contents from the tank, in case of necessity, unless tank water is to supply automatic sprinklers.

"Such tanks shall be placed where practicable at one corner of a building, and shall not be placed over nor near a line of stairs, unless the stairs are enclosed with brick walls of sufficient strength to support the added load of the tank and contents."

A Word from Winnipeg

Mr. William Bruce, a well known architect of Winnipeg, Man., says that the authorities of the western capital should take warning from the calamity at Montreal. He writes:

"Nearly two years ago I directed attention to the defective building by-law, and got classified as an 'old crank' by certain members of the council and some of the city officials.

"Including the tank with its load of water, and the usual load on the floors, I have seen the dangerous and very exces-

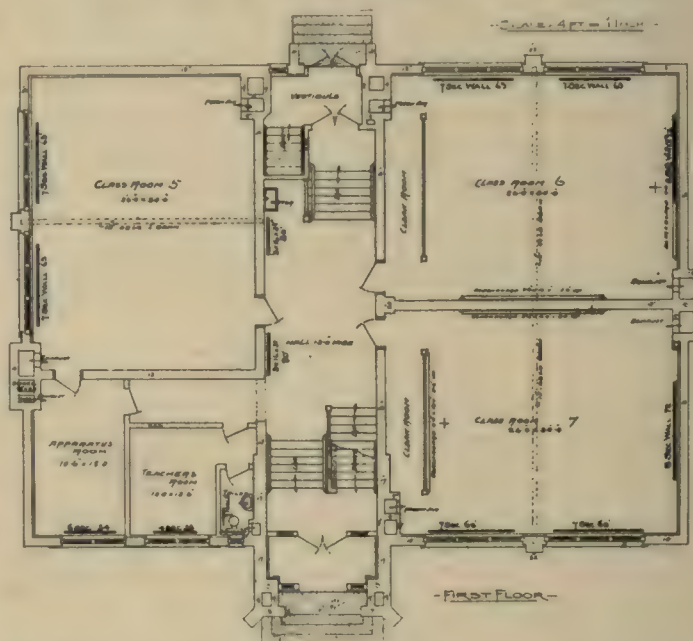
sive load of 18 tons per square foot, on some brick work, in this city. That is about three times more than should be placed on local brickwork, when considering the height and area of some of the brick piers.

"Another very dangerous feature of water tank construction is the omission of lightning conductors to efficiently connect the metal framework that carries the tank, with the earth. In addition to the metal supports of the tank there are the fire escapes and water pipes for hose on the outside walls. All erections of this kind should have conductors properly connecting all such metal work to the earth.

"How long are the fire, water and light committee to allow dangerous structures to be erected in this city, and when may we expect an up-to-date building by-law, and buildings erected according to the plans that are formally approved of?"

Artemesia Township School

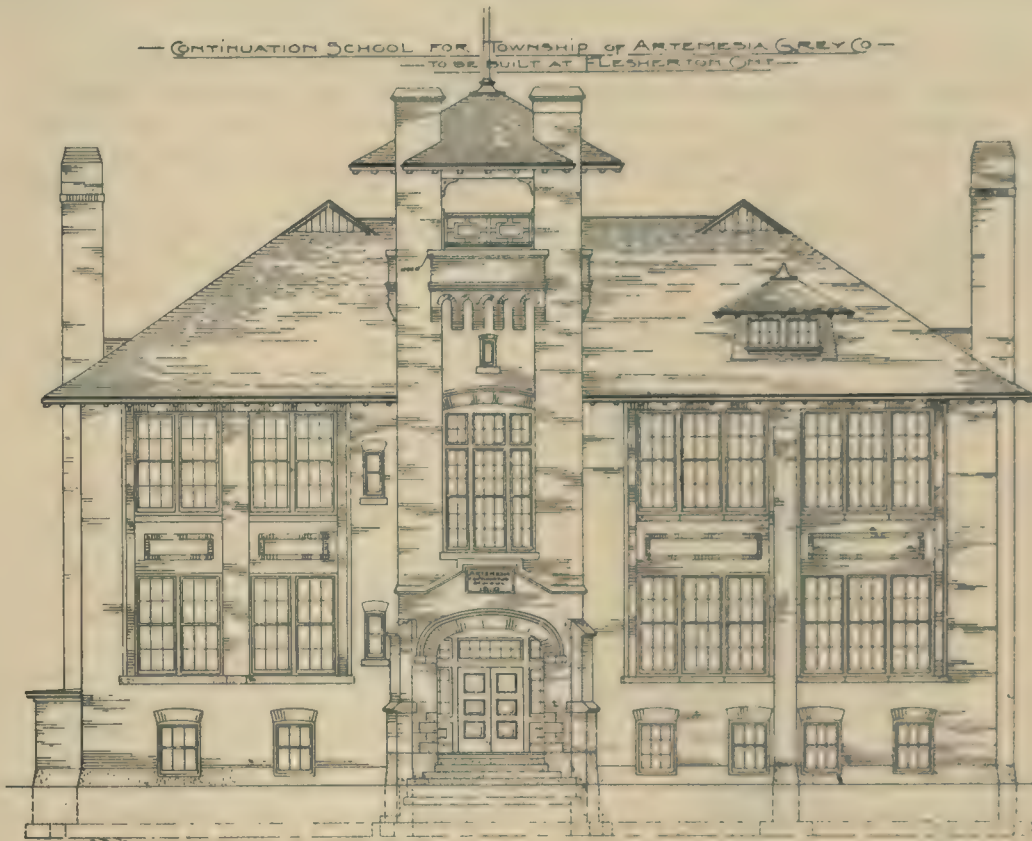
The Artemesia school, illustrated herewith, will be the first continuation school to be built in Ontario. The dimensions of the school will be 78 feet x 56 feet, and the cost approximately \$13,000. The specifications call for concrete foundation, 13-inch brick walls and trussed roof. Steam heating will be installed. The ventilation



will be on the most modern principles. Direct wall radiators will be provided for heating and indirect for ventilating. The latter are placed in fresh air rooms, fresh air being conveyed direct from the outside through the radiators into the rooms. The basement provides for boiler and feed room and separate play rooms. The school will be erected according to plans prepared by Forster & Clark, architects, Owen Sound.

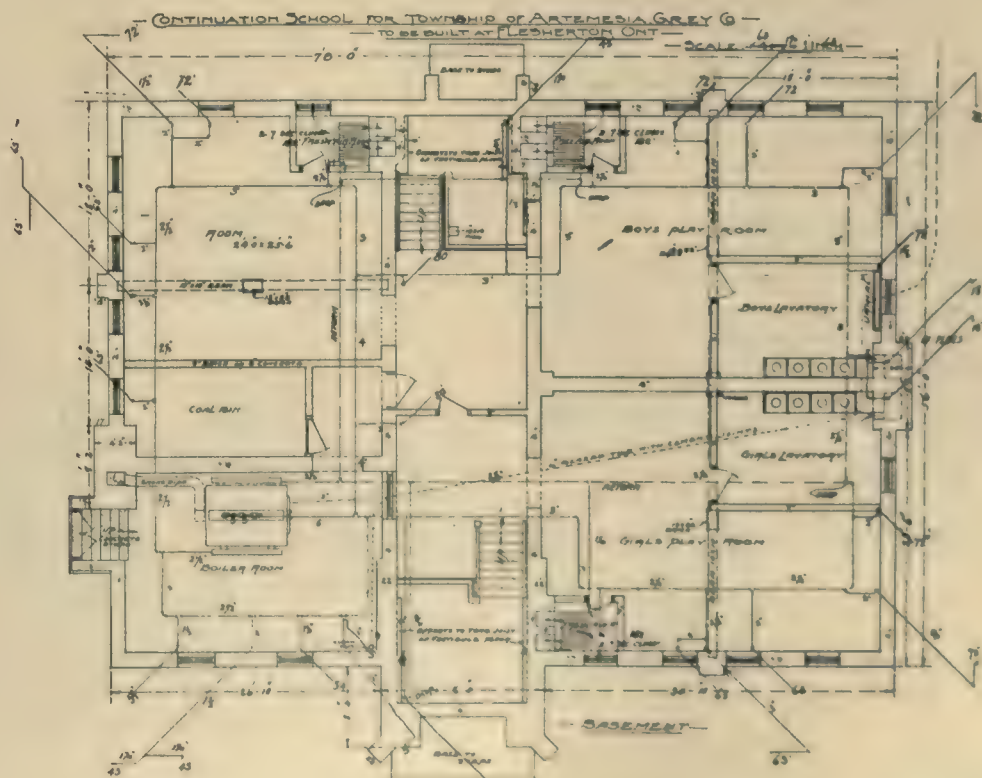
Messrs. Peter Lyall & Sons, general contractors, undertook the task of removing the debris and bodies of victims from the ruined Herald Building when the civic workers gave up the task. The walls remaining standing were also placed in a safe condition by this firm. The Montreal Street Railway Company's steel freight cars rendered an excellent service in removing the rubbish. It is fully expected that a new building will be erected at an early date on the site of the disaster.

A meeting of the Council of the Royal Architectural Institute of Canada is called for July 11th at 5 Beaver Hall Square, Montreal.



Front Elevation Artemesia Township School

Architects: Forster and Clark, Owen Sound, Ont.



Installation of Modern Steam Heating

How to Figure Radiation—"Avoid Rule of Thumb" Methods in Calculating Requirements—A Practical Talk to the Heating Engineer

Steam heat has been to long in use and its advantages, especially for buildings of large size, are too well known to make necessary any argument as to its efficiency and success. We will consider briefly the best methods of installing such a system, together with the rules for figuring amount of radiation, pipe sizes, and so on.

The modern low-pressure system of steam heating is usually a gravity job, the boiler or steam generator being placed below the level of the steam mains. While the two-pipe system is still at times advocated and employed, practically all of the installations of low-pressure steam heating in these days are erected by what is known as the one-pipe method.

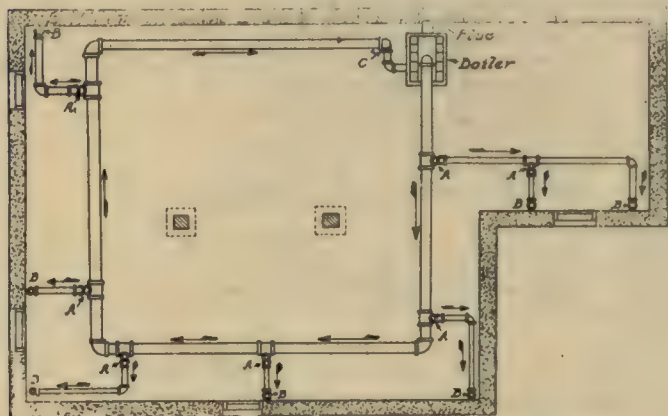


Fig. 1—One-Pipe Circuit System of Steam Heating.

There are several adaptations of this method—namely, the "one-pipe circuit" system, the "divided-circuit" system, the "one-pipe system with dry returns," the "one-pipe system with wet returns," etc.

In planning for the installation of a low-pressure steam heating apparatus, it is necessary to figure the size of radiator needed for each room to be heated; and after the total amount of radiation has been determined, the proper size boiler can be figured.

How to Figure Radiation

The amount of radiation required depends upon three factors: (1) the size and location of the room; (2) the square feet of its glass exposure (windows and outside doors counted as glass); and (3) the square feet of outside or exposed wall surface. Too many fitters and contractors are using "rule of thumb" methods in calculating such requirements, thereby causing trouble and unsatisfactory results from installations of this character. Only such rules as are absolutely accurate should be used in figuring on work.

The Mills rule, known also as the rule "2—20—200," is easily applied, and it is the one generally used by heating men. Its explanation follows:

Find the following three quantities in each room to be heated: (1) the cubic feet of contents, by multiplying together the length, width and height; (2) the square feet of exposed or outside wall (not deducting the space occupied by doors or windows); and (3) the square feet of glass (counting outside doors as glass). After obtaining these results proceed in figuring thus:

For each 2 square feet of glass, allow 1 square foot of radiation; for each 20 square feet of exposed wall, allow 1 square foot of radiation; for each 200 cubic feet of contents, allow 1 square foot of radiation.

The total of these different results will be the number of

square feet of radiation required to heat the room to 70 degrees with a pressure of 2 pounds of steam, the outside temperature being at zero.

For example, consider a corner room (two walls exposed) having three windows 3x6 feet in size. Dimensions of room, 15 by 20 feet, with a 10-foot ceiling.

$$\begin{aligned} 3 \text{ ft.} \times 6 \text{ ft.} &= 18 \text{ sq. ft.} \times 3 = 54 \text{ sq. ft. of glass} \\ 15 \text{ ft.} \times 20 \text{ ft.} &= 350 \text{ sq. ft. of exposed wall} \\ 15 \text{ ft.} \times 20 \text{ ft.} \times 10 \text{ ft.} &= 3,000 \text{ cu. ft. of contents} \\ 54 \div 2 &= 27 \\ 350 \div 20 &= 75.5 \\ 3,000 \div 200 &= 15 \end{aligned}$$

Total... 59.5 sq. ft. of radiation required

Having determined the number of square feet of radiation necessary to heat the building, we proceed to the selection of the boiler.

The selection of a boiler of sufficient size means much for the efficient and economical operation of the entire job.

The catalogue ratings of all boilers for house heating, or "low-pressure" boilers, are gross ratings; that is, in the stated capacities, not only is the amount of radiation to be supplied considered, but all pipe, fittings, etc., on the work are counted as radiating surface, and allowance must be made for the same in accepting the printed ratings.

A safe plan when using such ratings, is to make the following allowances:

Actual square feet of radiation in building	600
Add 25 per cent. for uncovered mains and risers	150
	750
Add 20 per cent. for friction and condensation loss...	150
	900

showing that for good service on the boiler the boiler selected should have a gross rating of approximately 900 square feet.

For economy, choose a boiler so constructed that it may be easily and thoroughly cleaned in all its parts. Soot is a great non-conductor; and the heating surfaces, to be effective, must be kept free from an accumulation of it.

The firebox and grate provided are features worthy of par-

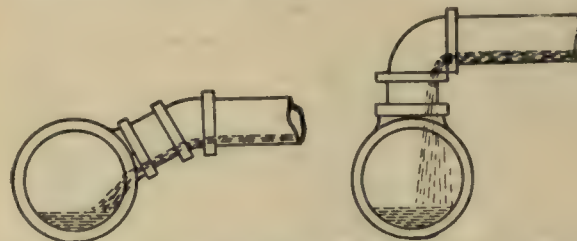


Fig. 2—Illustrating how Steam is Saturated by 90-Degree Connection to Main.

ticular attention, as a firebox of proper depth, and a type of grate which can be easily cleaned and which is able to carry its full load of fuel without a sagging of bars, are essential points to consider.

A large amount of direct heating surface above the grate, with a length of fire travel sufficient to consume and utilize the gases of combustion, means economy of fuel.

One-Pipe Circuit System

The one-pipe circuit system of steam piping is doubtless used more than any other plan, as it is the one having the most advantages when installed in a square or rectangular building.

In this system, the upright pipe out of the boiler rises to as high a point as possible, up to within a few inches of the cellar joists. On its top is placed an elbow from which the circuit is started. This starting place is the high point of the main steam pipe; and from it the main should have a gradual fall or pitch from the boiler of $\frac{1}{2}$ to 1 inch in each 10 feet of length. The branches should pitch up from main at least 1 inch in each 5 feet of length, and as a rule should be of one size larger pipe than are the risers which they feed.

The circuit continues around the basement at a distance of from 3 to 4 feet from the outside wall, continuing until an advisable point at or near the boiler is reached, where a reducing elbow is placed on the end of this main, and a drop made with a smaller size of pipe into the return opening of the boiler.

Fig. 1 shows the basement plan of a piping job of this character. The main acts as a reservoir supplying the various branches leading to the radiators, and also as a return pipe receiving the condensation from the various branches it feeds. By reason of this latter function, it should not be reduced, but should be run full size from the boiler to the end where the return connection is made. The condensation from the system runs along the bottom of the main in the same direction as the course of the steam.

At the extreme end of the main, where the connection to the return is made, there should be placed an automatic air-valve, in order that all air in the main may be quickly exhausted, and the main put in shape to be rapidly filled with steam so that all branches will be supplied at practically the same time, thereby securing an equal proportion of heat for all radiators.

Each branch connection may be taken from the main by either of two methods—namely, (1) by using a nipple and 90-degree elbow, and (2) by using a nipple and 45-degree

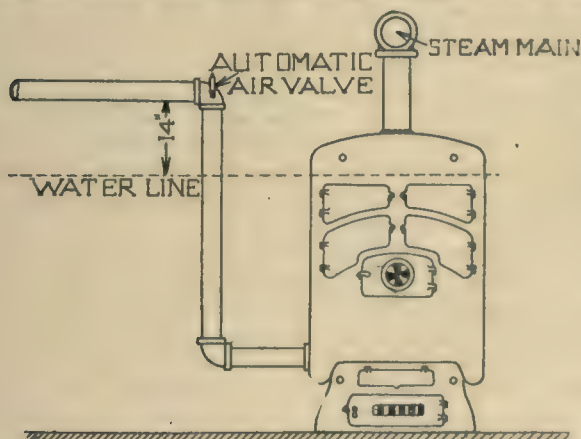


Fig. 3—Elevation of Boiler and Return Connection of a One-Pipe Circuit System of Heating as Shown in Plan in Fig. 1.

elbow. The first method is preferred for the reason that in all low-pressure mains the steam flows along the top, the condensation along the bottom. With the 45-degree connection, the condensation from each branch enters the main without saturating the steam, while with the use of the 90-degree connection this water of condensation flows into the main on top of the steam supply, saturating it and thereby greatly reducing its efficiency. This difference is very clearly explained by fig. 2.

Points marked A A A on fig. 1 indicate the 45-degree connection; B B B, the risers to radiators; and C the point at which the automatic air-valve should be placed. The

arrows indicate the downward pitch of the main and the upward pitch of the branches.

The end of the steam main should never be lower than a point 14 inches above the water line of the boiler, and, if possible, a distance of 20 inches should be maintained between the two points. Fig. 3 shows an elevation of the boiler and return connection of a piping system as shown in plan in fig. 1 and clearly indicates the space to be maintained between the two points. Fig. 3 shows an elevation of the boiler and return connection of a piping system as shown in plan

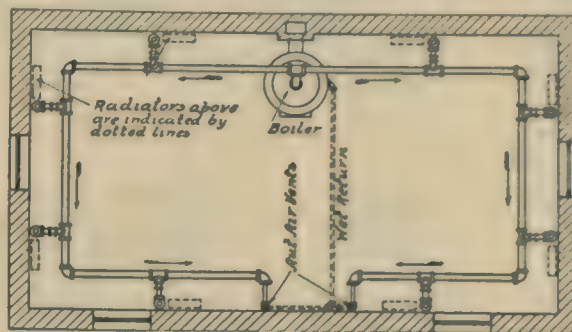


Fig. 4—Divided-Circuit System of Heating

in fig. 1 and clearly indicates the space to be maintained between the end of the main and the water-line of the boiler.

Divided-Circuit System

The divided-circuit or two-circuit system is quite similar in its general plan to the single-circuit, and what has been said regarding the details entering into the one will apply to the other. When the boiler is located on one side of a rectangular building, frequently it is better practice to run the main in two circuits; and the method this provides is known as the "divided-circuit system." On leaving the boiler, the mains pitch down from it in either direction, following around the basement until they meet at the side opposite to the boiler, or perhaps at some other point, the place of junction depending upon the character of the building or on circumstances surrounding the installation. At this point a reducing elbow and an automatic air-valve are placed on the end of each main, and a drop made to the floor of the basement, where, below the water line, these return are connected together, and a single pipe having a capacity equal to that of both the drop pipes is run across the cellar floor, either on the surface or under it, to the boiler, where it is connected into the return opening.

Fig. 4 illustrates the divided-circuit system.

One distinct advantage of a one-pipe circuit system is that all piping is overhead and out of the way. In addition it affords a very neat and attractive method of piping, and will be found sufficiently effective provided care is exercised in properly proportioning the sizes of the pipes. Pipe-sizes for one-pipe systems are given in the following table:

Sizes of Main and Return Pipes—One-Pipe System of Steam Heating

Boiler Pressure, 2 pounds gauge		
Sq. ft. Direct Radiation	Size of Main	Size of Return
125 to 250 sq. ft.	1½ in.	1 in.
250 to 400 sq. ft.	2 in.	1½ in.
400 to 650 sq. ft.	2½ in.	1½ in.
650 to 900 sq. ft.	3 in.	2 in.
900 to 1,200 sq. ft.	3½ in.	2½ in.
1,200 to 1,600 sq. ft.	4 in.	2½ in.
1,600 to 2,000 sq. ft.	4½ in.	3 in.
2,000 to 2,500 sq. ft.	5 in.	3 in.
2,500 to 3,500 sq. ft.	6 in.	3½ in.
3,500 to 5,000 sq. ft.	7 in.	4 in.

Note—The maximum amount of radiation given for any size of pipe is based upon favorable existing conditions, such as a short main (under 100 feet) and a compact job. When

the mains are extremely long, and the amount of radiation scattered, the larger size of pipe should invariably be used.

While some engineers consider the sizes as given somewhat excessive, the fitter can make no mistake by adopting them on heating work. Perhaps circumstances surrounding installations in some particular instances might warrant material reductions in the stated pipe sizes; but unless the fitter is fully conversant with the effect these conditions exert

Where the elbow is placed on the end of the dry return for the drop connection into return opening of boiler, an automatic air-vent should be used, and this point should not be less than 14 inches above the water-line of the boiler, as previously described.

All branches are taken from the main with a 45-degree connection and they should always pitch upward from the main at least $\frac{1}{2}$ -inch in each 5 inches of length. When sup-

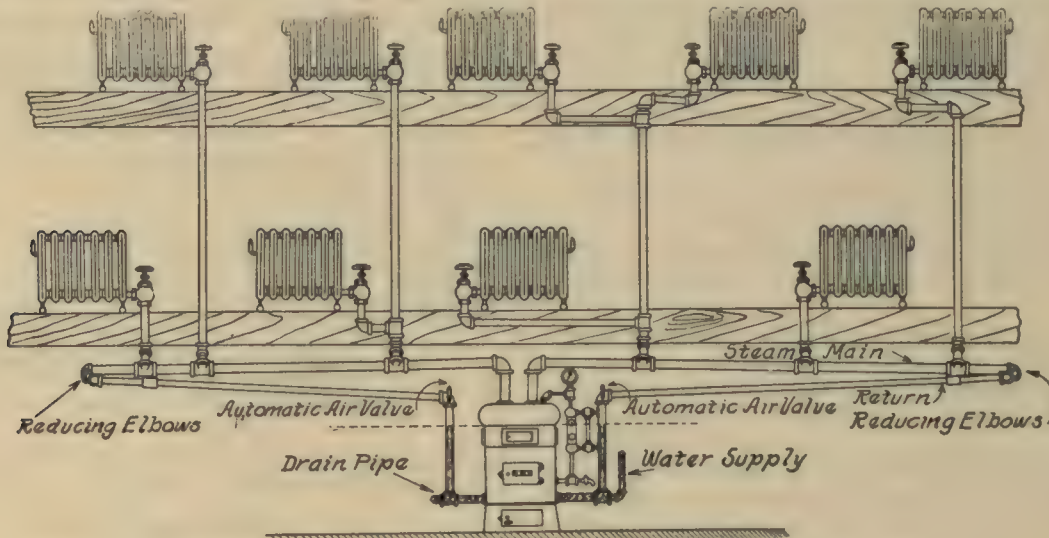


Fig. 5—One-Pipe System of Steam Heating with Dry Returns.

on the plant, it is better to be guided entirely by the sizes given, which have been proven by conclusive tests as worthy of general adoption.

One-Pipe System with Dry Returns

The one-pipe system of steam heating is so called from the fact that there is but one pipe connection to each radiator, this pipe acting the dual role of flow and return. For this reason the use of this arrangement requires pipes larger in size than those necessary for the two-pipe system. There are several adaptations of the one-pipe method, that illustrated in fig. 5 being the one particularly suited to a build-

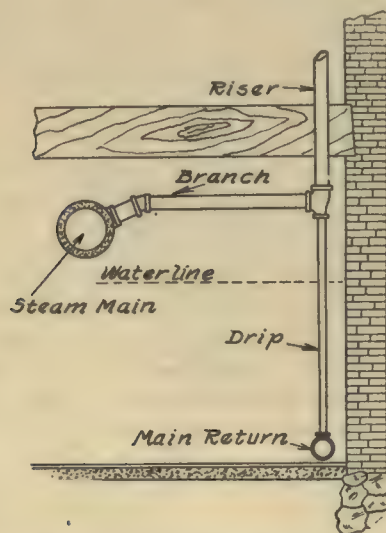


Fig. 6—Bleeding a Riser in Installing a Wet Return System.

ing where the main flow pipes may be run straight from the boiler in either direction.

Note the manner in which this connection is made. The return pipe is always one or two sizes smaller than the flow, and the connection from main to return is accordingly made with two reducing elbows and a close nipple.

plying large radiators, the branches, as a rule, should be one size larger than the riser or radiator connection which they feed.

It is well to make connections to radiators in such a manner as will permit of some expansion of the riser. A swing joint at base of riser is sometimes employed for this purpose.

One-Pipe System with Wet Returns

The one-pipe system of steam heating with wet returns does not differ materially from any one of the methods previously described so far as the manner of running the mains and connecting the branches is concerned. There are some heating men who favor a wet-return system, believing that the provision of the wet return steadies the working of the system or "balances" the job. This system is specially adapted to jobs where the mains are exceptionally long or when surroundings make it necessary to work unusually close to the water-line of the boiler.

A wet return would be started on a circuit job as soon as the last branch or radiator has been connected, but the drop should not be made directly at the last connection. The main should be extended not less than two feet beyond this point, where a reducing elbow tapped for an air valve should be placed on the end, and the drop then made into a wet return. This return, as a rule, is carried along the cellar wall to a point where a connection with the boiler can be conveniently made.

One method of installing a wet-return system is to bleed all risers, as illustrated in fig. 6. If the job is of such a character that the risers can be treated in this manner, much smaller piping may be employed than is ordinarily necessary with one-pipe work, as no condensation enters the main from radiators or branches, and its entire area is free space for the conveyance of live steam. Also, where risers are dripped into the return in the manner illustrated, it makes no difference in the results attained whether a 45-degree or a 90-degree connection is used in starting the branch from main.

In the collapse of some scaffolding at Strathroy, Ont., last week, Mr. Thos. Maines, contractor, of Watford, Ont., was fatally injured. He died shortly after the accident.

The Value of Contractors' Cost Records

**Not Only as Basis for Future Work, but also in Case of Dispute—
Particulars of Satisfactory System Used by a Large General Contractor**

The importance of cost records on construction work has been pretty generally realized by contractors during recent years and most concerns engaged in work large enough to warrant it have adopted some system by which all expenses on any contract may be determined and classified among a number of accounts, forming permanent records of considerable value. These are of use not alone as a basis for future bids, or as a means of determining the cost of each class of construction from day to day, but as accurate records in case of litigation, especially in the matter of extra work. The system of contractor's cost keeping and organization in use by Mr. Charles Cranford, general contractor of Brooklyn, N.Y., was described at a recent meeting of the Brooklyn Engineers' Club by Mr. Richard L. Russell, who discussed its advantages and explained the use of a number of printed forms used both in the field and in the office in connection with the Brighton Beach improvement work, involving excavation and concrete.

The degree of fineness into which the work is to be subdivided is one of the important factors in any cost-keeping system; the records dealt with by Mr. Russell are intended solely for the use of the contractor who through constant oversight of the work is so familiar with the conditions that few explanatory notes are needed in connection with the costs. Each foreman, under this system, is furnished with a 5½ x 8½-inch blank daily report, containing six ruled columns; the first is headed "Employee's Number," and four are headed "Hours and Amount," the sixth column being used for the total. The laborers' numbers and the hours at each class of work are entered and the total summed up in the last column at the end of each day. Space also is left for remarks. With such a form a man's time may be classified according to the different kinds of work he may have done during the day. The foremen also report the daily yardage of excavation and concrete and material received.

Daily and Monthly Statement Sheets

The reports are inspected by the superintendent and if they give the information and cost distribution desired are sent to the storekeeper, who enters the cost and quantity on a "daily statement." This sheet measures 9½ x 12 inches and contains after each foreman's name, under the heading "Excavation" or "Concrete," the total cost for the day, the daily yardage and the cost per cubic yard. Space also is left for entering up the value of materials received and the grand total under each classification is summed up at the bottom of the sheet.

The quantities from the daily statements are in turn transferred to monthly statement sheets which measure 17 x 14 inches, and are ruled so that entries may be made upon them for 31 days' work. On these sheets there are a large number of classifications; for example, the classifications under "Excavation" include work done by buckets, by orange-peel buckets and by hand. There are columns under which charges may be made against moving and maintaining buckets, derricks, boilers and engines, and oil and fuel.

The second of the monthly statement sheets covers transportation charges, the third, timber work, and the fourth concrete. Classifications on the latter are as follows: "Massive," "Concrete," "Reinforced Concrete," "Arch Concrete," "Foundations and Drains," "Facing Walls," "Forms," "Cement" and "Conduits." Under each of the first four main

headings there are three subdivisions labelled "Mixing and Placing," "Cubic Yards Placed," and "Cost Per Cubic Yard."

In addition to the cost of the work in the field, administration charges are made under the following heads: "Engineering and Superintendence, timekeeper and storekeeper, general office force, telephone and office supplies, liability insurance, surety bonds and legal expenses, rental of yards, office, etc., watchmen, interest, depreciation on general plant and miscellaneous small tools, interest and discount. The daily general expense, under this system, is proportioned by the engineer among the various items and included by the storekeeper in making up the daily statements previously referred to.

Requisitions for materials are made by the storekeeper and submitted to the engineer for approval. If approved, orders are made out in triplicate on forms of three colors for ready identification, the original going to the manufacturer or dealer, the duplicate to the storekeeper and the triplicate being retained in the main office. When the invoice is received it is forwarded to the storekeeper and checked against the original order and returned to the main office.

The voucher system is used in settling all bills and payrolls; the bills are enclosed in folded vouchers on the back of which are spaces for the name of the creditor, distribution of the amount, number, date of check, date of bank, and date on which the voucher was recorded and distributed. The regular cash book, ledger, journal and voucher book are kept. In the latter the horizontal lines across the double page are numbered consecutively, one line to each voucher and the vertical columns contain first, the number of the voucher; second, the total amount, and, third, the number of the contract and the amount to be charged against it. By this system the total amount of each contract is shown.

Good Plumbing as a Paying Investment

If the average property owner will only take time to consider the question he cannot do other than admit that the plumbing outfit of the ordinary dwelling or flat is, after all, the most difficult to maintain in proper sanitary condition and repair. This will become all the more apparent if the person interested will but examine his pile of repair bills for cleaning out traps, installing new supply pipes, closets, basins and innumerable small parts so important to the successful operation of the plant.

Usually the tenant is blamed for such a state of affairs, although in many instances the real fault may be traced to defective installation and the employment of light materials, which are unfit to properly withstand the wear and tear caused by the elements. It has often been pointed out that the method of conveying water through a building is a simple problem, requiring no especial ability on the part of the mechanic, while, on the other hand, the disposal of excrement without unnecessary odor or the violation of established plumbing regulations is an entirely different matter.

Providing the rough work has been installed in a proper manner, and heavy material is used, little trouble is likely to follow; but often an error is committed in finishing with seconds, or an inferior grade of materials, such as thin traps, pitted closets and basins or other weak or damaged parts. Under such circumstances there is but one sensible thing to do, and that is to rip them out and have the job done right and by an experienced plumber.

Methods of Waterproofing Road Surfaces

The Problem of Economical Construction—Pointers on the Application of Tar—Satisfactory Results from Broken Granite and Tar Compound

BY GEO. W. MANNING, Surveyor to the Staines, Eng., Rural District Council.

This is a subject which possibly at the present time is receiving more attention from the road mender, the road user, and the general public than any other, except possibly rubber in its many forms; but as a large proportion of the trees to produce this valuable waterproofing agent have yet to be planted, we need not discuss that material at great length.

Since motor traffic of all classes has become such an acknowledged fact, it has always been a source of astonishment to the author—and very possibly to others, who, like himself, are spending the greater portion of their lives in attempting to solve the problem of economical road construction—to see how many amateurs there are who are willing to give advice upon the subject of what class of materials to use and how to proceed to construct the ideal road surface. It is unfortunate, however, that these good gentlemen generally forget the purse, and have not to face the indignant ratepayer, without doubt the greatest stumbling block in the way of the poor struggling road-mender.

In these notes it is proposed to deal only with the general question of highways and not with roads that carry such a traffic as to warrant their being paved. It has generally been accepted by surveyors that up to the present, tar, used in some form or other, is the most convenient material to cheaply waterproof the everyday road surface by painting or spraying.

The Application of Tar

Before any successful work can be done with tar it is absolutely essential that the surface shall be true and even, and it is towards this end that the surveyor has been devoting his attention. In the author's own opinion, many years must elapse before anything approaching a majority of our roads will be even tar-painted, as quite 75 per cent. of the surfaces are totally unsuitable to take tar. The cost of amendment, such as strengthening the haunches, giving the road a reasonable camber, breaking up the crown and sifting out the accumulations of muck and rubbish in them and restoring the surface with only good clean material, will be so enormous as to make the safe and universal tarring of roads almost beyond possibility.

The word "safe" is used advisedly, as the author has seen tar put on a road with a cross section something like a semicircle, or possibly worse; this was in a hunting county. The result was that the road was rendered absolutely unsafe for practically every class of traffic, and the general fault-finding soon caused the road to be broken up and re-rolled. In this case the cost of proper reconstruction before attempting to waterproof was too great to think about. Again, the author has seen tar applied to a road surface mostly composed of muck and some metal, with plenty of pot-holes in it, but with a suitable cross section. This surface was, however, slightly damp when the tar was applied, and the condition of that road throughout the past winter beggars description; it was quite a common occurrence for a car to find itself sliding into the channel or endeavoring to work crab-fashion through the slime, while the condition of the unfortunate pedestrian or carriage that happened to be in the neighborhood of the road when a car passed can be much more easily imagined than described.

Given the road surface in a reasonably suitable condition as to strength, camber, and regularity, the surveyor is again met with great difficulties in getting anything like good and lasting results from spraying or painting, as the climatic

conditions in England give, comparatively speaking, a very few days in a season when the road surface is in the best condition to assimilate tar and to obtain the desired results. It simply ends in the surveyor, worried to death by the growls of the aforesaid "indignant ratepayer" against the clouds of dust raised by cars, etc., from the drying mud, being tempted to apply tar to a surface which appears dry, while, as a matter of fact, the body of the road is quite wet and refuses to take it.

Tar Painting and Spraying

The experiences of the past winter, after a summer in which the roads were never dry, more than amply proves the argument that tar painting or spraying all and sundry road surfaces, with the expectation of obtaining anything like a lasting waterproof surface, is a delusion. There are lengths here and there which before painting have been properly reinstated and have been tarred at fair condition as to dryness, have stood the winter very well, but the author motored many hundreds of miles to find them, and they have all been where the conditions have been ideal, lying high and dry, well exposed to the action of the sun and wind, with not too much traffic, especially of the slow-moving type. In this neighborhood tar-painting vanished early in the autumn in a slough of mire, which not only rotted the roads through and through, but caused bitter complaint everywhere.

The deductions the author has drawn from the various methods of tar-spraying and tar-painting as a waterproofing agent for roads during the seven or eight years he has had experience of it are, that it does very materially effect this object when road and other conditions are suitable, while its effect in keeping any class of road together throughout the summer is undoubted. The author is, however, equally confident that tar-painting, applied haphazard to any road surface, must not be accepted as a waterproofing agent, but rather as the most permanent palliative to reduce the dust nuisance during the dry months of the summer. This dressing, except in isolated cases, does not enter the body of the road at all, and simply churns up into black mud under the traffic when the autumn rains and frosts commence, leaving the pores of the roads exposed to the worst action of the winter weather.

Use of Tarred Slag

Since early in 1903 the author has been turning his attention closely to the question of reinstating the surfaces of his roads, as they become worn, with a waterproof material. He has tried a number of the various materials placed upon the market, and some of his own making. His first experiment was with tarred slag, and it was a most satisfactory one. The author has laid numerous lengths of this class of material, but of recent years the supply of good, close, suitable slag appears to be giving out and that of an inferior quality to be taking its place; the result is that surfaces which have only been laid for less than two years have had to be thoroughly repaired, so many pot-holes having appeared. The author's council is now abandoning the use of tarred slag as a waterproofing for their roads.

Several miles of road surfaces have been laid with ordinary broken granite rolled into a matrix mixed with a tar compound, and the surface sprayed over with the same compound. These surfaces have given satisfaction, but they need touching up every year, or every other year, according

to the traffic. This, however, is to a certain extent an advantage, as the painting freshens up the body of the material and at the same time forms a veneer of tar and granite chippings, which to a great extent prevents the traffic coming into direct contact with the main body of the road, and so enhances its life. This class of road being waterproofed in itself, can be painted and attended to at a time when it would be madness to think of doing any such work to an ordinary road.

Tar-Grouting Macadam

The author's experiments in tar-grouting ordinary granite macadam have not been very satisfactory, either from an economical or permanent point of view. He found so many little details which continually crop up to delay the job or detract from its well being; for instance, a sudden storm means much delay and increased cost, to say nothing of inconvenience to the public. In any case, where a road is laid in this manner, and except in the very best of weather, the author considers it advisable to use a blow lamp to effectually remove traces of damp and to warm up the stone to more easily assimilate the tar. Some of the systems of tar grouting have, he is aware, given very satisfactory results upon the outside of tramlines, etc., but the cost put its general use for highways outside the pale of practical politics.

The author has laid considerable lengths with granite macadam broken in irregular sizes from 2¼-inch downwards, and coated with a tar compound. This has given capital results as a waterproofing material, and has the great advantage of being able to be laid at all reasonable times and with the least likelihood of delay from outside causes.

The author's experiments since 1903 have satisfied him that in districts where the annual allowance for highway repairs will permit of it, the surveyor is much better advised to look to construction than anything else for the solution of the problem of building suitable waterproof roads to suit modern requirements. The comparative costs in his own district prove this very conclusively. Such a class of repair is, of course, quite out of the question for the ordinary country district, and the author certainly thinks that, so far as the bulk of the highways are concerned, we are as far off the solution of the problem as ever, except that we are now perfectly satisfied that one of the schemes mooted to date are workable, solely for the want of that simple agent "capital."

Business Opening in Western Canada

Aldersyde, Alta.—Brick plant.

Barons, Alta.—Electric light plant.

Castor, Alta.—Sash and door factory, electric light plant, brick plant.

Govan, Sask.—Sash and door factory, light and water plants, brick plant. It is stated that there is a demand for dwellings at this point and that there is a good opening for a contractor with capital, who would build and rent houses.

Sedgewick, Alta.—Brick plant.

Strassburg, Sask.—Planing mill and wood working shop. Scarcity of residences. Good opening for a contractor to build small houses for renting.

Mr. Dufresne, of the Public Works Department, at Winnipeg, has been transferred to Ottawa to take the position of deputy chief engineer in the place of the late Mr. Gilmour Brown. His place at Winnipeg has been filled by the appointment of Mr. Earle, formerly manager of the street railway company of St. John, N.B.

Mr. S. E. O'Brien, secretary to the chief engineer of the Department of Public Works, Ottawa, is mentioned for the vacancy caused by the lamented death of Mr. Napoleon Tessier, Secretary of the Department.

Personal News and Notes

Mr. G. T. Altham, town engineer of Macksood, Alta., has resigned.

The new manager of the Standard Fitting & Valve Company, Guelph, Ont., is Mr. A. W. Given.

The death occurred last week of Mr. Eli Snyder, a well known building contractor of Parkdale, Toronto.

Mr. R. F. Armstrong, Toronto, has left for Moncton, N.B., to take up a position on the engineering staff of the G.T.P.

Mr. C. M. Canniff, president of the Engineers' Club, Toronto, and, until recently, chief engineer of the Expanded Metal & Fireproofing Company, has formed a partnership with J. S. Fielding, consulting engineer. The offices of the new firm will be at 15 Toronto street, Toronto. Messrs. Fielding & Canniff will specialize in steel and reinforced concrete work. Both of the partners in the new firm are widely known



Mr. C. M. Canniff, of the newly organized firm of Fielding & Canniff, Consulting Engineers

in engineering and contracting circles and the best wishes of their many friends will go out for their success.

The headquarters of Mr. T. Aird Murray, consulting engineer, are now located at 303 Lumsden Building, Toronto.

Mr. G. D. Whitmore, consulting engineer, Regina, Sask., has acquired the services of A. E. Eastman, of Lachine Locks, Que.

Mr. W. F. Tye, vice-president of the Canadian Society of Civil Engineers, has removed from Montreal and taken up his residence in Toronto.

City Engineer Ker, of Ottawa, is unfavorable to the use of cement macadam for paving work. He considers the material too brittle to be satisfactory.

A permanent builders' exhibition has been established at Edmonton, Alta., by the manufacturers and builders' associations affiliated with the building exchange of that city.

New Westminster, B.C., has just adopted a building by-law that takes four hours to read. Each alderman has had to make an affidavit that he has perused the document.

Mr. W. H. Shillinglaw, of Brandon, Man., was injured in the collapse of some building work last week. We are glad to state that he is making satisfactory progress towards recovery.

Factory Products, Limited, Toronto, have been appointed Canadian agents for the General Electrical Company, Limited, of London, Eng., manufacturers of electrical apparatus and supplies.

St. Thomas builders are to have a novel feature in connection with their Dominion Day picnic. There will be a plumbers' competition for those who can join up pieces of waste pipe in quick time.

Mr. A. M. Jones, Ottawa, has been appointed assistant engineer on the construction of the new Quebec bridge. For several years past Mr. Jones has been resident engineer for the C.P.R. at the Federal Capital.

At a meeting of the building trades council at St. John, N.B., the following officers were elected: Jacob Brown, of the Sheet Metal Workers' Union, president; James McGirr, of the Masons' Union, vice-president; and James Sugrue, of the Carpenters' Union, secretary-treasurer.

Vancouver and the Coast

As a result of the scarcity of desirable "near in" homes, and the disinclination of many people to assume the cares that are part and parcel of ordinary housekeeping, there is a strong and constantly growing demand for flats, and to supply this need a number of roomy apartment houses have been erected and others are under way or projected. These buildings are divided into suites of three, four, five and six rooms, and embody all modern accessories to luxurious living. The rents are high, of course, but the suites are eagerly snapped up weeks before they are ready for occupancy. A leading architect predicts that in the course of a few years the greater portion of the west end will be given up to apartment houses, and at the rate these human hives are being constructed it would seem that the prediction appears likely of fulfilment.

The rapid growth of Vancouver has compelled the removal of the Customs to the first floor of the new Federal building at the corner of Granville and Hastings streets, where there is room for growth, even if it be at the same rapid rate of the last two decades. After the fire which destroyed Vancouver on June 13th, 1886, a Customs house was opened on Abbott street in quarters only 12 x 10 feet in size, most of which was taken up by a huge safe. The office was in charge of the late Isaac Johns as sub-collector for the outport of Burrard Inlet, then under the port of New Westminster. On July 1st, 1887, Vancouver was constituted a port, Mr. J. M. Bowell, who still holds the office, being appointed collector. The offices were then moved to a building on the site now occupied by the Canadian Bank of Commerce. For the fiscal year ending June 30th, 1893, the returns were \$318,000, the number of entries being 8,406, while for the current fiscal year the returns are \$3,900,000, with 68,000 entries, an average increase of about 3,500 entries per year. The staff now numbers about 70 employees.

The Canadian Slate Products Company, which some weeks ago secured from Seattle parties the patent rights to manufacture in Canada certain products that are finding a wide sale among United States builders, is establishing a large plant at Vermilion, Alta. The outlay will exceed \$150,000, and it is said that from 250 to 500 hands will be employed. The company's article is a new composite substance consist-

ing mainly of shale, cement and lime. The slate can be polished like marble or granite, is susceptible of all manner of coloring, and can be manufactured so cheaply that it can be used for wainscoting, flooring, roofing, counter tops, fireplaces, etc. The company is locating in Vermilion because that place contains the raw material which is necessary to the manufacture of its products and has excellent railway facilities. The company holds the rights to manufacture and sell from Montreal to Vancouver, and it is its intention to extend its plant so as to employ from 1,000 to 1,500 people. It will also establish warehouses and agencies in many of the principal cities in the country, Vancouver among them. To permit of this expansion, the capitalization of the company is \$2,500,000.

Work on the new plant for the Steger Silica Brick Company was commenced a couple of weeks ago, and is being rushed with all possible speed under the superintendence of Mr. Joseph Farrier, secretary-treasurer of the firm, who recently arrived from Bonham, Texas. Modern machinery will be installed and the plant will have a capacity of 40,000 bricks per day.

A French syndicate of capitalists which recently bought the southwest corner of Granville and Cordova streets, opposite the C.P.R. station, has secured plans for an eight-storey office block, to cost over \$250,000. The building will have a frontage on Granville street of 120 feet, and 78 feet on Cordova street. The structure will be fireproof throughout.

The fertile district known as the Delta, near the mouth of the Fraser, is to have an up-to-date waterworks service in the near future. From the lowest level of the springs that are to be tapped, to the gulfside, there is a fall of from 12 to 13 feet, so that no trouble will be experienced in distributing the water in the mains. Two cement reservoirs will be constructed on an elevation of 250 feet.

Wood Block Paving

The rapidity with which asphalt pavement wears out, especially along the streets where there is a great and increasing amount of automobile traffic, has caused many automobile tradesmen to look around for more suitable paving material, and in the wooden block, it is claimed, they have found it.

W. J. Mead, secretary and general manager of the Olds Motor Works, of St. Louis, says: "To those who believe, as I do, that the number of automobiles of both the pleasure car and the commercial type will be doubled and trebled in this country within the next few years, it is apparent that the municipal authorities must give more consideration to the needs of motorists than has been their custom. It has been the invariable rule of city officials to consider only the horsemen when making plans for repaving streets, but there are even now so many motor cars in use that owners of them ought to receive more consideration.

"Asphalt pavement wears out quickly, and the holes that result are very, very bad for automobiles. Wood block pavement, on the contrary, does not cut so fast, and even when it does finally wear out, the wearing down is gradual and does not leave the gaping holes that may be seen in any street paved with asphalt. It is practically impossible to prevent some oil and grease falling from the cars to the pavements. This rots asphalt very quickly, but its only effect on wooden blocks is to preserve them. For this reason alone, the economy of wood blocks ought to be enough to ensure their adoption.

"Another reason for doing away with asphalt and using wood blocks is the skidding danger, which is ever present whenever the asphalt streets are sprinkled or after rain storms. The skidding danger on wet asphalt can hardly be exaggerated, but there is very little danger of skidding on wet wooden block paving."

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Aylmer, Que.

The town of Aylmer has purchased the waterworks from M. W. J. Poupore and his associates.

Bright, Ont.

Tenders addressed to W. G. Henderson will be received until July 15th for construction of Anderson drain extension in the Township of Blandford. Plans, etc., at office of F. J. Ure, C.E., Woodstock, or at the office of the clerk, Bright.

Cumberland, B. C.

The ratepayers of Cumberland have rejected a by-law to authorize an expenditure of \$20,000 for highly necessary sewerage works.

Dunnville, Ont.

T. W. Holmes, town clerk, sends us the following list of tenders for completion of sewerage system: John F. Connolly, Toronto, \$10,705; Bennett O. Ramdon, Dunnville, \$11,140; Lorendo and Marshall, St. Catharines and Dunnville, \$12,595.50. Council deferred action until Monday, July 4th.

High River, Alta.

A by-law to spend \$121,000 on water works and sewerage systems was defeated. There are prospects of the question being re-submitted.

Kamloops, B. C.

The matter of an additional reservoir is again before the council with a recommendation from H. K. Dutcher, construction engineer, for its installation.

Montreal, P. Q.

Tenders addressed to David Seath, secretary, Harbour Commissioners will be received until July 7th for supply of Portland cement. Specifications at above office.

Tenders will be received until July 8th for the construction of the sixth section of the Sherbrooke street sewer from Drummond to Guy street. City Surveyor Barlow.

Nanaimo, B. C.

The by-law to raise \$25,000 for the water system improvement was carried.

North Vancouver, B. C.

City Engineer Hanes' plans for the sewerage system here have been officially approved.

Quebec, Que.

The Board of Control will call for tenders for paving in asphalt of Caron street, opposite Cartier church.

The following tenders were received in connection with the installation of waterworks at Chaudiere Curve: F. Sullivan, Montreal, \$2,000,000; J. Bertram, Montreal, \$255,000; B. Castigan, Ottawa, \$245,000. Noted in last issue.

St. James, Man.

Tenders addressed to Frank Ness, secretary-treasurer, will be received until July 9th, for material and labor required in the laying of a 4-foot plank sidewalk.

Saskatoon, Sask.

Tenders addressed to J. H. Trusdale, city clerk, will be received until July 25th for the supply of 250 n.p. Water Tube Boiler. Plans, etc., at office of City Engineer, G. T. Clarke.

St. John, N. B.

W. Murdock, C.E., city engineer, writes that the award in connection with paving has been referred to a committee.

Tenders for laying permanent paving in Germain street, between Princess and Queen streets, were as follows: Carritte Manufacturing Company, sheet asphalt, \$2.60 per yard; new curb stones, 93 cents per foot; old curb stones, 58 cents per foot; catch basins, \$75 each.

McDonald and McLeod, sheet asphalt, \$2.65 per yard; new curb stones, 90 cents per foot; old curb stones, 65 cents per foot; catch basins, \$75 each.

The Westrumite Company, sheet asphalt, \$2.55 per yard; new curb stones, 88 cents; old curb stones, 55 cents; catch basins, \$75.

Albert R. C. Clarke, sheet asphalt, \$2.95 per yard; new curb stones, \$1; old curb stones, 65 cents; catch basins, \$75. deferred.

Steeltown, Ont.

Tenders addressed to J. Robinson, town clerk, will be received until July 13th for the following:

- (a) Labor and certain materials, in construction of sewers.
- (b) Vitrified tile pipe junctions.
- (c) Cast iron manhole covers.
- (d) About 600 feet of concrete sewer, sixty inches in diameter.

Plans at the office of above.

Toronto, Ont.

Tenders addressed to G. B. Geary, chairman Board of Control, will be received until July 19th, for laying a 6-ft. steel conduit from a connection with the present intake into Lake Ontario. Specifications, etc., at office of City Engineer.

Victoria, B. C.

A sewer by-law to raise \$50,000 will be submitted shortly to the ratepayers.

Vancouver, B. C.

Tenders will be called for the laying of the sewer in Ward Five on tenth avenue and continuing to the south city limits, the paving of Broadway, from Ontario to Scott; on Dunlevy avenue, from Hastings to Harris, and on First avenue, from Yew to Macdonald.

Welland, Ont.

The by-law to raise \$60,000 to increase the capacity of the waterworks, was defeated; that for \$13,000 for sewer carried.

Winnipeg, Man.

The Board of Control will call for tenders for sewer on Orleans and Rolans streets, from Red River to Carter avenue. Estimated cost, \$21,000.

AWARDED.

Coldwater, Ont.

The following bids were received: (a) c. i. supply mains and distribution system;

(b) ground reservoir; John F. Connolly, Toronto, Ont., (a) \$17,877 (awarded contract), (b) \$3,200; J. E. Farrell, North Bay, Ont., (a) \$18,800; J. Cullon, Huntsville, Ont., (a) \$19,879, (b) \$2,789 (awarded contract); Clement and Curran, Ovelia, Ont., (a) \$20,383; G. B. Moogk, Weston, Ont., (b) \$3,500.

Hamilton, Ont.

City Engineer Macallum was awarded the contract to build a sewer on Charlton avenue at 65 cents, and on Wentworth street at 85 cents.

Moncton, N. B.

The council decided to purchase from W. H. Thorne and Co., St. John, a carload of White Bros. cement at \$1.72 per bbl., and also a carload of Vulcan cement in bags, from Sumner Co., at \$1.75 per bbl.

New Westminster, B. C.

The Hassam Paving Company, B. C., were awarded the contract for paving on Second street. Tenders given in last issue. The Pacific Construction Company was given a contract for laying concrete sidewalks at \$13,750. J. W. B. Blackman, city engineer.

Nanaimo, B. C.

Macdougall and Company, of Vancouver, have been awarded a contract for the construction of \$50,000 worth of sewers in this city, at their tender figure of \$48,346. The work is to be completed within ten months. The estimate of the city engineer was \$50,000. The tenders received were as follows:

The Pacific Coast Construction Company, Victoria, \$74,945.

James C. Kennedy, Vancouver, \$71,205.25.

Hugh Macdonald, Victoria, \$59,523.

John W. Moore, Jr., Victoria, \$53,751.

Outremont, Que.

T. Kruse, secretary-treasurer, writes that the contract for 10,000 feet of concrete sidewalk was awarded to G. Gilbert and Paye, 479 Huntley street, Montreal, at 22c. per square foot. The other tenders ranged up to 28½c. per foot.

Strathcona, Alta.

A. J. McLean, city engineer, writes that the contract for proposed paving in this city for 1910 has been awarded to the Bitulithic and Contracting Limited, at \$3.00 per square yard.

Smith's Falls, Ont.

F. Dolan and Son, of Belleville, Ont., was awarded a contract for the construction of 40,000 square feet of concrete walks at 14½ cents a square foot, and crossings at 16½ cents. Other tenders were: H. A. Pruner, Ottawa, walks, 15½ cents; crossings, 25 cents; H. Winstanley, Morrisburg, Ont., 14½ cents for walks, and 19 cents for crossings.

St. John, N. B.

Tenders for the construction of a sewer in the old Westmoreland road were as follows: W. J. Cain, \$3.50 for rock and 50 cents for earth; Robert Short, \$2 for rock and 40 cents for earth. (Accepted.)

W. J. Cain tendered for water main in Germain street, rock \$3.50, earth 70 cents; a sewer and water main in Murray street from George McHarg—rock \$3.50, earth 90 cents. The engineer thought this tender high, and the matter was left with him to try and make arrangements.

No tender had been received for the work in Bridge street. In this connection Ald. White moved the city put in the Bridge sewer at once, by days work. This was carried.

Two tenders had been received for the supply of cast iron pipe, Singleton, Dunn and Company quoted: 12-inch pipe, \$28.06 per ton, 10-inch, \$28.40 per ton, 8-inch, \$28.91 per ton; 6-inch, \$29.78. (Accepted.)

R. D. Woods, an American founder, quoted: 16, 14, 12, 8, and 6-inch pipe at \$24.15 per ton, and 4-inch, \$26.15.

The engineer pointed out that \$8 a ton would have to be added to Mr. Wood's prices, as that was the amount of the American duty.

Vancouver, B. C.

Contract for the paving of Granville street from Ninth to Sixteenth avenues was recommended to M. P. Cotton at \$56.366. For the grading of Sixteenth avenue from Bridge to Manitoba the successful tenderer was T. R. Nickson and Company, at \$4,300. The tenders for the regrading of Pender street from Dunlevy to Campbell were referred to the engineer for report.

Wingham, Ont.

The contract for the laying of the sewers in Wingham was awarded to Messrs. Pidgeon and Reid, of Stratford, lowest tenderers.

Railroads, Bridges and Wharves

Arden, Man.

Tenders addressed to M. E. Boughton will be received until July 16th for the construction of steel bridge with stone or concrete abutments, etc. Plans, etc., at office of the above, or at the Department of Public Works, Winnipeg.

Everton, Ont.

Tenders are being received until July 14th for 2 concrete bridges. Bowman and Connor Toronto, engineers. For further information see advertisement in this issue.

Halifax, N. S.

A contract between the Provincial Government and the Halifax and Eastern Railway Company has been signed for the building of 204 miles of railway from Halifax to Guysboro, etc. Contract provides that company shall at once make surveys and plans of construction (which is to start by September, 1910, and be completed by Sept. 1st, 1913). Noted in issue of June 22.

Natashquan, Que.

Tenders addressed to R. C. Desrochers, Assistant Secretary, Department of Public Works, Ottawa, Ont., will be received up to the 19th of July, 1910, for the construction of a wharf here.

Port Arthur, Ont.

Port Arthur has a deputation at Ottawa urging that work on the breakwater outside the yards be completed without delay.

Tenecape, N. S.

Tenders are being called by the Public Works Department, Ottawa, Ont., until July 25th, for the construction of extension to breakwater. Plans, etc., at offices of district engineers, Halifax, and Antigonish, and on application to the local postmaster. R. C. Desrochers, assistant secretary.

Tracadie Harbor, P. E. I.

Tenders are being called by Public Works Department, Ottawa, until July 27th for construction of breakwater here. Plans, etc., at office of J. H. Hegan, district engineer, Charlottetown, and on application to postmaster at Grand Tracadie. R. C. Desrochers, assistant secretary.

Vancouver, B. C.

The ratepayers endorsed the by-law placed before them by city council to ratify an agreement regarding False Creek lands and foreshore, made between the city and the Canadian Northern Railway.

City Engineer Clement has been notified by Assistant Chief Engineer Stewart, of the Great Northern Railway, that he was recommending the construction of a bridge over the railway cut at Broadway.

The city engineer was instructed to prepare plans for a wharf at the foot of Balsam street and to call for tenders for the construction of an approach on Third avenue to the Granville street bridge.

AWARDED.

Armow, Ont.

P. B. Campbell, township clerk, writes that the tenders for building a bridge, 30-foot span, in the Township of Kincardine, were considered, as follows: C. S. Wood, \$1,380; John Keyes, \$1,140; Hunter Bridge and Boiler Company, \$1,040 (accepted).

Chilliwack, B. C.

It is stated that the C. N. R. has let the contract for the construction of sixty miles of railway, between New Westminster and Chilliwack, B. C., to the Northern Construction Company, of Winnipeg.

Collingwood, Ont.

We have been informed that tenders for bridge on town line between Nottawasaga and Collingwood Townships, were received as follows: John Lockton, \$738 (accepted); Frank Walker, \$975; Wm. Alborough, \$1,245; H. G. Wynes, \$953; A. Cooper and Brother, \$750.

Gordon, Ont.

We are informed that Frank Dufour has the contract for concrete abutments on bridge, Anderdon Township, at \$685. F. Touragean tendered at \$975.

Guelph, Ont.

The following contracts for bridges in the County of Wellington have been awarded: To J. H. and R. Beattie, Kelly's bridge, 16-ft. flat top, \$289.25, two other bids; McGinn's bridge, 12-ft. flat top, \$271.45, three other bids; Mickle's bridge, 12-ft. arch, \$554.60, two other bids; Harper's bridge, 14-ft. flat top, \$357.50, two other bids; Sanderson's bridge, 40-ft. flat top, \$808.55, five other bids; J. Galvin, Four-Mile Creek bridge, 48-ft. arch, \$1,690, four other bids; Simmons Brothers, Colquhoun's bridge, 24-ft. flat top, \$376, four other bids; Mr. Clemens, Moorfield bridge, steel structure new abutments, \$1,649, five other tenders; Hamilton Bridge Company, strengthening old bridge and putting in concrete floor, \$669, six other bids; Jno. D. Callaghan, Gleming's bridge, 10-ft. flat top, \$238, three other bids; Mr. Brydon, Damascus bridge, 12-ft. flat top, \$235, three other bids. Bowman and Connor, consulting engineers, Toronto.

Kamloops, B. C.

The contract for the new C. P. R. machine shop and roundhouse here has been let to McDermott and Co., of Winnipeg. C. P. R. supply the steel. Estimated expenditure, \$250,000.

Winnipeg, Man.

The National Transcontinental Railway Commission has awarded important contracts for the workshops at Winnipeg, in every case the contract being awarded to the lowest tenderer. The Morgan Engineering Company, of Alliance, Ohio, secures the contract for one 140-ton electric traveling crane; Mussels, Limited, of Montreal, have been awarded contracts for eleven electric (Booth) cranes; George Anderson and Company, Montreal, will supply one five-ton grey iron foundry crane, five hand power traveling cranes, and 15 (Gib) cranes, and twenty foundry equipment cranes goes to the Whiting Foundry Equipment Company, of Harvey, Ills.

Public Buildings, Churches Schools, etc.

Brantford, Ont.

Tenders addressed to M. E. B. Cutcliffe, chairman Building Committee, Public School Board, will be received till August 8, for plumbing, gas piping, electrical work, required in King Edward and Byerson Schools. C. W. Hall, architect.

Balcarres, Sask.

Tenders addressed to J. D. McLean, secretary, Department of Indian Affairs, Ottawa, will be received until July 16th for the erection of a brick veneered school at File Hills, near here. Plans, etc., at Indian office, Winnipeg; also at office of Dominion Lands, Regina.

Bervie, Ont.

Tenders addressed to W. McComb, secretary-treasurer, Bervie, will be received until July 9th for repairing, etc., of school house in Sec. 9, South Line, Kincardine Township.

Duncans, B. C.

The King's Daughters, at their convention in Vancouver, decided to erect a convalescent home here. Miss Leitch, Provincial secretary, Victoria.

Gladstone, Man.

The skating rink and grand stand in the exhibition grounds were completely wrecked by the gale of the 22nd ulto.

Ladysmith, B. C.

Tenders were called until July 4th for erection of public hospital, according to plans prepared by S. F. Birds, A.B.I.B.A. W. J. Forbes Robertson, chairman Hospital Building Committee.

Midland, Ont.

Tenders are being called until July 18th for the erection of a new school at Old Fort. Plans, etc., at home of A. Parker, Old Fort.

Mitchell, Ont.

Mr. T. Hepburn, architect, Stratford, is preparing plans for remodelling the town hall, etc. Tenders will be asked for as soon as the plans are completed.

Montreal, Que.

A permit was issued for construction of basement of St. Zotique church, on Notre Dame street. Present expenditure on church, \$25,000; on presbytery, about \$15,000.

The Government has authorized T. Daoust, 90 St. James street, to prepare plans for the remodelling of the old post office on St. James street. Government appropriation, \$80,000.

It is reported that a new building will be erected by the Notre Dame hospital authorities shortly.

The Grey Nuns will erect a large building on the property at the corner of Sher-

brooke, Milton and St. Lawrence Boulevard.

Northfield, Ont.

The Advent Church, George Rupert's residence, and a large public hall, were destroyed by fire on the 29th ulto.

New Westminster, B. C.

Tenders for the construction of the new Royal Columbian hospital will be called for this week.

A horse show building with seating capacity of \$3,500, an arena 75 feet by 200 feet in the clear, and an amphitheater 130 by 270, will be erected for the Provincial exhibition. It is expected that much of this structure will be finished in time for this year's show.

Ottawa, Ont.

Tenders addressed to R. C. Desrochers, assistant secretary, will be received until July 11th for the supply of boilers, etc., for Langevin Block. Plans, etc., at above department.

Phoenix, B. C.

Theo Phoenix school board will shortly commence preparations to build a new school which will cost about \$12,000. C. B. McAstocker, chairman; P. J. Cosgrove and T. A. Love, secretary.

Prince Albert, Sask.

The ratepayers have decided to take over the hospital. A nurses' home will be erected, and about \$5,000 spent in improving the hospital.

Quebec, Que.

The federal department of militia will erect a two-storey ordnance steel building at the foot of Palace Hill in proximity to the arsenal.

Swift Current, Sask.

Tenders addressed to W. H. Field, secretary, school board, will be received until July 8th for the erection of addition to school. Plans, etc., obtained from the above mentioned, or from Storey and Van Egmond, architects, Regina and Saskatoon.

Somerset, Man.

Tenders addressed to Board of School Trustees of Richard school district, No. 1092, will be received until July 11th, for the instalment of a low pressure steam heating plant, and fire escape. J. A. De-Cosse.

St. Emard, P. Q.

It is stated that the Protestant Public school will shortly be erected in this municipality.

Strathcona, Alta.

The plans for the new school building, to be erected east of Mill Creek, are to be seen at the offices of Messrs. Wilson and Herald, Whyte avenue. It is expected that the school board will now be in a position to call for tenders at an early date. Estimated cost, \$15,000.

Toronto, Ont.

Theron Gibson has been appointed chairman, and A. H. Jeffrey, secretary of the committee to procure site for Grosvenor street congregation. Noted previously.

It is stated a new and up-to-date vaudeville house is to be erected on the corner of Yonge and Shuter streets. Cost \$25,000. D. J. Bondy, of California, is interested.

In regard to the tenders for band stand, the lowest was \$4,565, ranging up to \$7,787. Board of Control's estimate, \$2,000. No decision.

It is stated that nearly ten acres have

been presented to Bishop Strachan School as a site for new school. S. H. Jones, bur-sar. Plans are being prepared.

Tenders will be received until July 12th for heating palm house in Allan Gardens. G. R. Geary, chairman Board of Control.

The Unitarian Church, Jarvis street, are to consider in the fall the advisability of changing their location. R. J. Hutcheon, pastor, is away until September. Victoria, B. C.

A by-law to raise \$45,000, the amount estimated for the new isolation hospital, recommended by the city council, will probably be submitted shortly.

Vancouver, B. C.

C. T. Perry of this city has prepared plans for St. James Church, Cordova street and Gore avenue. Material, stone throughout. Estimated cost, \$100,000.

Winnipeg, Man.

Tenders are being called by the Public Works Department, Ottawa, Ont., until July 18th, for customs and savings bank fittings. Plans, etc., at above department and on application to J. Greenfield, resident architect. R. C. Desrochers, assistant secretary.

Tenders will be received by J. H. G. Russell, architect, Silvester-Willson Building, until July 7th, for the erection and completion of a brick and reinforced concrete hospital building for the Children's Hospital Board.

AWARDED.

Dresden, Ont...

We are informed that the contracts of the Dresden School building were let as follows: Blonde Lumber and Mfg. Co., masonry and plastering, carpenter work, roofing, tinsmithing, slate black boards, painting, and glazing.

In the above the Blonde Company included the local tenders for roofing, tinsmithing, and slate blackboards, as submitted by Wells and Wells, Dresden, Ont.

The heating and ventilation has been let to J. B. Carscellan at Dresden, the system to be hot air.

The plumbing, electric wiring have not been let yet.

Montreal, P. Q.

G. A. Monette, architect, 97 St. James street, has awarded the general contract for the erection of St. Jean Berchmans chapel and school, corner Shaw and Comte streets, to O. Villeneuve, contractor.

Contracts have been awarded as follows for erection of Church and Presbytery for the parish of St. Zotique, P. Q.: General contract, D. Gagne; stone work, Filion Freres; brick work, J. D. F. Villemare. Messrs. MacDuff and Lemieux, architects.

North Toronto, Ont.

The tender of Mr. N. Auld was accepted for the construction of a basement under the town hall for \$840. Mr. Schulkins received the contract for the installing of the steam heating plant at \$1,045.

Quebec, Que.

Tenders for the construction of a wall on the seminary property between the Archbishop's Palace and Laval University, in Rampart street, was awarded to Mr. Alphonse Cote, for \$6,872.

Toronto, Ont.

The Property Committee of the Board of Education have awarded the following contracts for repairs to and extensions of school premises in the city: Carpentry, Humberside Collegiate, O. C. Pook, \$326; Parkdale Collegiate, W. Eaton, \$576; Riv-

erdale School, W. Williamson, \$220; painting, F. J. Cox, \$307. Enlarging Howard street school: Masonry, R. Hewitt and Son, \$13,491; reinforced concrete, A. Gardner and Co., \$3,700; carpentry, M. Hutchinson, \$6,385; structural steel work, W. H. Salter, \$1,000; roofing, A. B. Ormsby Co., \$1,098; plastering, Beaver and Company, \$1,700; painting, J. Phinnemore, \$1,025; heating and ventilating, W. F. Rutley Co., \$3,300; plumbing, Fred Armstrong, \$1,531. Pape avenue school: Masonry, B. Chalkley and Son, \$1,875; carpentry, W. Eaton, \$375; roofing, Flowers and St. Leger, \$6; painting, T. Barrett, \$250. Shirley street school: Masonry, H. Hewitt and Son, \$2,000; carpentry, W. Eaton, \$410; roofing, Flowers and St. Leger, \$58; painting, R. J. Wray, \$145. Pyne school: Carpentry, C. Hollett, \$2,020; painting, J. Taylor, \$270. Contracts for general carpentry were awarded for nine other schools at amounts varying from \$86 to \$427; also 13 for painting at the same number of schools, which ranged from \$160 to \$365. Mr. W. J. Simmons secured the contract for grading and sodding at Clinton, Ogden, and McCaul schools, at \$255.

Victoria, B. C.

The contract for the improvements to the plumbing at the South Park school to Colbert and Company, at \$1,827, was awarded.

Vancouver, B. C.

Rankin and Cherrill have been awarded the contract for wiring the interior of the industrial building on the exhibition grounds, at \$725. There will be 22 arc and 190 incandescent lights. The exhibition association is now seeking for tenders for decorative lighting of the exterior of the industrial building and grounds. The tender calls for 8,000 incandescent and 25 arc lights.

Watrous, Sask.

Adam Reid, this town, was awarded the contract for the erection of the Manitou Lake Sanatorium, at \$50,000. President of the company, J. Erzinger; Dr. E. N. Morrel, Winnipeg, secretary-treasurer.

Wainwright, Alta.

We are informed that the contract for the erection of brick school was awarded on the 27th ulto., to P. D. Laird and Son, this city, at \$15,000. Others tendered as follows: Neil Stewart, Saskatoon, \$17,950; T. E. Dolan, Wainwright, \$16,500; T. J. Brocklebank, Melville, \$13,790 (not regular); W. D. McKay, Wainwright, \$15,775; Alberta Construction Company, \$14,400; H. V. Fieldhouse, secretary-treasurer.

Residences

Brandon, Man.

The officers of St. Paul's Presbyterian Church are considering the erection of a new manse. Mr. W. H. Sillinglaw has been commissioned to prepare plans.

Hamilton, Ont.

Recent building permits include:

Henry Dunham, brick dwelling on Charlton avenue, for Mrs. A. Campbell, \$2,700; W. A. Pettit, brick dwelling on Central avenue, Fred Stone, \$2,200.

Montreal, Que.

Messrs. MacDuff and Lemieux are preparing plans for the erection of a residence in St. Henri for Mr. Villemare.

Plans have been prepared by J. Ogilvy Harris for the erection of a residence at Notre Dame de Grace, Cote St. Antoine

road, for Mr. George Marcell. Estimated cost, \$25,000.

St. Thomas, Ont.

The old St. John's church, on Balaclava street, has been purchased by Alf. Horton, contractor. Mr. Horton will erect two modern two-storey red pressed brick residences on the site.

Victoria, B. C.

Plans have been drawn for a handsome residence on Oak Bay avenue for Max Leiser. Building operations will commence shortly.

Vancouver, B. C.

Mr. R. D. Patterson has made application for a permit for a handsome new residence at 1255 Thirteenth avenue west, to cost \$4,000.

On Granville street a permit was granted for a \$45,000 four-storey brick-built rooming house for Mr. C. P. Gustafson.

Winnipeg, Man.

H. Browning has secured a permit to construct an apartment block on the north side of St. Mary's, at \$15,000.

The following permits for dwelling houses were issued recently:

West End Realty Company, west side Banning street, \$3,600; W. McIntosh, west side Home street, \$4,200; G. L. Stephenson, north side of William, \$5,500; John Beattie, south-east corner of Banning street and Einarson avenue, \$2,700.

AWARDED.

Montreal, Que.

General contract for the alterations to residence of Mr. H. S. Holt, on Stanley street, has been awarded to Chas. Thackeray Co., general contractors, 127 Stanley street. Architect, H. C. Stone, 84 St. Francois Xavier street.

Mr. Alex. MacKay is erecting two apartment houses on Oldfield avenue. Contract for the erection of the masonry and brickwork, has been awarded to Wm. McArthur and Sons, contractors, 459 Clarke avenue, Westmount. Architect, J. Seath Smith, 207 St. James street.

Contract for the wiring in connection with the additions to the Alliance Building has been awarded to M. Rubenstein, 342 St. James street. General contractors, J. and W. Morrison, Latour street.

The following contracts for plumbing and heating have been awarded to John A. Gordon, 301 St. Antoine street: Residence, Hon. Frank Gilman, Arlington avenue, Hutchison, Wood and Miller, architects; house, B. Tansey, Belmont street, W. E. Doran, architect; Welcome Hall, St. Antoine street, Ross and McFarlane, architects; two tenements on Esplanade avenue, for E. J. Rivet.

Business Buildings and Industrial Plants

Allandale, Ont.

The shipping sheds and weigh house of the Grand Trunk Railway were destroyed by fire on the 2nd inst. Estimated loss, \$3,500.

Bridgeburg, Ont.

Plans for the shipbuilding plant and dry dock here are now being prepared. Buffalo capitalists are interested.

Brandon, Man.

Tenders were called until July 4th for erection of four-storey warehouse for the Cockshutt Ploy Company. J. C. H. Inkster, local agent. Noted previously.

Cascapedia, Que.

A company is seeking permission to construct a dam at Cascapedia and erect a lumber mill, the whole to cost about \$200,000. Hon. Jules Allard, Minister of Crown Lands; Senator Edwards, H. G. Turner, engineer, New York, and Angus McClean, Buffalo, are interested parties.

Hamilton, Ont.

The Hamilton Brick Company suffered serious loss by fire on the 1st inst.

Lavallee, Ont.

It is stated that the hotel, Canadian Northern Railway station, and mill were destroyed by fire on the 30th ulto.

Monckton, Ont.

The grain elevator owned by Hay Bros was destroyed by fire recently. Loss, \$2,800.

Montreal, P. Q.

Tenders are now being received for the general contract for erection of the Dominion Express Building, on St. James street, and these will close July 12th, at the office of Mr. W. S. Painter, C. P. R. Architect, Windsor station.

Lawrence A. Wilson and H. A. Dorsey, incorporated under the name of the Carslake Hotel Company, Limited, have purchased the Carslake Hotel property on St. James street. The sum of \$75,000 will be expended on additions to the property on Windsor street about the 1st of September.

The Montreal News Company's premises on St. James street were badly damaged by fire on the 1st inst. Loss, about \$8,000.

Ottawa, Ont.

Plans for two large drydocks have been approved by the Government. One is to be built at Sault Ste. Marie, and the other at Vancouver. The Sault dock is to be seven hundred feet long and cost \$900,000. The Vancouver dock is to cost about \$1,200,000. This is to be a floating dock, with a lifting capacity of fifteen thousand tons. The company contemplate the operation of a car construction plant in conjunction with its drydock and shipbuilding and repairing industry. The car works will involve an additional outlay of \$250,000.

The Canadian branch of the Beaver Company, of Buffalo, N.Y., will locate here. It is announced that work will start immediately on the erection of a factory building. J. MacGlashan, representative.

Portage la Prairie, Man.

The Hart Parr Gasoline Engine Company are looking for a favorable site for warehouses, which they purpose erecting when site is secured. I. P. Porter, local agent.

Spanish River, Ont.

The saw mill of Wm. Milne & Sons, Limited, was destroyed by fire on the 28th ulto. Estimated total loss, \$40,000.

Saskatoon, Sask.

Tenders will be received at the office of the Sawyer Massey Company, Limited, Winnipeg, until July 9th for the erection of a reinforced concrete and brick warehouse here. Plans, etc., at office of the secretary, Builders' Exchange, Winnipeg, also at the offices of the architect, Yorkton, and this city.

St. Lambert, P. Q.

The Monarch Electric Company propose to establish a manufacturing plant in St. Lambert, providing the local council will grant exemption from taxes and also free water for twenty-one years.

Toronto, Ont.

The Roman Stone Company has specifications out for an immense new building.

Victoria, B. C.

Messrs. P. Burns and Company have purchased a site on Store street, where, it is stated, they will erect a cold storage plant and warehouses. Estimated expenditure, \$90,000.

Vancouver, B.C.

Plans were passed for a brick warehouse on the C. P. R. reserve, Beatty street, to cost \$22,000. A \$21,000 structure for warehouse purposes will be erected in the same locality for Messrs. E. C. Prior and Company.

On the 27th ulto. fire destroyed the buildings and plant of the Eagle Harbor Packing Company, on Howe Sound, ten miles from this city. The loss is estimated at \$50,000.

The Dominion Stock & Bond Corporation have purchased property on the corner of Granville and Cordova streets. It is stated that a large building will be erected on the acquired site.

A permit was taken out by the Vancouver Milling and Grain Company for \$40,000, and covers a new warehouse and grain elevator on the company's tract on the Canadian Pacific Railway reserve. Mr. J. A. Sayward also obtained a permit for a six-storey structure, but three storeys are all that will be erected at present. Messrs. G. C. Mesher and Company have secured the contract. The cost of the building is placed at \$100,000.

W. Owen, C.E., of London, Eng., is authority for the statement that the company he represents will shortly establish a large steel plant here, for which about 50 acres have been secured. Estimated expenditure, \$15,000,000. Preparations for construction will start immediately after registration, which will probably be during the last week of August.

Waterloo, Ont.

The Dominion Box Factory was destroyed on the 1st inst. Loss about \$30,000.

Welland, Ont.

The bylaw to grant fixed taxation to the Peters Company, who will build a three-storey brick factory here, was carried.

Winnipeg, Man.

The Alaska Bedding Company's factory was damaged on the 29th ulto. to the extent of about \$35,000.

Tenders addressed to D. W. McCunig, chairman, Manitoba Elevator Commission, 279 Garry street, were received until July 5th. Plans, etc., at office of above.

Tenders addressed to James Chisholm and Son, architects, were received until July 2nd for purchase and removal of buildings and necessary excavation, etc., required by the Royal Realty Company, corner of Portage avenue and Smith street. Information at office of the above.

Dingle and Stewart have a permit for a two-storey addition to their building at 263 Stanley street, \$10,000.

Tenders are called until July 6th for erection of building for the Empire Meter and Engine Company. Plans, etc., at office of the architect, W. W. Blair, Nanton Building.

AWARDED.

Montreal, Que.

Contract for alterations to the premises of Mark Workman, Notre Dame street, have been awarded as follows: Wood work and painting, J. H. Randolph & Company;

plumbing, R. N. Sevigny. Messrs. MacDuff & Lemieux, architects.

W. Beverley Robinson has closed a contract with A. Rosenthal & Sons, Limited, of Ottawa, to supply Doulton & Company's glazed terra cotta "Carrara" for the new shop being erected on Sparks street. St. John, N. B.

We are informed that the contracts for the following trades in the extension of the St. John Exchange were awarded as follows: Masonry, B. Mooney and Sons; carpentry, A. E. Hamilton; structural steel, etc., Jas. Fleming; painting, J. Johnston; sheet metal, Jas. McDade; roofing, G. S. Fisher and Son; electric wiring, heating, and plumbing, not yet awarded. G. Ernest Fairweather, architect.

Victoria, B.C.

We are informed that Dinsdale & Malcolm have been awarded the contract for the erection for Sweeney & McConnell, printers, of brick building, three storeys and basement, enamelled brick front, at \$14,000; also that the amount of contract for Drake Hardware Company's building is fixed at \$15,000. Noted in last issue. H. Griffith, architect.

Waterloo, Ont.

The Sanitary Flooring Company, of 544 King street west, Toronto, have been awarded the contract for laying "Sanorta" flooring in the new Grand Trunk station.

Power Plants, Electricity and Telephones

Belleville, Ont.

Tenders will be received until July 6th for the erection of a power house for the Brockville Light and Power Department. B. Dillon, architect.

Ingersoll, Ont.

Mr. Ross, of the firm of Ross and Holgate, Montreal, has been engaged to prepare plans, get tenders, and generally supervise the recently-acquired plant of the Ingersoll Electric Power and Light Company.

Kenora, Ont.

It is stated that the Reese Engineering Company have acquired the Keewatin Power Company's power and property. The intention is to supply several Manitoba municipalities, of which it is stated Brandon has accepted an offer equivalent to 2,500 h.p. at \$20 per h.p. Date fixed for delivery, December, 1911.

Kingston, Ont.

The Seymour Power and Electric Company are offering the supply of electric power at \$25 per a. p.

New Hamburg, Ont.

Tenders are being received until July 18th for electrical apparatus. E. B. Merrill, 59 Yonge street, engineer. W. Millar, town clerk. For further information see "Tenders and For Sale Department" of this issue.

Ottawa, Ont.

The Municipal Electrical Department is calling for tenders until July 7th for 42,000 feet of vitrified clay conduit, 4 k.w. air blast transformers, with blower equipments, and 25 manhole covers. J. E. Brown, superintendent.

Regina, Sask.

Tenders addressed to S. P. Porter, Deputy Minister Railway and Telephones, will be received until July 12th for erec-

tion and installation of the following exchanges: Watrous, Outlook, Scott, Humboldt, Vonda (Davidson, Craik, Broadview, Whitewood, Carlyle. Plans, etc., at Department of Railways, etc.

Strathcona, Alta.

The municipality of Leduc has asked this city to supply electric light and current for power purposes. Ald. Richards, chairman of Fire and Light Committee.

Welland, Ont.

The by-law to grant franchise to electric railway through the town was carried; that for electric fire alarm defeated.

AWARDED.

Montreal, Que.

Messrs. Ross and Greig have been awarded the contract for the installation of four tandem compound Goldie and McCullough engines in the Chateau Laurier, Ottawa.

Miscellaneous

Montreal, Que.

Recent building permits include: Jos. Beaulac, 1127 Laurier avenue, six houses containing eighteen dwellings, \$22,000; Ant. Viens, 1024 Cartier, six houses containing eighteen dwellings, \$10,800; H. Forget, 1956 Dufferin, three houses containing six dwellings, \$6,000; E. Laliberte, 204 Bernard, one house containing two dwellings, \$3,000; J. T. Decarier, 365 Decarie avenue, one house, \$3,500; M. Ville-neuve, 131 St. Elizabeth du Portugal, one house containing three dwellings, \$2,700; James Scott, 651 St. James, business block, \$10,000; O. Galarneau, 2337 St. Lawrence, two houses containing four dwellings, \$6,000; Dominion Trust Company, Wilder Building, two houses containing four dwellings, \$9,000; Mrs. J. B. Papineau, 49 Marechal avenue, one house containing two dwellings, \$3,000; Mrs. E. Shirres, 583 Dorchester street, one house, \$20,000; F. E. Merritt, 205 St. James street, one house, \$14,000; H. J. Ferguson, London Lancashire Building, one house, \$12,000; G. H. Hansen, 2692 Manse, one house containing two dwellings, \$3,000; T. Danien, 1132 St. Dominique, one house containing three dwellings, \$4,500; L. Aubuchan, 603 Laval, one house, \$2,800; A. Bilodeau, 132 Beaubien, two houses containing six dwellings, \$6,000; J. A. Stevenson, Montreal, two houses containing eight dwellings, \$10,000; Laliberte, 206 Beaudry, two houses containing five dwellings, \$5,000; E. Varin, 1372a Parthenais, one house containing three dwellings, \$3,000; A. Dumont, 1127 Cadieux, one house, \$4,500.

Ottawa, Ont.

This municipality is receiving until September 2nd tenders for the purchase of \$362,800 30-year debentures, and \$257,707.11 20-year. Chas. Hopewell, mayor.

Toronto, Ont.

The city engineer has been requested to report to the board, estimate of the cost of construction of concrete wall in front of the Lake Front boulevard, from the westerly limit of the wall now under construction at Grenadiers' Pond, to the Humber river.

Recent building permits include:

W. H. Harris, 2-storey brick stable, on 330-2 Gerrard street east, \$5,000; J. L. Nichols Company, 2-storey brick factory, 184 Spadina avenue, \$20,000; J. S. Hedge, 8 detached 2-storey brick dwellings on Weston road south, \$16,000; E. Johnston, 3-storey brick stores, 1650-2 Dundas street, \$12,000; J. M. Walker, 1 pair semi-detach-

ed 2½-storey brick dwellings, on Sunny-side, \$5,800; J. Pherrill, 2 detached 2-storey brick dwellings, on Wright avenue, \$6,000; Pinchin Johnston Company, 4-storey brick factory, on Carlaw, \$26,000; Mrs. Hills, 5 attached 2-storey brick stores and apartments, Teranley, \$12,000; G. M. Bryan, 3-storey brick addition to restaurant, 15 Temperance, \$6,000; Henry Carter and Dubois, 189 Amherst, three houses containing nine dwellings, \$11,000; B. Damiens, 898 Mount Royal avenue, two houses containing two dwellings, \$10,000; A. Marsolais, 209 St. Andre, two houses containing eight dwellings, \$4,500; A. Jarry, 125 Boyer, one house containing two dwellings, \$3,500; L. Dalbec, 287 Garnier, three houses containing six dwellings, \$4,500; W. Robitaille, 819 Sanguinet, one house containing two dwellings, \$3,000; A. Robillard, 408 St. Denis, two houses containing six dwellings, \$8,000; A. Duranleau, 44 St. Lawrence, one house containing three dwellings, \$8,000; J. M. Wilson, 678 St. Urbain, one residence, \$45,000; Jos. Laurier, 385 Ontario east, one warehouse, \$8,000; Alex. MacKay, St. Martin street, four houses containing sixteen dwellings, \$24,000; N. Deslauriers, 432 Sherbrooke, three houses containing nine dwellings, \$18,500; T. A. Waterson, 831 Albert, one house containing three dwellings, \$4,000; H. Jaffery, 19 St. John, six houses containing six dwellings, \$21,000; H. L. Deslauriers, 1427 Papineau, one house containing five dwellings, \$4,000; Z. Coulombe, 431 Garnier, two houses containing six dwellings, \$4,000; T. Clermont, 544 Frontenac street, one house containing six dwellings, \$3,000; P. Demers, 115 Van Horne avenue, one house, \$4,000; F. X. Company, 2-storey brick dwelling, Concord, \$6,000; Weismiller and MacKenzie Brothers, 2 detached 2-storey and attic brick dwellings, Marion street, \$6,000; Wm. Horwood, 3 attached 2-storey brick dwellings, corner Shaw and Yarmouth, \$6,000; R. McCauley, 2 pair semi-detached 2-storey and attic brick dwellings, 769-775 Markham street, \$10,000; Bachrach and Company, alterations to store, corner Albert and Yonge streets, \$5,000; Massey-Harris Company, 3-storey brick addition to factory, King street, \$7,500; Standard Bank, 2-storey brick bank and dwelling, corner McCaul and Caer Howell, \$7,500; W. S. Meredith, 2-storey brick dwelling, Glendale, \$5,800; Standard Bank, 3-storey brick bank and dwelling, 249 Avenue road, \$10,000; Standard Sanitary Manufacturing Company, 6-storey brick and steel warehouse, corner Boyes and Lansdowne, \$45,000; M. H. Pringle, 1 pair semi-detached 2-storey brick dwellings, 128-130 St. Helen's avenue, \$5,500; C. O. Lasby, 1 pair semi-detached 2-storey and attic brick dwellings, Roncesvalles avenue, \$6,000; Dr. K. Peaker, 2-storey brick dwelling, 8 Laxton avenue, \$5,500; John Stacey, 4 pair semi-detached 2-storey roughcast dwellings, brick fronts, Carlaw avenue, \$5,000; J. Singer, 2 pair semi-detached 2½-storey brick dwellings, Stephanie street, \$3,000; H. O'Hara, 2½-storey brick dwelling, Elm avenue, \$9,000; R. Gillies and Company, 2 pair semi-detached 2-storey brick dwellings, Fern avenue, \$11,200; Malachi Yetman, 3 pair semi-detached 2-storey brick dwellings, Dufferin, \$12,000; W. W. Hiltz, 2 detached 2-storey brick dwellings, Danforth avenue, \$6,200; R. C. Bustard, 4 pair semi-detached 2½-storey brick dwellings, Pricefield, \$22,000; Sisters of Our Lady of Charity, 4-storey brick addition to laundry, West Lodge avenue, \$30,000; T. E. Washington, 2 pair semi-detached 2-storey brick dwell-

(Continued on page 31)

Tenders and For Sale Department



Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on TUESDAY, JULY 19, 1910, for laying a 6-foot steel conduit from a connection with the present intake southerly into Lake Ontario a distance of 500 feet, including all connections.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and plans may be seen, and forms of tender obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman Board of Control.

City Hall, Toronto, July 4, 1910.

27



Department of Railways and Canals, Canada

Quebec Bridge

Tenders for Superstructure

Notice to Contractors

Sealed tenders, addressed to the undersigned and endorsed "Tender for Quebec Bridge Superstructure," will be received at this office until 12 o'clock noon, not later than SEPTEMBER 1ST, 1910, for the superstructure of a Bridge across the St. Lawrence River near the City of Quebec.

Plans and specifications may be seen and forms of tender obtained on and after July 1st, 1910, at the office of the Quebec Bridge Board of Engineers, Canadian Express Building, Montreal, and at the Department of Railways and Canals, Ottawa.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$500,000, made payable to the order of the Minister of Railways and Canals of Canada, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted and in accordance with the terms stated in the form of contract accompanying the specifications.

Cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The lowest or any tender not necessarily accepted.

L. K. JONES,

Secretary.

Department of Railways and Canals,
Ottawa, 17th June, 1910,

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

28

NEW HAMBURG Debentures for Sale

Tenders will be received by the undersigned up to 2 o'clock p.m., JULY 18TH NEXT, for the purchase of \$8,000 4½ per cent. Electric Light Debentures of the Village of New Hamburg, payable in thirty equal annual instalments.

WM. MILLAR, Clerk.

New Hamburg, June 23rd, 1910.

28

Sealed Tenders

marked "Tenders for Bridge," will be received by me at my office, in the County Buildings, in the Town of Cornwall, until 12 o'clock noon, of MONDAY, THE 18TH DAY OF JULY, 1910, for making the necessary excavation and the construction of a reinforced Concrete Arch Bridge over the River De Lisle, on the Military Road about one and one-half miles north of the Town of Alexandria, in the County of Glengarry; also the grading of approaches and the construction of wing-fences. The estimated quantities are as follows:

95 cubic yards reinforced concrete.

282 cubic yards excavation.

4¼ cubic yards rock excavation.

760 cubic yards grading.

342 feet of wing fence.

Plans, specifications, etc., may be examined and forms of tender procured at my office, or at the office of Magwood & Walker, Civil Engineers, Cornwall.

A marked cheque or cash deposit equal to 10 per cent. of the tendered price must accompany each tender.

The lowest or any tender not necessarily accepted.

A. I. MACDONELL, Counties' Clerk,
Stormont, Dundas and Glengarry,

27



Notice to Contractors

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, endorsed "Tender for Section No. 6, High Level Interceptor," will be received by registered post only, until noon of TUESDAY, JULY 26TH, 1910.

The sewer consists approximately of 1,840 lineal feet of reinforced concrete pipe sewer, 5 feet internal diameter, extending from Defoe street at Stanley Park in a northerly direction to a point about 500 feet north of Queen street.

Specifications can be obtained from and original drawings will be on file and can be seen at the Main Drainage Department, City Engineer's Office.

For the convenience of contractors, sets of blue prints have been prepared and will be issued to contractors upon the deposit of \$5.00, which amount will be refunded upon return of blue prints in good condition within thirty days of receiving tenders.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained. The lowest of any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto, June 23rd, 1910.

26

Canadian Pacific Railway Central Division

Tenders are hereby requested for the construction of Piers, Abutments and Pedestals for Bridge over the Kaministiquia River at Port William. Plans, specifications and forms of proposal can be seen at the office of the Engineer of Bridges, Montreal; Division Engineer, Toronto, and Division Engineer, Winnipeg. Proposals must be made out on the Company's standard proposal form, and sealed in an envelope, plainly marked "Proposal for Kaministiquia River Bridge, Port William." These must be delivered at the office of the Division Engineer, Winnipeg, by 12 o'clock JULY 15TH. The right is reserved to reject any or all proposals.

(Signed) FRANK LEE,
Division Engineer.

28

For Sale Steam Shovel

One Style "A" Marion Steam Shovel, 1¼ yard dipper capacity, about 45 tons working weight, in first-class condition, with new extra heavy reinforced boom, latest style new independent crowding engines, all thoroughly overhauled, the boiler just re-tubed. Can be inspected where it is now working. Offered subject to inspection and acceptance before shipment, and subject to prior disposition.

Apply

F. H. HOPKINS & CO.,
New Imperial Bank Bldg., Montreal.

24

City of Moose Jaw Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A," "Tender B," etc., will be received by the undersigned City Clerk until 8 o'clock, p.m., on MONDAY, JULY 18TH, 1910, for the following:

Contract "A." Supplying material for and constructing Sewage Disposal Plant complete, and laying Trunk Sewer.

Contract "B." (1) Supplying and installing a complete Air Lift System; (2) Supplying and installing one electrically-driven Centrifugal Pump and Auto Starter.

Contract "C." Supplying and delivering 3,000 cords of Field Stone.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw, and also at the office of the "Canadian Engineer" at the following addresses:

Toronto, 62 Church Street.
Montreal, B33 Board of Trade Building,
Winnipeg, Room 404 Builders' Exchange Buildings.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.

Moose Jaw, Sask., July 16th, 1910.

28

County of Wellington

Bridge Tenders

Tenders will be received up to the hour of letting at Everton, at 2 p.m., on THURSDAY, JULY 14th, 1910, for

10-ft. Concrete Bridge.
15-ft. Concrete Bridge.
both to be built on the town line between the Townships of Eramosa and Erin. For further information apply to the engineers.

BOWMAN & CONNOR,
36 Toronto St., Toronto.

27

City of Belleville

Waterworks Pumping Plant

Sealed tenders endorsed Pumping Plant will be received by the City Clerk up to 20th JULY, for the following pumping equipment:

A. Two turbine pumps, direct connected to proper motors, with lightning preventive apparatus, and starting apparatus.

B. Two triplex pumps, also direct connected to similar motors and apparatus.

Note.—Equipment to be installed by contracting company. Each pump to have a guaranteed capacity of 1,000 gallons per minute against a head of 240 feet. Three phase alternating current, 60 cycles, 2,200 volts. Supplied with water meter.

Further particulars can be obtained on application to the undersigned.

The lowest or any tender not necessarily accepted.

JAMES G. LINDSAY,
City Engineer.

Belleville, July 4th, 1910.

Sealed Tenders

will be received by the Secretary-Treasurer for the Town of Yorkton, Sask., until 6 p.m., JULY 12TH, 1910, for the following:

Contract No. 1.

Construction of a Sewage Disposal Works for the Town of Yorkton.

Contract No. 2.

Construction of the following sewers:

Approximately 2,900 feet of 20-inch sewer.

Approximately 8,200 feet of 15-inch sewer.

Approximately 1,700 feet of 10-inch sewer.

Approximately 2,800 feet of 8-inch sewer.

Contractors may tender on either or both of the above. Plans and specifications may be seen and forms of tender obtained, at the office of the Town Engineer. A marked cheque for 5 per cent. of the amount of the tender must accompany each bid. The lowest or any tender not necessarily accepted.

F. T. McARTHUR,
Town Engineer.

Town of Yorkton, Sask.

27

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—A large quantity of galvanized steel, suitable for re-inforcement. Would suit to sizes to suit purchasers. Enquiries solicited. GOOLD, SHAPLEY & MUIR COMPANY, Limited, Brantford, Ontario.

28

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 inch x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail. —WM. LESSLIE, Walkerville, Ont.

TF

Tenders for

Electrical Apparatus
for New Hamburg, Ont

Tenders will be received up to noon of MONDAY, 18th JULY, 1910, by the Municipality of New Hamburg, Ont., for

1. 13,200/2,200 volt transformers.
2. Switching apparatus.
3. Protective apparatus.
4. Street lighting apparatus.
5. Distributing transformers.
6. Maximum demand apparatus.

Full information may be had from the undersigned, or at the office of the engineer, Edward B. Merrill, 59 Yonge street, Toronto, where specifications, etc., may be had by bona fide tenderers.

WILLIAM MILLAR,

Town Clerk.

New Hamburg, Ont., 25 June, 1910.

27

Miscellaneous

(Continued from page 27.)

ling, St. Clarens, \$8,000; T. Walker, 3 attached 2-storey brick dwellings, 1308-10-12 College street, \$6,000; W. A. McConnell, 2 pair semi-detached 2½-storey brick dwellings, Margueretta street, \$8,000; A. B. Coleman, 2-storey and attic brick dwelling, 108 Bernard avenue, \$4,500; J. T. Smyth, 4 detached 2-storey, roughcast dwellings, brick fronts, Carlaw, \$6,000; Home Bank of Canada, Alterations to office and bank, corner Bathurst and Bloor, \$13,000; Chas. Blatchford, 2-storey brick dwelling, 11 Binscarth road, \$4,500; H. A. Clark, 2½-storey brick dwellings, Foxbar road, \$5,000; F. M. Tuckett, 2 detached 2½-storey brick dwellings, Woodville, \$6,000; A. S. Rogers, 2-storey brick warehouse and stable, Antler street, \$9,000; A. R. Clark and Company, 3-storey brick addition to factory and store room, Eastern, \$5,000; P. Umbach, 1 pair semi-detached 2½-storey brick dwellings, 145-7 Denison, \$5,000; Jas. Clark, 3 attached 2-storey brick dwellings, Edwin avenue, \$6,900; Lewis LeGrow, 1 pair semi-detached 2½-storey brick dwellings, corner Manning and Palmerston, \$4,500; W. Colwell, 1 pair semi-detached 2-storey brick dwellings, on 540-2 Lansdowne avenue, \$4,500.

Victoria, B.C.

The contract for the supply of galvanized pipe will be let to the B. C. Hardware Company at \$6.22 per 100 feet for one-inch; \$10.70, two-inch; \$14.30, two and one-half inch.

Vancouver, B.C.

Recent building permits include:

J. Crane, 2665 Fifth avenue west, two houses, \$6,000; R. J. Potts, 1644 Balsom street, \$6,500; R. D. Paterson, 1255 Thirteenth avenue west, \$4,000; Lutheran Church, 431 Carl avenue, \$3,000; D. C. Fulton, 3602 Second avenue west, \$5,500; T. H. Calland, 1538 Yew street, apartment house, \$10,000; F. J. Fisher, 736 Broadway, \$5,500; W. J. Stuart, 52 Sixth avenue west, \$5,500; Bank of Montreal, \$65,000; Sixth avenue west, \$3,700; Empire Supply Bentley and Weir, frame dwelling, 2555 Company, concrete hotel, 915 Westminster avenue, \$57,000; R. H. McDonald, 325 Twelfth avenue west, \$3,500; W. B. Moore, 1573 Tenth avenue east, \$2,800; H. B. Blair, 2356 Fifth avenue west, \$3,900; Mrs. Sanford, 324 Dufferin street, \$3,500; W. Tinney, 2632 Hemlock street, \$3,000; J. C. Hawkins, Victoria drive, \$3,500.

Winnipeg, Man.

Recent building permits include:

P. Olson, house, west side of Home, \$2,500; J. Hewitt, house, west side Home, \$4,500; W. A. Wilkie, two houses, east side of Arlington, \$5,800; R. Longley, house, west side of McPhail, \$2,500; A. C. Ewart, residence, Ruskin row, \$15,000; Dr. Galloway, addition to house at 661 Broadway, \$6,000; Ed. Noe, four houses, south side of Jessie, between John and Hugo, \$12,000.

AWARDED.

Victoria, — C.

Tenders for repairs of steamer Yucatan were as follows:

Union Iron Works, San Francisco, \$170,000, 175 days.

United Engineering Works, San Francisco, \$153,000, 150 days.

Wallace and Jenkins, Seattle, \$133,250, 125 days.

British Columbia Marine Railway Company, Victoria, \$125,000, 130 days.

Moore Iron Works, San Francisco, \$122,500, 150 days.

Moran Shipbuilding Company, Seattle, \$119,460, seven months.

Williamette Steel and Iron Works, Portland, \$89,000, 140 days.

Kingston, Ont.

The Kingston Shipbuilding Company has been awarded the contract for building of a quarantine steamer for the Immigration Department, to be located at Grosse island, at \$60,000.

New Companies

The Universal and Metals and Aluminum Solder Company, Limited, Quebec, Que., capital \$100,000. Incorporators, H. Dusault, contractor, Levis; O. Turgeon, manufacturers' agent, Quebec.

The St. Lawrence Quarries Company, Limited, Montreal, Que., capital \$100,000. Incorporators: J. W. Blair, F. J. Lavetty, advocates, both of Montreal.

The Continental Lumber Company, Limited, River Charlo, N.B., capital \$100,000. Incorporators, J. E. Brochu, attorney, L. L. Maynard and A. Laberge, accountants, all of Providence, R.I., U.S.A.

The National Brass Manufacturing Company, Limited, Montreal, Que., capital \$50,000. Incorporators, R. T. Heneker, K.C., A. H. Duff and W. S. Johnson, advocates, all of Montreal.

Western Canada Electric Company, Limited, Montreal, Que., capital \$1,500,000. Incorporators, G. V. Cousins, accountant, and P. Brown, both of Montreal.

The Highland Telephone Company, Limited, Ruskvieu, Ont., capital, \$2,500. Incorporators, G. C. McGibbon, Honeywood and Lennox.

Tarontorus Telephone Company, Limited, Sault Ste Marie, Ont., capital \$5,000. Incorporators, R. S. Walker, C. Becker and A. Cameron.

The Rockwood Line and Stone Company, Limited, Rockwood, Ont., capital \$40,000. Incorporators, O. Wilder, C. McNab, both of Rockwood.

The McAuliffe-Davis Lumber Company, Ottawa, Ont., capital \$200,000. Incorporators, W. H. McAuliffe, A. G. Gill, A. M. Davis and M. E. Davis, lumber merchants, all of Ottawa.

J. P. Mullarkey, Limited, Montreal, Que., capital \$500,000, incorporated to carry on the business of general contractors, builders, etc. Incorporators, J. H. Davey and J. H. Brittle, accountants, and J. E. Charbonneau, notary public, all of Montreal.

Plasterers' Work

There is considerable art in connection with the plaster industry, simple as it might appear to be to a number of people. Even in the simpler forms of plaster work there is demanded considerable knowledge, if the results are to be lasting, and the work prove in other respects satisfactory. We have outgrown the old time methods of plastering houses, where a lime mortar was all that was needed, and where the finishing coat was slaked lime, spread over the first coat as a complement to the job. Now we build in a hurry, and time is money to the contractor as well as to the owner of the structure.

To meet this changed condition there are quick-setting plasters and wall finishes, so that it is a matter of application and not long delays that confronts the plastering contractor. If he has a well trained force of employees, and has good material, there is nothing to bar him from securing and completing considerable work in his line, and that at a good profit. These two facts must be kept in mind, however, because they are of vital importance to the man who undertakes this portion of house construction. Now, we can plaster a structure almost as soon as it is under roof, and there will be no danger of any evil results where good materials and competent work has been done.

A Matter for the Contractors

The plaster manufacturers have so improved the quality of their output that it is simply a matter for the contractors to have the same applied with alertness and by good men, in order that there will be no delays in completing this portion of the work on any building. Our hard wall plasters for the first coat and finish are ready at hand, and with a sufficient knowledge of how they are to be applied, gives the plasterer ample opportunity that was not possible several years ago. It is not necessary to name any one or more brands of plaster for this work, as the makes are so well advertised that they can be had in any locality on short notice.

However, there are some points that should be understood by the plastering contractor, even though his previous knowledge be ample, that will not be amiss in making his work more satisfactory, and that will be helpful to those whom he may employ to carry out the details of the contract. Hard wall plasters contain more or less gypsum, which gives them greater strength, and also makes possible a quick setting, so that they are largely used in this age in quick construction work.

Trouble from Quick Setting

One of the primary causes for trouble is having the plaster set too quickly, not only on the walls, which is not the general complaint, but in the mortar box, which is often looked after by an inferior hand, is due to a lack of cleanliness. The same can be said of the tools that are in the hands of the operators themselves, which, from a lack of careful cleaning, will invite trouble for him. The gypsum contains myriads of small crystals, which, when they come in contact with old plaster, will rapidly multiply, thus forming a coat of plaster in either mortar box or on the tools, and will cause the plaster to become less adhesive, and will also obstruct the working of the same on the walls. Cleanliness in this respect is, then, of as much importance as it is in so many other undertakings that demand this rigid care if the results are to be good.

Then there is the danger of having too little water in mixing the plaster. The gypsum demands considerable water, from the very fact that the increasing number of crystals consumes so much moisture that the plaster drinks it up and this prevents the proper hardening or setting of the same on the walls. If the lath are too

dry, where wood lath are used, they will naturally consume considerable water from the plaster, and this will do much to harm the proper setting of the same. It is cheaper in the first place to use only the best grades of wooden lath; those that are free from either bark or sap. Then they should be soaked for some time before placing them in position. Even when they have been nailed to the studding it is not a bad idea to sprinkle them just before applying the plaster. This prevents the wall from cracking, and gives the plaster ample moisture, so that it will set quickly and securely.

Every contractor appreciates the fact that the room which has been plastered should not be left open to admit draughts, rains or other means of preventing the plaster from getting a secure set. One of the primary objections to securing good results in plaster work is often due to a poor quality of sand, which has been the cause of a great amount of trouble. While there are rules for the quantity of sand that must be used in connection with plaster, there must be taken into consideration the quality of the sand; the poorer the quality the less to be used, as it has an evil effect on the plaster.

Where a plaster sets too rapidly a retarder can be used, which is easily obtainable from plaster manufacturers. The operator is guided in this matter by local conditions, and can soon judge of the exact amount required, as the directions are given for general cases.

For much work done now there are several coats applied, the first, or scratch coat, being of one part lime and four parts sand. This contains certain proportions of hair, as a rule being about one bushel of hair to 100 yards of plaster. After the first coat has dried sufficiently it is scratched and it is then in a condition to hold the second coat, which is applied, the same mixture being used, being brushed down with a coarse broom. The finishing coat is simple hard plaster, and is scarcely more than $\frac{1}{8}$ -inch in thickness.—"National Builder."

A Pompeian House

A well known house at Pompeii (No. 39, in the second Insula of the 8th Region), named after the Emperor Joseph II., who visited it when first laid bare, a century ago, has been lately completely excavated. It is three-storied and of terrace construction, having been built against the steep side of the mountain. The upper storey presents the usual plan of a Roman house. A staircase of 28 very well preserved steps of Vesuvian lava, divided into three flights, or landings, leads to the lower floor. The topmost landing and the two upper portions of this staircase have wooden balusters; the lowest portion, which is also the largest, is vaulted over. Two very plain rooms, with rough walls, one of them having a hearth, open on to this staircase. At its foot there is a long passage leading to a back staircase, which again lead to the upper storey. Proceeding, however, straight on, the visitor will find himself in a court, or kind of peristyle, on each of two sides of which there are two chambers, the third side being occupied by a large room, most probably the triclinium, or dining-room. The fourth side opens on to a great terrace, from which the courtyard and the rooms are lighted. Beneath this terrace is the lowest storey, comprising the various offices, kitchen, bakery, mill, bath, etc. The bath consists of a tepidarium, a vaulted room, with a white mosaic floor, the walls painted yellow; a caldarium, also vaulted, the walls adorned with pictures on a red ground, the floor mosaic, the frigidarium, circular, as usual, having a cupola-formed vaulted room with an air-opening in the middle, furnished with a wide ventilating shaft of terra cotta.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
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Municipal Progress, Advance Information

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto July 6, 1910

No. 27

The Need of Skilled Workmen

The increasing difficulty experienced in obtaining properly skilled workmen to carry out even the ordinary tasks of the mason and carpenter is a matter that calls for something more than passing reference. The question arises: "What are we doing in Canada to meet the situation?" The facilities for technical education in even our best cities are very inadequate, and we are constantly receiving reminders of the urgent nature of the problem. The following is an extract from a recent issue of the "American Architect":

"Probably one of the most urgent needs in the entire realm of building is that of more skilled workmen or artisans. The dearth of competent mechanics in all lines of construction work is becoming a matter of grave concern. It is no longer possible to secure certain character of masonry or woodwork, due to the fact that mechanics who are qualified to undertake its production cannot be found. If a workman does not possess the requisite knowledge and skill there is no possibility of securing desired results from the use of materials under his hand. In time past the artisan has contributed almost as much to the final effect of buildings as the designer, and his assistance is sorely missed by the architects of to-day. Under present conditions of trade-unionism and the further art of deadening effect produced by the modern requirements of speed imposed on the majority of construction undertakings, there seems little hope of early improvement. And yet it must come if our work is to be restored in character to the average that obtained in earlier days, for example. Perhaps the vocational school offers a solution of the problem.

At least it seems worthy a trial, and there can be no question but that an infinitely more independent and, beyond a doubt, a loftier career is open to the thorough artisan, than to a clerk or small tradesman. We shall hope to see more emphasis laid on the importance and value of a vocational training for young men."

Responsibility of Architects and Engineers

There is a pronounced tendency to be observed in many directions to withhold authority from architects, engineers and others, while demanding of them that they assume full responsibility for the outcome of the work in charge, says the "Improvement Bulletin." A recent instance occurred in Tacoma, where the city engaged a responsible engineer to undertake the construction of a hydro-electric plant. The arrangement was that he should have full authority to engage his engineering assistants and fix their salaries, subject to the approval of the Public Works Commission. Further, the arrangement was not to be cancelled without a two-thirds vote of the city council. A stipulation was included that the engineer was to be retained until the completion of the work. A change of the municipal administration brought in a new set of officials, who promptly demanded that the control of the work was thereafter to be with a commissioner, and also demanded that the engineer accept a reduction of salary to half the former figure. The engineer showed his appreciation of his position by refusing to accept any such conditions, feeling that the responsibility for the work demanded that he have the authority. His attitude will appeal to most people as quite logical and reasonable. The council had the governing power retained to prevent making the work different or more expensive than was planned. But the real responsibility rests upon the engineer, and should it prove a failure, it is upon him that the blame falls. Under such circumstances, he is entitled to have control.

The Galt "Reporter" protests against the builder who "improves his property without regard to the depreciation he is responsible for in surrounding properties." The journal further adds: "Irregular lines are destroying the beauty of some streets, and individual owners are being injured by the haphazard methods employed in the construction of dwellings. We seem to have got away from safe methods of construction, and in some cases too little attention is paid to harmonious lines in the filling up of vacant lots with modern houses." It is very gratifying to find this trend of feeling in Galt. The next thing we may expect from the town, judging by what we have seen elsewhere, is an advertisement calling for the preparation of an expert improvement scheme at an outlay not exceeding \$25.

Fifteen hundred union bricklayers and stonemasons at Montreal have gone on strike for a graded scale of wages and recognition of the union.

resting directly upon 12-inch piling, 35 feet long, spaced 5 feet centre to centre both ways. No allowance has been made for the earth under the floor taking any load whatever, the entire weight, amounting to about 6,800 pounds per square foot, being carried by the piling. The top of the ore floor is dropped 4 feet below the top of the girders, thus increasing the capacity about 7,400 tons, the total capacity being approximately 245 tons per lineal foot of floor, which is 200 feet long. The earth at the top of each pile is excavated to a depth of 10 inches, forming a shallow, funnel-shaped collar, in which is embedded a ring of $\frac{3}{8}$ -inch round steel rod, 18 inches in diameter, placed 8 inches below the top of the pile. The slab is reinforced by three $\frac{1}{2}$ -inch square twisted bars over each pile in four directions, at both top and bottom, making 24 rods crossing at every pile. Over the piles the rods are well wired together to avoid spreading, while steel separators are placed between the two layers at intersections between piles, thus ensuring proper placement of steel rods as near the surface as practicable. This arrangement was adopted in order to give a rigid and strong network of steel with sufficient concrete to develop its full strength.

The girder at the land end of the ore floor, supporting the rear tower of the ore bridge, is similar in form to the other girders, but is especially reinforced to withstand the thrust from the ore and is tied to the ore floor every 10 feet by a $1\frac{1}{2}$ -inch square twisted rod 15 feet long, in addition to floor rods, which extend well into the girder. A portion of the ore floor just behind the dock proper is filled in and a railroad track is run on it for the full length of the floor. The small retaining wall at the

inner side of this fill is 12 inches thick at the top, 18 inches at the bottom, 8 feet 6 inches high, and is reinforced with steel rods on both sides.

At the connection of the new dock with the old a 12-inch wall about 4 feet high is built and well anchored to both docks.

A drawing gives the lay-out of the mixing plant and stock piles. The sand, slag and cement were brought in on a double trestle about 20 feet high, in hopper bottomed cars, which were dumped directly over the stock piles; the cement was received in cloth sacks in cars and unloaded directly into chutes leading to the cement shed, where it was piled in separate car lots, which were not disturbed until released upon receipt of a satisfactory report of the cement tests. The mixer was located about 50 feet from the stock piles and was fed by two 1-yard wide dump cars, dumping directly into the loading skip of the mixer.

The material track branched to both sides of stock piles, where tip boxes of suitable size were placed in such a manner as to permit of their being loaded while the material was on its way to the mixer to be dumped. The empty car was run to the loaded tip box at the slag pile, received the slag, and was then moved to the chute under the cement shed, where the cement was dropped in. It was then pushed to the sand tip box and on to the mixer. This proved to be a very simple and economical arrangement. The mixed material was dumped directly into end-dump industrial cars and hauled to the form work over tracks slightly elevated above the ore floor.—Engineering Record.

Town Planning and Improvement Schemes

A Consideration of the General Principles—Width and Classification of Roads—Buildings in their Relation to Town and City Development

By R. H. HAYNES, M. Inst. C.E.

It is not proposed to discuss the question of the proper person to prepare a town plan. The writer is one of those who hold the opinion that a complete and satisfactory town plan must be the work of many trained minds each laboring in his own proper sphere. Art, architecture, engineering, forestry, landscape, and finance should receive consideration in due relation one to another. A rational and effective town plan cannot possibly be a cheap production. Nastiness will inevitably accompany parsimony.

The Preparation of the Extension Plan

The first question to be decided is the area to be included, the second the basis on which the plan is to be prepared, i.e., is it to be a general idea plan or shall it comprise the complete development of the projected area?

As to the area to be included, it would appear reasonable to look thirty years ahead and to incorporate any land, whether within or without the town boundaries, which may be used for building purposes during that period. In separate jurisdictions the matter of joint or several action on the part of the local authorities must also be settled beforehand.

The writer favors the general idea plan on the ground that there is a reasonable prospect of forecasting with accuracy the general trend of development, and of de-

fining the lines on which such development may legitimately and properly take place which cannot apply to a plan for a complete lay out.

The general or primary plan should comprise all main lines of communication, arterial roads, bridges, means of transportation, secondary traffic roads, places, open spaces or parks, and once fixed, its outline should not without very good cause be departed from. If it be possible to arrange the area to be set aside for manufacturing purposes so much the better, though there will certainly be difficulties ahead with respect to this.

The subsidiary or secondary plan may be prepared in sections from time to time as the necessity arises, and this plan, or the sectional portions thereof, should provide for a proper development of individual owners' lands in accordance with the prescribed regulations and with the minimum of rearrangement of the boundaries.

It may be regarded as an axiom that the general plan should take into account existing through routes from town to town or county to county, and that arterial roads should be so planned as to connect with any new routes which may be projected or undertaken under any development act or scheme.

Furnished with a correct plan properly contoured and with the different ownerships shown, the development of the scheme may be proceeded with.

There is no royal road to success. Knowledge, ability and experience are the only guides. The following points

*Extracted for this journal from a paper read before the Incorporated Association of Municipal and County Engineers.

should be kept to the fore. Do not disregard existing divisions between the lands of different owners, although these should not be slavishly followed if they interfere with correct development. Bear in mind all natural features worthy of preservation. Do not destroy trees. Let your main arteries have moderate gradients. Be particular to follow the contours so far as this may properly be done. Chaotic confusion, failure, and great waste of money must result if the physical configuration of the area be ruthlessly disregarded.

A very excellent general direction is that contained in the Swedish Act relating to town plans. "The town plan must be prepared so as to ensure, as far as possible, that the requirements of traffic, in respect of ample space and convenience, shall be supplied; that the light and air needed for health shall be provided; that the danger from fire shall be guarded against; and that there shall be open spaces, the variety of construction and the beauty necessary for æsthetic reasons."

Does not this sum of the whole art of town planning?

Width and Classification of Roads

The road problem is the most debated of modern times. The motorist on the one hand clamors for wider and more costly roads, the town planner, on the other hand, urges a minimum width in subsidiary roads and a general reduction in the cost of road works. Both views should within limits prevail. Arterial traffic roads must be of ample width, well constructed to resist the destructive effects of modern locomotion. Subsidiary roads may be laid down in the most economical form for the traffic they have to bear. Bad formation can only result in large maintenance costs, a danger which must be guarded against.

If ample space be provided between buildings and set aside for public necessities, the road width can, in the first instance, be adjusted to the current traffic, and if found necessary in the future it can be increased so as to provide for a more intense circulation. This is putting a fair share of the ultimate cost on the future users and relieving the landowner and the real bearers of the burden, the householders, from unnecessary expenditures in the present.

There is much to be said for the continental system of multiple track roads. The general adoption of this method in main arterial roads would have an extraordinary effect on transportation methods and costs. If tramway tracks were placed in a special place reserved for tramway traffic alone, the initial expenditure on track construction might be reduced by one-half, and the maintenance rendered far more simple and much less expensive than can possibly be attained in the present systems of location and construction.

In purely residential roads the width need only provide for two lines of traffic, but the formation must withstand modern motor traffic, though the destructive motor lorry should be excluded by legal authority. In some cases nothing more than a carriage drive would be required, though the position in relation to future requirements must be safeguarded.

Some one must pay for roadworks, the cost of which is invariably added to the building values. Excessive road expenditures result in largely increased rentals. Wide paved boulevards and cheap houses cannot exist side by side.

Buildings in Their Relation to Town and City Development.

Apart from traffic considerations, roads are but a setting for the buildings adjacent to them, and it is of importance that the grouping and architectural treat-

ment should be well considered and only really effective buildings erected.

Three-fourths of the recent building work in this country does not rank as architecture at all. The utilitarian has been given far too free a hand, and it is to be regretted that architects in general have not realised the potentialities of and seriously taken up the planning and design of the smaller class of dwellings.

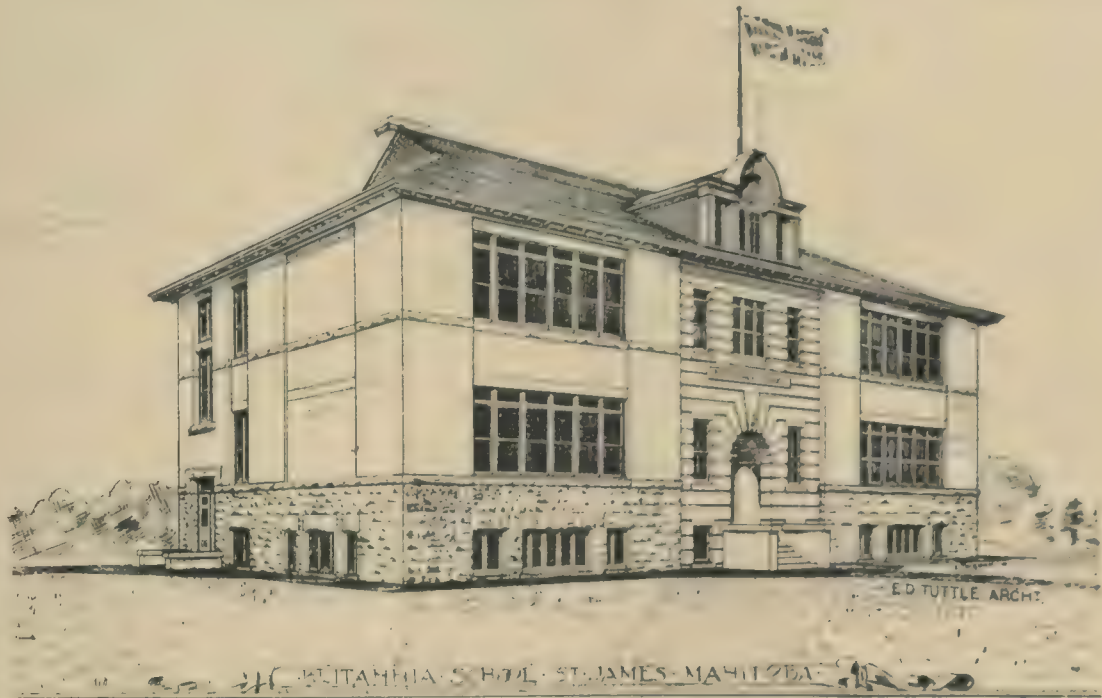
Heating a Shop through the Floors

No steam or hot water, no heating coils, no hot air registers—the absence of these devices for heating a shop is the engineering feature of a modern industrial plant, reported in the "American Machinist." The exterior walls of the buildings of this plant are either of concrete blocks or monolithic concrete, in which the aggregate is crushed stone, a native slate quarried on the spot in preparing the foundations.

A system of 1-inch wrought iron pipe was laid in the floor of the new pattern shop and connected back to the drip from the glue pot by a suitable system of valves. This system was put in with two ideas. A section of heated floor space would be of service in drying out the built-up wheel pattern sections after they had been glued; at the same time, it was believed that the arrangement would serve as a satisfactory way to heat the shop. This shop was a roofed-over court between two main buildings. Aside from the heat which would be communicated to the floors from the system of pipes, no other provision was made for heating the room, except to make a few openings whereby air from the plenum of the main shop could enter. This experiment was successful.

The new plant which this same concern has recently erected has offered the opportunity for a trial of this novel system of heating an industrial plant on a scale large enough to grasp its real worth. Three modifications of this system of heating through the floors are in use in the new plant. The pattern shop is heated by exhaust steam traversing wrought iron pipes laid in the concrete floor. The main machine shop is heated by hot air, forced through a system of supply and return ducts built in as part of the concrete floor structure, and the blacksmith shop is heated by a circulation of hot flue gases through a system of tile pipes buried some little distance below the floor of the shop. The pattern shop system is that of the simplest installation and more directly follows the successful experimental system at the old plant.

The pattern shop building is some 80 feet long, 22 feet 8 inches wide, and has a cubical content of 32,250 cubic feet. The walls are of monolithic concrete; the roof is of 3-inch plank, covered with composition roofing, and the building is isolated, except for the southern end, where it joins a lumber-storage and a pattern-storage building. Along the western wall is a 3-inch exhaust steam supply main; 1-inch pipes tap from this main run across the building, turn and run parallel with its length for a distance of about 5 feet, then turn again, cross the building again and enter a 2-inch return main that runs the length of the building on the same side as the supply main. The 3-inch supply main is at a level of about 1 foot above the floor. The total amount of radiating surface is 310 square feet, distributed as follows: Eighteen 1-inch pipes, 28 feet long, 161.4 square feet of surface; nine 1-inch pipes, 5 feet long, 15.5 square feet of surface; one 3-inch pipe, 84 feet long, 80 square feet of surface; one 2-inch pipe, 84 feet long, 52.5 square feet of surface, giving a total of 309.4 or, say, 310 square feet of radiating surface.



Britannia School, Winnipeg, Man.

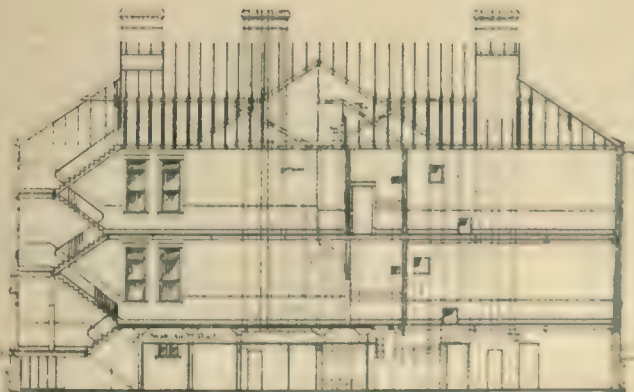
The building illustrated is being erected in St. James, a rapidly growing suburb of Winnipeg. It was designed by Architect E. D. Tuttle, of Winnipeg, who has made school and public buildings a study and has been very successful in combining good design with economy.

The building is placed 90 feet from the street and faces the west; it has a frontage of 98 feet 6 inches and a depth of 73 feet, and is two storeys and basement in height. The lot being over 600 feet long, the building is placed in the centre, and thus presents a good perspective.

The exterior of the building will have a pleasant effect, with the stonework carried to the bottom of the windows on the first floor. Above this the building will be of pressed buff brick with white panels.

As this building will eventually become a city school, particular attention has been paid to the requirements of the Board of Education. The classrooms are so arranged that all light is admitted at the left side of the pupils. The general layout of the building is such that four additional rooms may be added at a future time when required, by replacing the windows in the halls with doors. The design is for a six-room school, and when the additional four rooms are added they will not interfere with the general arrangement of the halls and the new rooms will have all the advantages of the first six.

The halls are large and amply lighted. There are three well located entrances and two convenient stairways. The basement contains play rooms for the pupils; the boys are divided from the girls by doors hung on an overhead



Sectional Elevation and First Floor Plan, Britannia School, Winnipeg

track and so arranged that they can be shoved around as indicated, thus joining the two play rooms, making a large assembly room. There are two commodious store rooms for seats, storm sash, etc.

The heating and ventilating system is that known as the gravity system, with three Pease-Waldon furnaces placed close to vertical stacks, and so arranged that they are all fed from one room, which is entirely surrounded with fireproof walls, as well as fireproof ceilings and floors extending over all the furnaces, thus affording a good fire protection. In addition to this, there will be placed in the furnace room one automatic fire alarm, which will be connected to electric bells in each classroom.

On the first floor are three classrooms with cloak rooms, teachers' toilet and cloak rooms, and principal's office. On the second floor are three classrooms with their cloak rooms, library and store rooms.

The contract for the entire work has been let to Messrs. Hodgins & Thompson, of Winnipeg.

Concrete Building Erected in 118 days at Vancouver

Something like a record for speed of construction has been established in the erection of the Manufacturers' Home building, Vancouver. The structure was put up from the water's edge to a height of 108 feet in 118 days. There are about 14,500 square feet of floor area per floor. The floors are designed to carry a live load of 175 pounds per square foot, the concrete slabs being carried on shallow concrete beams and girders, which are in turn carried by hexagonal columns heavily reinforced to cut down their sizes to a minimum. The entire floors were finished as the work progressed from floor to floor and were immediately covered with lake sand to protect them from being marred. The building piers rest on clusters of piles; the largest columns in the basement are 28-inch hexagons; the smallest columns in the last storey 10-inch square.

Frost Proof Brick

Of all qualities that brick should possess none is of greater importance than the ability to resist the disintegrating action of frost, and since a frostproof brick generally is also able to withstand a great external exposure with safety, it is desirable to devote a little time to this subject, said Robert Niedergesaess, of Seattle, before the State clay makers.

Frost, as we know, is one of those powers which we cannot restrict in its action; water will begin to expand when its temperature drops below 39½ degrees F., and if confined and frozen will even burst a gun, yet a brick properly made will not be injured by it.

A soft-mud brick is on the whole more frostproof than a stiff-made brick, and of the latter kind, one made of mild sandy surface clay will stand more frost than another made of rich, strong clay such as prevail in the Puget Sound country. The reason for this difference lies in the lamination which the stuff-mud process has to contend with. The stiffer the brick are made the more they are liable to be laminated, unless the greatest care is bestowed upon the mixing of suitable ingredients, which prevent the clay from slipping through the die in layers. A soft-mud brick is somewhat elastic and sponge-like in texture, whereas a stiff-mud laminated brick offers between its layers too much resistance to the expanding and freezing water. I am speaking of brick equally hard burned and have in mind a well made stiff-mud machine brick made in the 'sixties, that later on I saw

going to pieces by peeling off in layers whereas a less nice looking old hand made brick remained as good as ever. That experience taught me the necessity of mixing the clay with enough rough and gritty material, and now I can safely say without fear of contradiction, that of the many millions of sewer brick, made as indicated, and used in Seattle sewers none has ever shown any signs of disintegration. By the way, I will mention that many of them were found to stand a pressure of from 5,000 to 15,000 pounds per square inch.

There are no mechanical contrivances which prevent lamination of brick made without proper mixing and working of suitable ingredients.

Improvement of Clay Products

By ANTON BERG, TORONTO

Every low grade brick, poorly made and poorly burnt, is hurting the clay interests. The plea that at the prevailing low price it is impossible to manufacture good brick, will not hold, and it is simply the old case of the "survival of the fittest." This will mean either the improvement and better operation of the clamp kiln, or its replacement by better types. If the undisputed excellence of brick as a building material is to be used as the principal argument for its advancement, we must not vitiate it by offering inferior products when better grades can be made at the same cost. Here again the question of educating the public comes into prominence, for if we show what good brick really mean, they are bound to find appreciation. If we aim, for instance, to sell no brick which show a water absorption of more than 15 per cent. by weight, and let people know about it, a standard of strength would be set with which concrete would find it difficult to compete.

I do not raise any argument or discussion against the statement that brick and steel construction is the best for some purposes. It certainly is convenient and profitable, not only to the owner, but to the insurance underwriters. Is this the important point? I hope not. The 20th century, conscientious man must strive for righteousness for fellow men in future generations. I have repeatedly asked: Who is responsible? Who will be responsible for the collapse when it comes? I believe the fire underwriters will not be responsible for the catastrophe to thousands and thousands. The narrow base, the unreasonable height, the vibration from storms through the years, the salt water atmosphere! This problem continually standing before us is a serious one, needing our honest and incessant study. We must co-operate in the right direction for the clay interests, that we may erect structures for all generations to dwell in without fear of collapse.

Three Rivers, Que., recently celebrated the second anniversary of the great fire that wiped out its business section. The work of rebuilding the burned district has progressed steadily, and the Three Rivers of to-day is a most promising town. There is only one jarring note and that is the dilatoriness of the Dominion authorities in not rebuilding the Government buildings. Apart from erecting a temporary building for public offices at Three Rivers the Ottawa Government has done nothing in this connection.

The Port Arthur carpenters, numbering 500, who recently went on strike for 40 cents an hour have returned to work at this figure. They have conceded "open shop" to the contractors.

Road Construction and Maintenance

Road Commissioner Frederick Gilkyson, of New Jersey, finds it desirable to treat the roads of that State on two general principles: one being to produce permanent improvement where the funds will permit, the other being to temporarily treat roads where sufficient funds are not available to permit of more permanent improvement. He realizes that work of the second class may lead to criticism, in that the work done may need to be gone over again every year until the road can be permanently improved; but it would appear that where permanent improvement is not possible such temporary improvement is far better than nothing at all, frequently saving the roads from utter ruin, which might come to them before rebuilding was possible. One method of so treating well worn macadam roads is to apply a thick asphalt oil mixed with sand. This makes a cushion similar to rubber and comfortable for horses, and also holds crumbling stone roads together. The sand unites very rapidly with the oil, but it requires some travel on the road to perfect the binder. Piles of sand are deposited by the roadside to be sprinkled over the surface whenever and wherever the oil shows itself there.

Reports of the road supervisor show that it costs about \$350 per mile to fill up ruts and depressions in worn macadam roads with loose stones. The sand oil method costs between \$600 and \$700 per mile, but gives a far more satisfactory job and is expected to wear for at least two years. Resurfacing the roads by mixing asphalt, sand and stone costs from \$6,000 to \$8,000 a mile.

The Main Roads of Hampshire, England

A long and interesting report has been prepared by Mr. W. J. Taylor, the county surveyor of Hampshire, and submitted to his council respecting the present condition of the main roads under his control. The report is in sections, and deals with the class of material used on the various roads of the district. He points out that although the quantity of superior metal has been increased from year to year, there is, owing to the increasing traffic, but a small margin even under favorable conditions of weather between the quantity of metal applied to the roads and that lost by wear and tear; it therefore becomes imperative that it should be used to the greatest advantage by carefully supervised, efficient, and promptly applied labor. For the coming year it is proposed to use on the main roads in the county 10,265 tons of Cleve Hill basalt, an increase of 8,271 tons over the year just ended; 19,910 tons of Cornish granite, an increase of 2,622 tons; 9,540 tons of foreign granite, a decrease of 7,389 tons; a net increase of hard stone amounting to 3,504 tons, while 41,360 yards of flint and gravel will also be required, an increase of 980 yards, so that altogether something like 600 miles of roads require 80,000 tons of material to keep them in repair for one year. In 1900 there were used for each mile or road 115 tons of metal, of which only five were granite or similar hard stone; next year 150 tons will be used, of which exactly half will be hard stone. To help the life of the roads, tarring is carried out which, during last year, cost the county £712, and during the coming year £1,000 will be expended in the same way, so that altogether it will be seen that the increased wear of the roads in the county in ten years has been very large.

Roadwork at Hamilton, Ontario

City Engineer Macallum, of Hamilton, writes us as follows:

Outside of asphalt pavements, which we are laying ourselves, and expending \$200,000 thereon, we are also laying ordinary macadam roads on several of the city streets, spending \$30,000 on this work, and which amount of road work will more than keep us busy during the present season.

We are not laying any tar-macadam this year, neither have we so far this year been laying macadam mixed with asphalt oil, although probably in the course of the next couple of weeks we will probably use this oil macadam, as we have found it very satisfactory as a dust preventative. The oil used is Kentucky oil, having asphalt base, applied hot by means of an ordinary street sprinkling cart.

The macadam pavement was practically put in place and rolled, after which the sprinkler went over the road, covering the surface pretty closely, after which sprinkling of stone dust was put over the road so that the roller could be used for rolling this in and to prevent picking up the road by the roller. The results have been very satisfactory.

Road Grading

Highway Engineer Arthur R. Hirst, of the Geological and Natural History Survey of Wisconsin, on the grading of roads, says:

"For grading work of any magnitude it is necessary to secure the services of an engineer, as his grades will save many times their cost to the township in showing just where to cut and where to fill. Don't let the fact that you have not money enough to grade the hill to 6 per cent. stop you from doing anything on it. Take off what you can, and do the rest when more money is available, being always careful to so arrange the work that no dirt will be moved twice in reaching the desired grade.

"When it is impossible to grade a road properly on account of lack of funds, as little money as possible should be wasted upon it until the time comes when money is available to cut it to the proper grade. About all that can be done is to maintain a high crown on the road with the drag and make the water travel in the ditches.

"In cuts, the bank should be cut back to a slope of 1 to 1 to prevent caving. In building new roads slopes should be cut back as far as possible within reasonable limits of expenditure. It is better to move the dirt when the equipment is all on the ground than to come back time after time to clean the banks.

"On every steep hill, or on soil easily washed, the ditches should be paved with stone, for a width of 3 feet or more. No breaks should be tolerated in the road itself. They should be placed in the ditches in which the water will flow if the roads are crowned properly. On steep grades, whether the gutters are paved or unpaved, small dams of rock or concrete should be placed across the gutters as often as made necessary by the eroding action of the water. These dams should be made lower in the centre of the ditch than at the sides and should be provided with an apron of concrete or stone on the lower side on which the water will fall.

These dams, if placed often enough, will prevent wash, as the force of the water is expended at the dams and not in the gutters. Such dams are inexpensive when stone is convenient and should always be placed on grades of over six per cent.

"Fills should be built with side slopes of not more than $1\frac{1}{2}$ to 1, and the less slope the better. Whenever possible on hills, water should be turned away from the road through culverts or bridges, and should never be carried across the road in open ditches. All water should be turned off the road at the top of hills to prevent it from washing the ditches off the hill itself. On side hills a furrow or two at the top of the bank and running to the gullies will prevent the surface water from running down the side slopes and getting to the road. They should always be built when possible."

Use of Bituminous Binders

The practical value of the various forms of bitumen which have been most generally used and known, has been demonstrated, and there is more of a feeling of assurance of favorable results in their employment than has previously existed, says "Good Roads."

The fact that some bitumens have been reported as having given unsatisfactory results in some localities and under some conditions, is counterbalanced by the excellent results found under other conditions. It is a safe proposition, therefore, that the use of bituminous materials per se, is in accord with the methods of construction calculated to produce satisfactory road surfaces.

The greatest difficulty which has so far been encountered is in the formulation of adequate specifications for these bituminous materials. Nearly every highway department has prepared such a specification, and in addition to these, there are a number of others prepared by engineers and contractors. These all vary somewhat, but, so far as returns have shown, each of them defines a product suited to the requirements of the locality in which it is used. As a whole, it may be said that in spite of the little that is known about the factor of permanence, the immediate results are usually satisfactory, and the oldest constructions are in such a condition as to give promise of satisfactory service.

Opinions differ as to the method, whether by penetration, forming a bituminized macadam surface, or by mixing, thus producing a bituminous concrete, of which a wearing surface should be made. Many engineers seem to favor the latter, except for the fact that it costs more.

As between tars and asphalts, or asphaltic oils, each has its champions among the highway engineers, and there are many miles of excellent highways within a radius of a couple of hundred miles from New York, where each can be found producing satisfactory results.

The bitumen-bound surface gives evidence of growing popularity; and an important factor in its favor seems to be its influence on the dust problem.

The crop prospects in the Regina district could not be better. Reports from many towns adjacent to the city are also most encouraging. Plenty of moisture is in the ground, as this district has had plenty of rain, and the summer weather of the past few weeks has done much to inspire confidence in the crop outlook. The building activity in Regina is marked. Some trouble has been experienced by builders in regard to the labor problem, but this is now settled and contractors have more work on hand than they can possibly complete this year. A large amount of municipal work, such as sewer and waterworks construction, has also to be done in Regina this year.

"Good Roads" Campbell on the Importance of Drainage

"There are three principles to be observed in making good roads," said Deputy Minister Campbell to the Canadian Club at St. John, N.B. "The first is—drainage. The second is—drainage. The third is—drainage."

By this striking expression the man who is known as "Good Roads" Campbell sought to emphasize the importance of drainage in road construction. In the first place there should be ditches to drain the roadway. But these would be of no value unless they led somewhere and could empty themselves either naturally or by drains made through adjoining property for the purpose. A road is not drained where water lies in the ditches. Then it is necessary to have the road itself drained, so that water will not lie on the surface, and this is provided by a crown or rounding surface that sheds the rain into the ditches to be carried off by the drainage system. Mr. Campbell pointed out that it is a waste of labor to keep on year after year putting on broken stone or other material to fill up holes in a road that is not drained. In making a transverse section once in such a road he found five or six feet of such broken stone, that had been put on year after year only to sink out of sight and leave the road as bad as ever.

This is practical talk. It lies at the base of every system of good roads. It places the emphasis in the right place. It is the testimony, also, of the man who has constructed some of the finest roads in the Province of Ontario.

But Mr. Campbell has something to say that is worth saying in regard to the organization of road work. He once told the people of Ontario that if they would give him for fifteen years the annual expenditure of two million dollars on the rural roads of the province, he would; in that time, and for that amount, macadamise every mile of highway in Ontario. This seems an amazing statement, but upon examination it is found to be reasonable enough. The trouble in Ontario was that most of the expenditure was made year after year on work that was not permanent, that was not well done, and that had soon to be done all over again; whereas perfectly built macadamized roads can be kept up at a mere trifling expense from year to year for all time.

Mr. Campbell's advice is this: Let the statute labor be commuted at its cash value. Let all the road moneys of a district be put into one consolidated fund. Have a plan of the roads made, and then begin at one point as a centre, and make a certain amount of perfect road each year until the whole plan has been carried out for the whole district. This plan has produced wonderful results wherever adopted in Ontario. It is not less worthy of consideration in the Maritime Provinces, where there is great need of better roads.—Maritime Merchant.

The Royal Institute of British Architects were to have held a Town Planning Conference in London on May 28th last. On account of the death of His late Majesty, however, this event has been postponed until August 10-15 next. Full particulars may be obtained upon application to the Secretary-General, Town Planning Conference, 9 Conduit street, Regent street west, London, England.

The foreman of construction on the new provincial buildings at Edmonton, Alta., has been laid up with a broken leg for the last six months, during which time the Department of Public Works has paid his full salary of \$150 a month and all expenses, making a total of nearly \$2,000.

Good Progress being made on the Point du Bois Power Plant

One of the largest engineering undertakings of the Dominion was inspected recently when 75 of the leading business men of Winnipeg chartered a special train and ran out to Point du Bois to go over the civic power plant. This plant will eventually have a capacity of 100,000 horse power and will cost, when completed, over \$4,000,000.

The excursion was under the management of the power committee of the city council. The visitors included all the executive and department officials of the city. Controller Cockburn, who is directly supervising the work, the contractor for the plant, John Gunn, and Resident Engineer Scott provided the explanations of the work for the party. A large portion of the day was spent in inspecting the immense work and general surprise was manifest at the progress. The machinery will be installed during October.

The object of the work to date, outside of the wheel-pit construction and work on the arrester and power house, has been to stem the tide of the mighty Winnipeg

Much satisfaction was expressed over the progress and it is now assured that, barring accident, the city will be able to distribute its own power next year. The city is being asked, daily, to tender on light and power supply to several big manufacturing houses, and it is certain that civic power at rock-bottom rates will be a big stimulant to the manufacturing enterprises of Winnipeg and district.

A Moist Closet for Cement Tests

A moist closet designed expressly for maintaining a constant temperature and a constant degree of moisture for setting tests of cement has been in use by the Department of Railways and Canals, on the Lachine canal, where especial importance is attached to time of setting because the cement is used under water. With other types used the temperature and moisture are apt to be materially changed in opening the closet to make tests. The new closet, therefore, was provided with an arm-hole, through which the test is made, the door being used only for placing the pats. The cuff of the coat prevents any air entering, and on the arm being withdrawn the



View of South Canal Wall and Power House construction taken upon a recent visit to the Point du Bois power plant, Winnipeg's greatest municipal undertaking

river and divert its course into a cement walled canal which conveys it through the wheel-pits and transformers, and back into the original channel, divested of nothing, but utilized to give the city light and power.

Already 84,000 cubic yards of cement have been laid. Another 16,000 yards will see the cement work completed. Sixteen thousand sacks of cement are being used every day, Sundays included. A force of 450 men, working in double shifts, is rushing the work ahead. Sixty thousand cubic feet of granite rock have been blasted out of the canal and removed, partly to the stone crusher, but mainly to the rock-fill dam, where the material is being used to continue the dam of the original course of the river above the plant. In the removal of this granite, more than \$18,000 worth of dynamite has been used. Money is being blown up in this manner, even now, to the extent of \$200 per day.

Work on the power house is continuing rapidly and in the course of the next month will be completed. The big work, so far, has been the excavating of rock and the placing of cement for dams and wheel pits into which the turbines will be placed.

hole is quickly closed. The closet is 8 feet high, 3 feet wide and 18 inches deep, with walls of concrete 2 inches thick. The bottom of the closet acts as a tank to hold about 2 inches of water. The mix was rich and there is no leakage. The temperature inside the closet is usually 65 degrees in summer and winter, varying about 1 degree. Wet cement bags are placed on top during very hot weather, and repeated tests have indicated, it is stated, that the temperature can be evenly regulated. Water is seldom added to the pan forming the bottom of the closet, showing that little or no evaporation takes place inside the closet. The closet is carried on a base about 80 inches high and two open shelves are built below it.

One gallon of mixed paint will cover from 25 to 30 square yards of stone work; 50 to 70 square yards on wood work; 80 to 90 square yards on iron work; and 40 to 50 square yards on plaster. One pound of mixed paint will cover wood four yards for the first coat, six yards on the second coat, and seven yards on the third or fourth coat.

Problems of Modern Sewage Filtration

An Instance where Iron is Contributed by Manufacturing Plants—Effect Upon Sand Filters—Excluding from Sewage and Removing from Beds

The means that are being adopted by the city of New Britain, Conn., to overcome trouble arising from the presence of iron in the sewage filters are set forth in the "Municipal Journal and Engineer," of New York, by F. H. Oldershaw, city engineer, who writes:

In 1901 the sewer system was reconstructed into a separate system of sewers, one sewer being for storm water with outlets to neighboring streams, the other sewer being for house sewage only. All new sewers constructed since have been built on this plan. The lateral and intercepting lines of the system for sewage only have an outlet through two large trunk lines to the filtration station. The east trunk line, so-called, carries the sewage of 65 per cent. of the city in general and 75 per cent. of the sewage and wastes from the large number of our hardware manufacturing concerns, the south trunk line, so-called, carrying the sewage from the balance of the city.

The system used for sewage filtration is the downward intermittent filtration. The beds are constructed of coarse gravel and the underdrains are from 5 to 6 feet below the surface of the beds. We have at present 33 beds, each one acre in area, and one bed five acres in area. Before the sewage is turned onto the beds it passes through settling tanks, of which we have two, they being used alternately for a period of one week each and then cleaned. These tanks remove by sedimentation about 50 per cent. of the sludge, or about 16 cubic yards daily, and have proved an important adjunct to the beds, as they relieve them to a great extent and, by confining a large part of the sludge to the tanks, obviate the raking of same continually from the beds, thus reducing the maintenance cost considerably.

The population at present is 46,000, and our daily sewage flow at the filtration plant is about 6,500,000 gallons, this being determined by weir readings.

Before these filter beds were built it was shown by experiments conducted with the soil that about 200,000 gallons of sewage could be filtered every 24 hours by beds one acre in extent. From 1902 to 1907 the beds came up to all expectations in their work. In 1908 it was noticed that the efficiency of the beds was greatly lessened and they were unable to handle as large an amount of sewage, and the beds were carefully watched to find out the cause.

In June, 1909, it became very apparent that there was considerable iron in our sewage, this being shown by a reddish brown deposit in the effluent ditches and at intervals by the imparting of a distinct color to the sewage. This presence of iron was shown conclusively a little later on by the formation of a crust on the surface of the beds, which proved very detrimental to the working of them. Geologists are well aware that the oxides of iron are the chief cementing material of certain sandstone. From investigation and analyses of this crust above mentioned, it was found that the beds were becoming coated with a ferruginous cement which formed the above crust, analyses of which showed about 75 per cent. of silica and 24 per cent. of iron and small quantities of magnesium, aluminum, tin, zinc and calcium.

Trouble from Factory Waste

It was immediately apparent that the trouble came from factory waste and it was traced for the most part to one of the manufactories and proved to be the waste from their wet sand rolling barrels. We immediately took up the matter with the officials of that concern, and they co-operated with us in overcoming the difficulty, by passing all their wastes

through a system of settling basins at their plant before allowing them to enter our sewers. The result has been that no crust has been formed since.

This did not, however, bring back the beds to their full efficiency and in the fall of 1909 it was determined to build a small experiment station according to plans as designed by the city engineer; the station, consisting of a grit chamber, 2 feet x 2 feet x 2 feet deep; a septic tank, 10 feet x 12 feet x 5 feet 6 inches deep, and two beds, 22 feet x 20 feet, these beds being of the same construction as those in use. The station was built and put into operation in November, 1909.

Data along the following lines were obtained as soon as possible: First, data from all the manufacturing plants as to the average daily amount of water from iron work; second, as to the different acids used in the work and how much per day; third, as to whether the waste emptied from vats at intervals or flowed continually into the sewers. At the same time, analyses were made three times a week of the sewage and septic tank and filter effluents. These analyses included the determination for iron, as it was considered that this would prove the cause of trouble. After the experiment station had been run a short time, analyses which were made showed that the filter effluent was much better and the rate higher than for the regular filters, but also showed that there was a considerable deposition of iron in the filters. Results from the determination of iron made it apparent that about 40 per cent. of the iron in the sewage settled out in the septic tank, the remainder being practically all caught in the filters and clogging them up, which resulted in a lower rate of filtration. Analyses of the sewage of the trunk lines made at the same time showed an iron content of 1.6 parts per million in the south trunk line and 26.6 parts in the east trunk line, the latter being equivalent to 221 pounds per million gallons, a large portion of which remained in the filters.

We immediately turned our attention to the iron contents in the east trunk line and obtained numerous samples of sewage at points where the different manufactories individually emptied their wastes into the sewers. Analyses of these samples showed that four of the above were the chief offenders, the samples showing 124, 52, 70 and 105 parts per million, respectively. These analyses did not show the average amount of iron was discharged at certain times of the day. The chemist at one of the manufactories is now at work experimenting on the matter and is investigating methods for the removal of the iron by producing a by-product, and if this proves a success the other manufactories will use the same treatment.

After the iron is eliminated from the sewage, we will have to take up the matter of the iron already deposited in our filters. Analyses have been made for the determination of iron in the material of the different filters, the samples being taken at depths of every 6 inches. The results of these analyses so far show that 250 tons of iron have been deposited in the first foot of material of the 34 regular filters, the amount of iron decreasing until at a depth of 24 inches, the material seems free from the iron. Two means of removing this iron are now under consideration: First, by removing the top material of each bed as far as the iron has penetrated and replacing with new material; second, by passing some chemical through the beds and carrying off the iron in solution.

It can be readily seen that excessive amounts of iron are discharged into the sewers at intervals and, if it continues, the filters will in time be put out of commission. If methods are not devised for taking out the iron from the wastes before they are discharged into the sewers, arrangements can be made for these wastes to be held at the different manufacturing until a certain time each day, when they can be discharged into the sewers at the same time and given special treatment at the filter beds on beds for that purpose only.

Experiments on the question are still under progress, but have not been carried far enough for definite conclusions, and at present it is impossible to state just what we will do to remedy the conditions.

A Novel Cement House

In Belfast, Me., there is a house, built by Frank Hoag, believed by the builder and citizens of that place to be the only one of the kind on earth. Aside from the blasting and digging for the cellar, the house was built by Mr. Hoag himself. The entire outside is of cement, the mixing of the component parts being undertaken after a long study of the subject. Mr. Hoag finished the inside of the house first. This being done, he lathed the whole outside with wire screen stuff, such as is used for fencing chicken pens. This was firmly fastened. The studding was close, and when the wire was on it gave a rigid surface on sides, ends and the slopes of the roof. Over this layer of wire he spread a first coat of cement. It was well pressed on, so that it oozed through the meshes of the wire for clinching hold. When this first coating was thoroughly set another and a heavier one was spread over the surface. Shingle effects were fashioned on the gables and on the roof the cement was shaped and lined, to give an appearance of slating. Then over the whole outside was laid a finishing veneer of cement paint. The house is as tight as a bottle. It is impervious to heat or cold, or leak of rain; and, as its foundation is a solid ledge, it can defy the frost to wrestle with it. Mr. Hoag says the cost of building was about the same as wooden construction would have been but with cost of maintenance and repairs eliminated.

Repairing Asphalt with Brick

Asphalt pavement repairs in the city of Binghamton, N.Y., this year will cost less than \$500, although in years past, when asphalt was used as the pavement repair material, the cost ran up to \$14,000. For the past month a force of men has been engaged in repairing the holes in the asphalt pavements with brick. It was first planned to use an asphalt mixture, but it was found that the material could not be utilized unless the city purchased a heater, which was inadvisable, and brick was again selected to fill the holes. All the asphalt pavements have been patched and are in condition to last another year.

Mr. Hilder Daw, C.E., Montreal, has been appointed one of three members of a special committee to bring in a report to the American Society of Contracting Engineers covering the question of a uniform system of contractors' specifications. This is to be reported in January, 1911. Mr. Daw expects to incorporate the views of the various Canadian societies interested in this report.

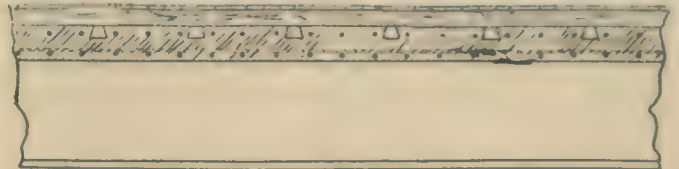
Mr. John M. Collins, of the Standard Sanitary Manufacturing Company, accompanied by the Hon. Charles J. Dohererty, K.C., M.P., and Mr. Henry J. Trihey, K.C., counsel for the Standard Sanitary Manufacturing Company, sailed for England on the 24th ult., on the S.S. Victorian. Mr. Collins' business in England is the appeal of the Standard Ideal Company to the Privy Council, which comes up for hearing this month.

Oiling New York Park Roads

Experiments with the use of oil on roads are being conducted by the Park Department of New York City in the Bronx under Chief Engineer Schenck, but the work has not reached a stage where it is possible to give definite results. The experiments were begun about two years ago, but owing to the opposition of citizens they were dropped, only to be renewed again. Two grades of asphaltic oil have been tried, also crude petroleum, and an oil emulsified with 80 per cent of water. The use of 60 per cent. of oil in the emulsion has given the best results so far as wearing qualities are concerned, but it is objected to by citizens, while that which contains 20 per cent. oil maintains the roads dustless, but does not prevent them from travelling. Crude petroleum is secured at three cents per gallon in tank.

Laying Boards on a Concrete Floor

A new yarn mill, designed by F. W. Dean, mill engineer and architect, of Boston, presents an interesting type of machine-carrying floor of concrete with wood top. The necessity of providing a wood top of such sort that it would afford a secure attachment for machinery, dictated the special scheme shown in the annexed figure. Planed, dovetailed, nailing pieces or sleepers, 2-inch by 3-inch were accurately placed with centres 18 inches apart, and when the concrete was poured about them they were securely locked into the mass of the floor slab. It will be seen, by reference to the figure, that the sleepers were laid parallel to the support course of reinforcing bars in the concrete, and that there were three

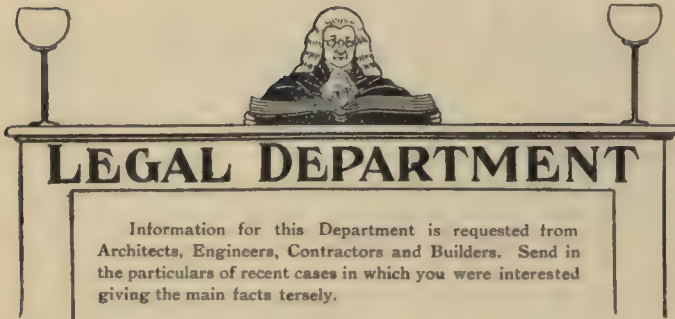


Wood Top Reinforced Concrete Floor.

bars to each space between sleepers. The bases of the latter were a little below the level of the upper course of bars. Machines can be easily and securely attached to this floor by means of lag screws.

Construction work on the National Transcontinental Railway has made good progress in the past year, according to the figures of the annual report for the fiscal year ending March 31. To the end of December, 312 miles of track were laid and in the intervening period 199 miles. Sixty-three per cent. of the railway work is now finished and 45 per cent. of the bridging. The mileage of track totals 760 and of sidings 165 miles. A total of 365 miles is graded. The expenditure is \$71,137,993, of which \$53,850,000 was spent in grading, \$7,201,000 in rails, \$8,237,038 in engineering and expenses. On the Winnipeg workshops the outlay has been \$335,000. The big contracts for machinery and equipment are about to be awarded, the tenders having been submitted.

The question of what kind of a finish to give a concrete wall is a matter of personal opinion, which is ever changing. The rough casting, or plastering of a wall, which has been the most common, is fast giving away to a more artistic treatment. A wire-brush finish brings the coarser aggregates to the surface and gives a pleasing effect. A scrubbing brush, applied while the concrete is green, will erase the board marks and smooth up the wall to a sand-like finish. A carborundum stone is good for rubbing down a wall, and with it you can get almost any texture. The finish that is pleasing to a large number of people, which is really no treatment at all, is to leave the wall just as it comes from the forms, with all the board marks showing.



Contract Between Municipal Corporations—Township of Gwillimbury v. Township of King. An appeal by plaintiffs from the judgment of Hon. Justice McMahon, who dismissed the action. Plaintiff township claimed that defendant township entered into an agreement with plaintiffs to build and maintain a public road in continuation of a road to be built by plaintiffs, and plaintiffs relying on said agreement, built their portion of said road, but defendants refused to build their portion, and plaintiffs claimed a mandatory order to compel defendants to build their portion, and damages for breach of said agreement. Defendants pleaded that such agreement was not under their corporate seal, and therefore not binding on them. At the first trial the action was dismissed on above ground. Court of Appeal dismissed plaintiffs' appeal therefrom with costs, but defendants to repay plaintiffs \$100 received from them.

Forfeiture of Contract—Buchanan v. City of Winnipeg; Stewart v. City of Winnipeg; Trial Court of Manitoba. These actions were brought to recover sums alleged to be due the plaintiffs in respect of a contract with the defendants. In October, 1907, the city of Winnipeg entered into a contract with Buchanan for the construction of a bridge across the Winnipeg river at Lac du Bonnet. Shortly afterwards he went into partnership with Stewart and they proceeded with the contract. The city had under construction at the time a tug and scow for use in building the bridge. It was one of the conditions that the contractor should take over the tug and scow at actual cost. One of the conditions of the main contract was the following: "If the works, or any part of them, be not completed at the expiry of the respective periods specified and guaranteed in the contract for completion, or if the contractor assign or sublet his contract without the consent had of the engineer, or if he commit any act of insolvency whatever, or if he permit any execution to be levied on his property, then the engineer may forthwith declare the contract forfeit, and in that case the corporation shall enter into possession of all the works, plant, and materials pertaining to the contract; and the contractor shall be liable for all losses and damage which the corporation may suffer on account of the non-completion of the work by the contractor, and he shall have no claim for payment in respect of the work thereafter performed. In default of other satisfaction for such loss or damage, the plant and materials remaining may be sold (at public auction) for the purpose of reimbursing the corporation. Provided, however, that, should the damage to the corporation resulting from the said default amount to a sum less than that due to the contractor under the contract, or obtained through sale of the contractor's plant as above, then shall the difference become due and payable to the contractor." Trouble arose between the partners and in January, 1908, the plaintiff, Stewart, notified the city authorities that it was impossible to go on.

The chief engineer, acting under a certain clause of the general conditions, then declared the contract forfeit. The plaintiff Stewart was placed in charge as foreman for the city, which adopted sub-contracts for the supply of material

made by the contractors and used their plant and material. Since then they have taken over and used the bridge. An attempt was made to show that the engineer had made a special bargain with the contractors at the time the city assumed control of the work that if the cost proved less than the contract price the difference would be paid to the contractors. It was shown, however, that all he did was to tell the contractors that he would make a recommendation of this nature to the Council. The actual arrangement would have been beyond his authority. The Court considered the preliminary expense which had to be incurred by the contractors before they could do any work, for which they would have a claim against the city. The purchase of a tug and scow, the moving of their plant, the making of sub-contracts, the erection of a heating plant for heating the cement and of living camps for their employees and teams, was all work that had to be performed, and the contractors, no doubt, in figuring on the contract, made allowance to cover this preliminary expenditure. When the defendants took possession of the work, they had the advantage of this preliminary outlay, and were thus able to complete the work at an amount less than the face of the contract. They now claimed the right to retain for their own benefit this sum, amounting to about \$4,000.

Decision was based in the main upon the argument framed by the House of Lords in the case of *Ranger v. Great Western R.W. Company*. It was held that the provision relating to forfeiture, etc., was to be regarded only as a means for enabling the employer to complete the work at the risk and cost of the contractor. In settling accounts with the contractors, the employer was bound to account for the value of the contractors' tools and materials. By taking advantage of the contractors' preliminary expenditure, including a large sum paid for a tug and scow and for a cement heating plant, the defendants were able to complete the work for less than the contract price. If it had cost the defendants more, they would have the right to sell the contractors' entire plant, and, if there still remained a deficit, to sue the contractors therefor. It could not be implied that the parties intended that the defendants were to take any profit out of the forfeiture of the contract in this way, although in the event of a loss the contractors would be liable for it. Judgment was referred to the Master for an account of the costs and expenses incurred by the defendants in completing the work, directing that the balance be paid into court to be apportioned among the proper parties. Plaintiffs were awarded costs of the action.

Recovery Under Lien—Sherritt v. McCallum; County Court of Victoria—This was an action to enforce a mechanics' lien for the sum of \$160. One, John Young, had contracted to build the defendant a house at Foul Bay according to plans and specifications. Under the portion relating to plastering it was provided that the plasterer should cut out and make good all defects arising from whatever cause and make good after other tradesmen had finished work. Plaintiff, Sherritt, was a sub-contractor to Young for the plastering work. Plaintiff completed the main part of his plastering before July 14th. On applying to Young for payment the latter told him that he had thrown up the job. Afterwards plaintiff sent him an account showing a balance due of \$160. It appears that Young got into financial difficulty and failed to go on with the building of the house. Defendant was forced to complete by day labor. No formal agreement was made cancelling the contract. On the 20th July the plaintiff gave the defendant notice that he intended to claim a lien, but no proceedings were taken. Under the Act the lien-affidavit must be filed in 31 days after the completion of the work, or else the lien expires; so about the 20th August the plaintiff was in a serious plight, as neither Young nor McCallum would pay him, and the 31 days had expired, and he had filed no affidavit. He then hit on the ingenious expedient of

going to the unfinished house and touching up blemishes, etc., made in the plaster by the workmen who followed him. But in the meantime the defendant, who had been having a lively time with the claimants, had instructed his foreman on the job to allow no one but his own workmen on the premises. A couple of days before the 25th August the plaintiff sent his son to do the plastering, but he was refused permission to enter the premises by the defendant's workmen; but on the 25th August the plaintiff himself went, and, notwithstanding that the defendant's foreman, who was there, told him that the defendant had told him (the foreman) not to allow any of the contractors into the building to finish their work, he went in and did four or five hours' work, putting on some dentals that had been knocked off, and fixing up some blowholes and cracks. He then filed his affidavit and brought his action, and contends that this last work relates back and he is entitled to a lien for the full amount unpaid. Under the Mechanics' Lien Act a lien is given only in respect of work done at owner's request. The Court held that the circumstances showed that the plaintiff was not making a bona fide attempt to complete his contract but instead to manufacture a lien. The action was dismissed with costs.

Damages for Defective Highway Construction—McMulkin v. Oxford; Divisional Court of Ontario. This was an appeal by the defendants from the judgment of Hon. Justice Teetzel. Plaintiffs brought action claiming that defendants had while engaged in repairing a highway wrongfully constructed certain grades and ditches along certain culverts through the highway so as to divert water from the highway and from an adjoining highway over which they had not assumed control, and from other lands into and upon plaintiff's farm, for which he claimed damages and an injunction. At the trial it was held that the evidence as to damages was conflicting, but there was no doubt that the excess of water discharged on plaintiff's land caused him loss and inconvenience, and would have a depreciating effect upon the value of his farm. In lieu of an injunction judgment was given plaintiff for \$450, for damages past and future, with costs. The Divisional Court dismissed the appeal with costs.

Acceptance of Private Lane by City—Rushton v. Galley; Divisional Court of Ontario. Defendant was the owner of certain property. About 40 years ago he laid it out in building lots, reserving a lane leading from public highway. This lane has been open ever since. The city laid gas and water thereon many years ago and never assessed it to anyone. Since then defendant built a sidewalk thereon and plaintiff was injured by the same being out of repair. He brought action claiming damages for injuries sustained. At the trial the action was dismissed on the ground that the lane had been dedicated to and accepted by the city. The Divisional Court affirmed this decision and dismissed plaintiff's appeal with costs.

Negligence of Waterworks Official—Shaw v. City of Winnipeg. The city of Winnipeg appealed against a decision in which damages and costs were awarded for alleged negligence on the part of an official from the waterworks department. The official in question called at plaintiff's house to examine the water meter. For this purpose he opened the trap door in the floor of the kitchen. After performing his work he left the house without closing the trap door, as a result of which plaintiff's wife met with an accident. The court found that it was the duty of the official and of the city to perform the inspection without doing injury or committing nuisance and to leave the premises in the same condition as they found them. The appeal was dismissed with costs.

Mechanic's Lien—Rathburne v. Michael; Court of Appeal. This was an action for the enforcement of a mechanic's lien tried before an official referee who gave judgment for the

plaintiff. The action was on a claim for a mechanic's lien on defendants' property for \$1,125.98, tried before an official referee, who gave judgment for plaintiff, holding him entitled to a lien for \$1,075.17. Defendants appealed to a Divisional Court on ground that action had not been commenced within 30 days from delivery of materials therein mentioned to amount of \$1,700, and Divisional Court allowed the appeal, but afterwards on application therefor reopened the judgment, received further evidence, reversed their former judgment and dismissed defendants' appeal. The Court of Appeal affirmed the later decision of the Divisional Court and dismissed the appeal with costs.

Lining an Irrigation Canal with Cement Plaster

Community Ditch, an irrigation canal of 650 sec. feet capacity at Eldorado Springs, north of Denver, Col., has recently been the subject of considerable discussion owing to the nature of the repair work carried on by J. G. Wood, assistant engineer in charge, and W. D. Rohan, superintendent of construction. Two thousand, six hundred and forty feet of masonry lining in the canal completed in March, 1909, was so carelessly built as to be useless in September of the same year. Of four possible methods of repair the engineers chose that of plastering the masonry with cement plaster, a decision that precipitated a lively controversy as to the comparative merits of lime and cement for such work. The engineers, however, were not dismayed by this. Cement costing \$1.36 per barrel was delivered by rail within 500 yards of the ditch. Good, sharp clean sand was found across the creek and brought to the ditch in one-half cubic yard cars at a cost of 25 cents per cubic yard. The mortar was mixed in a one-fourth cubic yard Ransom mixer with gasoline power, costing 40 cents per day.

The joints were first picked out and the wall thoroughly washed with a hose, when the joints were re-jointed with 1 to 3 mortar. The first coat of three-fourths inch mortar was put on with plasterers' and masons' trowels after the wall was well wetted, and then floated with wooden floats. After setting four to six hours the second coat was applied and floated in the same way. The plaster was kept wet for two or three days after.

An inspection in May, 1910, showed the ditch in splendid condition after five months' hard wear. No signs of pulling away were found in the plaster, but five contraction cracks appeared at points of tangent, and these have silted up. The conclusions drawn by a writer in "Engineering-Contracting" were:

1. The addition of lime—hydraulic, hydrated or otherwise—to cement plaster or concrete is neither economical nor beneficial.
2. Cement plaster is the cheapest and most satisfactory method of lining and waterproofing earthwork or masonry ditches.
3. Cement plaster can be made permanent on masonry or concrete, no matter how old, by (1) thoroughly washing the surface to remove all dust and dirt; (2) having surface well soaked; (3) thoroughly floating to get plaster as dense as possible and ensure good contact by expelling all air.
4. With skilled superintendence common labor gives good results.
5. No need for acid washes to ensure a good bond.
6. A thick coat of grout wash is sufficient protection for concrete and plaster against a fairly heavy frost.

The city of New Westminster at the present time possesses 69 industries, and 39 fish canneries are located in the immediate vicinity. New industries are being added at the rate of six or eight a month, while the rapid purchase of industrial sites bespeaks a bright future.

Railway Work in the Province of Alberta

Resume of Construction in hand and Projects Contemplated—Companies' Plans Somewhat Abridged Owing to the Scarcity of Labor

A reader of the "Contract Record" interested in the western contracting field addressed us recently asking for information in connection with railway developments in Alberta. The following information, furnished us by Mr. F. F. Fisher, secretary of the Edmonton Board of Trade, will doubtless be of interest:

Owing to the scarcity of labor it will be impossible for the companies to carry out nearly all the work that they had laid out for this season, and at the present time it is impossible to say with certainty how much work will be done, or which lines will be built and which carried over for future operations.

"To start with, the Grand Trunk Pacific is now running trains about 120 miles west of Edmonton, and about a similar distance from that point to the Yellow Head Pass is now being put under construction. There is but little doubt that the rail will be laid to the Pass this fall.

"The Canadian Northern has its survey closely paralleling the G.T.P., about 50 miles of which to the west of Edmonton is partly built. On half of this distance trains have been running for a year or two. Until a few weeks ago it was expected that this line would be continued as their main line. They have recently, however, made a sudden change and have now started work on a new survey which branches off their road running northerly from Edmonton at a point about ten miles out, then turning westerly and keeping to the north of the Grand Trunk Pacific. It is understood that every effort is being made to rush construction on this line. I also have information to the effect that a spur line will be built southerly from the main line of the C.N.R. to reach some very valuable coal fields controlled by Mackenzie & Mann, some 130 miles west of Edmonton and about 30 miles south of their main line. It is understood that this spur will be built just as soon as their main line reaches a point far enough west, as they are exceedingly anxious to get access to this coal for the use of their road.

"At the last session of the Alberta Legislature bonds to the extent of \$13,000 per mile were guaranteed for a road to be built northwesterly by the C.N.R. to a point on the Athabasca river, in the neighborhood of old Fort Assiniboine, this, of course, being the first instalment of a road to the Peace river. The understanding is that a guarantee will be given for the balance of the road when the first section is built. Assurances were given that this first section would be built this season, but it is now doubtful whether the company will be able to make good on that.

"The C.N.R. line from Edmonton to Athabasca Landing was also supposed to have been completed this season, but this work also will likely have to be left over. About 20 miles of this line, as far as Morinville, is now in operation, and grading is done about 20 miles further. A guarantee of bonds was also provided for 25 miles of a road to go easterly from a point north of Morinville on this branch.

"A guarantee of bonds was also provided for a line of about 50 miles southeasterly to connect Camrose, on the Wetaskiwin branch of the C.P.R., and the Vegreville-Calgary branch of the C.N.R. with Edmonton. It was partly arranged that this road should be placed under operation this coming summer and it was understood that this would be carried out if men could possibly be obtained to do the work.

"Bonds were also guaranteed at the last session for a C.N.R. line southwesterly from Edmonton, passing through the Pigeon lake country and the valley of the Blindman

river. This would render accessible some magnificent agricultural country which has hitherto had no means of transportation but which is fairly well settled. There does not now appear to be any prospect that construction of this line will be undertaken this year.

The Alberta & Great Waterways Railway is to be built from Edmonton to Fort McMurray following a general course slightly east and north. These people were all ready to start active construction and had contracts let and large quantities of all supplies on the ground with a view to completing about 150 miles this summer. Owing to the political difficulties which have suddenly developed, however, this work has all been held up and there is practically nothing being done in the meantime.

"In addition to these roads radiating from Edmonton, G.T.P. branches are being built southward from Tofield and Wainwright on the G.T.P. The C.N.R. branch from Vegreville to Camrose is being put into working shape and extended southward towards Camrose.

"Final arrangements have been completed by the C.P.R., the cities of Strathcona and Edmonton, and the Dominion and Provincial Governments, for the construction by the C.P.R. of a high level bridge between Strathcona and Edmonton to cost approximately one and one-half million dollars. Preliminary work is now being done and it is understood that this work will be rushed ahead and that the structure will carry trains before the close of 1911. It is generally understood that the expenditure of this large amount of money on this bridge means that the C.P.R. intend to extend their present line across the Saskatchewan and proceed northwesterly in the direction of the Peace river. They already have the necessary charters and have completed their final surveys, made with that end in view.

"At the session of the Dominion Parliament just closed, a subsidy of \$6,400 per mile was voted to the Pacific & Omenica Railway for 110 miles northwesterly from Edmonton. It is understood that the G.T.P. control this charter and that this is a G.T.P. enterprise. This line is for the purpose of enabling the G.T.P. to reach the rich Peace river country.

"In addition to the roads I have mentioned there are a number of charters in existence for roads northerly and northwesterly from Edmonton, but so far as I am aware these are in the hands of promoters rather than of railway builders, and at the present time can hardly be considered as practical railway propositions."

Mr. Charles Silson, of Oshawa, Ont., has resigned his position as assistant engineer of that town to become road superintendent for the county of Prince Edward.

The concrete linings of the aqueduct bridges on the Illinois and Mississippi Canal have been in service through two seasons and, according to the engineer, have given satisfaction. The concrete was a 1:4 mixture, using well-graded gravel, or 2:3:5 when fine crushed stone was used for the coarser aggregate. The bottom is 6 inches and sides 9 inches thick. The depth of water is 7 feet. The linings are practically water tight, the exterior at nearly all points being dry under a full head of water. The only place where seepage shows to any noticeable extent is on some of the sides, at the joint between two days' work. No seepage shows where the sides were carried up continuously.

Trade News from Montreal

Any amount of work, and supplies plentiful in this locality—Contractors making the most of a good season

Montreal Office of the "Contract Record."
July 2nd, 1910.

Under most favorable weather conditions building operations in the Montreal district are proceeding at a rapid pace. The large bulk of the work on hand at present consists of excavations, and until a later stage is reached there will be a comparative lull in the business of local builders' supplies. For a short time trouble, in the form of a strike by stone-mason contractors, threatened to tie up advanced construction work, but this danger seems to have been averted. The mason workers asked for an increase over the standard agreement of forty cents per hour. Contractors are always willing to pay according to the ability of their laborers.

The scarcity of teams during the progress of the extensive excavation work under way continues to be a feature of local conditions.

Supplies are plentiful, and, generally speaking, the market is quiet. Cement, however, continues to move freely.

Common brick are selling well and are being used in construction of the cheaper class of houses in the north and eastern parts of the city.

Pressed brick are not so plentiful as in the earlier part of the season.

The P.Q.A.A.

At a special general meeting of the Province of Quebec Association of Architects in the Association rooms, 5 Beaver Hall Square, the following resolution, re Federation of Provincial Architectural bodies with the Royal Architectural Institute of Canada was passed:

10. That a Dominion Institute of Architects must consist of properly organized Provincial Associations. Architects in Provinces where there are no Provincial Associations, are advised to form one, or to join an existing Provincial Association.

20. That all Provincial Associations must first be organized on a basis equal to the charters granted to the Ontario Association of Architects, the Alberta Association of Architects, or the Province of Quebec Association of Architects.

That examinations shall be controlled by the respective Provincial Associations.

40. That in order to establish a uniformity of standard, the curriculum and examination papers from each Provincial Association be submitted to an advisory board appointed by the Dominion Institute and consisting of representatives from each Association, whose duty shall be to give such advice to Provincial Associations as will tend to raise and unify the standard.

Such advisory board to be appointed for two years by way of trial.

50. That membership in such Provincial Associations shall "ipso facto" constitute membership in the Dominion Institute, but that, on the other hand, membership in the Dominion Institute shall not constitute membership in any, or all of the Provincial Associations.

60. The Council of the Institute to be composed of delegates appointed by the respective Provincial Association.

80. Each Provincial Association to pay to the Dominion Council a per capita fee, or a fixed sum per Association.

70. All officers of the Institute to be elected by the Council.

90. That the present charter of the Royal Architectural Institute of Canada be amended accordingly.

Kensington School

The Kensington school, which will be erected in Notre Dame de Grace during the present season, is to be a two-storey building containing ten class rooms. The exterior finish will be in brick with Roman stone trimmings. The structure was designed by Messrs. Peden & McLaren, architects, Montreal, and is being erected by Robertson Bros., general contractors. T. A. Morrison & Company are supplying the Roman stone requirements.

Inspection of Grand Stands Ordered

Two important motions were adopted at a recent meeting

of the City Council, which call for the inspection of all grand stands in the city limits, as well as for the inspection of grand stands for the aviation meet, and other stands outside the city confines, where Montrealers are accustomed to gather for sporting events.

The first motion read as follows:

"Whereas, the public of Montreal assists at different places of attraction, such as race courses, aviation meets, athletic meets, and others, outside of the limits of the city of Montreal, and as it is necessary that the stands erected within those places of amusement should provide for the public of Montreal a perfect security, it is moved that a request be sent the Provincial Government to the effect of having all stands above mentioned inspected as to their safety."

The second motion reads:

"That the inspectors already charged for the inspection of the sprinkling tanks, be charged also to inspect all stands erected in all the athletic parks situated within the city limits, as to the solidity and security of said stands."

New Lachine Bridge

The Foundation Company, Limited, is shortly to commence construction work on the Lachine bridge contract. This includes the extension of the present piers on the downstream end, in order to provide accommodation for double tracking. Several new piers will also be built in between the existing ones, to carry additional structural work.

In carrying out this work pneumatic methods will be largely employed. It is estimated that 18 months will be consumed in completing this contract. The Dominion Bridge Company will fabricate and erect the extra structural steel.

New Quarry Company Organized

The St. Lawrence Quarries, Limited, have been incorporated with a capital of \$100,000 to carry on the business of quarries and pavers. Messrs. Blair & Laverty are solicitors for the incorporators, about whose plans no definite announcement has yet been made.

Earl Grey School Building

The construction of the Earl Grey School Building on Christopher Columbus street for the Protestant School Commissioners is progressing at a steady pace. All the masonry work on the two fireproof wings has been completed and these have been roofed in. At present the contractor, Mr. Cape, is proceeding with the interior work and it is fully expected that the structure will be ready for occupation with the opening of the fall school session. This building was designed by Mr. A. F. Dunlop, whose plans were accepted in competition with a number of other architects. It is a skeleton steel type structure, two storeys in height, with basement, and fireproofed throughout. The exterior is finished with La Prairie pressed brick trimmed with Roman stone. The Phoenix Bridge & Iron Works, Limited, erected the steel and Messrs. T. A. Morrison & Company supplied the Roman stone. Mr. E. G. M. Cape is the general contractor.

Notes

Many new homes are being erected on the upper level, Westmount, and new streets are being opened as rapidly as possible. It is estimated that there will be more than a hundred houses on the market this autumn.

The erection of the new reinforced concrete factory building for the Dougal Varnish Company, on Manufacturer street, Point St. Charles, has been placed well under way. Mr. A. F. Dunlop is the architect and Mr. E. G. M. Cape general contractor.

The stock and business effects of Mr. Thos. Wand, general contractor, insolvent, were disposed of recently by auction sale. Local contractors comprised the chief purchasers of the building materials and machinery.

A new steel dredge for the Montreal Harbor Commissioners has just been launched at the Toronto yards of the Polson Iron Works and is now on its way to Montreal. The

Dredge No. 5, and is of much larger proportions than any new dredge will be known as the Harbor Commissioners' of the dredges at present in use in the harbor or Lake Ontario. In length it is 104 feet, beam, 36 feet; breadth at bow, 10 feet 9 inches; breadth at stern, 10 feet 8 inches.

Mr. R. S. Lea, consulting hydraulic engineer, is at present on an extended trip through the Canadian West. Mr. Lea will go right through to the coast and will return towards the latter part of July.

Mr. J. F. Jago is in Toronto, where the firm of Jago & Harris, of which he is a member, have just secured an important contract for the construction of the new Norway school in the eastern part of that city.

The engineer in charge of the St. Lawrence Ship Channel station has notified the Marine Department at Ottawa that the work of widening the channel through Lake St. Peter has been completed, with the exception of a short section at Nicolet traverse. At this point, however, the channel is at the present time 250 feet wide.

Mr. E. G. M. Cape, general contractor for the erection of the additional fireproof wing to the McGill University Medical Building has the excavation work well under way. The necessary rock has been removed and they are now busy on the rubble excavation work. Messrs. Brown & Vallance are the architects for this building.

The general contractors for the erection of the A. E. Rea & Company's buildings, Messrs. Byers & Anglin, are making rapid headway with the excavation work. The orange peel excavators supplied by the J. W. Harris Company are materially assisting in this work.

Winnipeg to Spend Millions

**Will Probably Submit By-Law to Raise Six Millions
Towards New Waterworks for Population of 500,000**

Office of the "Contract Record."

Winnipeg, Man., July 2nd, 1910.

A project which will include some large works for contractors is being formulated in Winnipeg now, in connection with the proposed establishment of a municipal water works on the Winnipeg river west of the Point du Bois power plant.

Members of the city council are at present satisfied that Winnipeg's artesian system of water supply is being outgrown and with a view to providing for the immediate and distant future a by-law will be submitted to the public at the next municipal elections for the establishment of a water system on the Winnipeg river. The initial expense, if the by-law carries, will be in the neighborhood of \$6,000,000, and this cost will ultimately be increased to \$17,000,000. At this latter figure water supply for a city of 500,000 people will be provided.

The city's water supply is now stated to be in a dangerous condition, as the chief source of supply is one well. If anything should happen to this well, the city would be face to face with a water famine. The board of control of the city has already discussed the subject and last week a diminution test of the wells was ordered. In view of the approaching World's Fair to be held there in 1914 it is admitted that the water problem is a very serious one, and the temporary extension of the present system at a large outlay of money is considered inadvisable. It is now stated on good authority that one member of the present city council will go before the public as a mayoralty candidate on the platform of a new system of supply.

Three years ago a board of consulting engineers, consisting of James H. Fuertes, R. S. Lea, J. E. Schwitzer and George C. Whipple, carried out at a cost of more than \$15,000 an investigation of the water supply question and sent in a report in favor of the seven portages on the Winnipeg river,

as the most favorable available sources of supply. With the civic power plant on the same river nearing completion, city power could be used in the pumping of water to and from the city and it is thought that the citizens, who are now feeling the scarcity of water, will favor the adoption and execution of the report of the commission. The C.P.R. has offered \$200,000 toward the cost of the work.

Two of the largest apartment blocks to have been constructed in Winnipeg this summer are now in the passive stage owing to the failure of loan companies to make the required advances on the properties. These are the Rostrevor and Regent apartments, whose joint costs were to have been in the neighborhood of \$750,000. In the case of the Rostrevor, which is being erected on Bannatyne avenue in the rear of the Carnegie Library, the basement was fully completed before it was found impossible to continue the work. Some arrangement may yet be arrived at whereby it can be constructed, but just now there is some discussion about the city leasing the basement for a public swimming bath. The Regent did not go as far in construction as the Rostrevor although the building permit was taken out. These are not the only two buildings tied up by reason of loan companies refusing to advance money. There are in the neighborhood of a dozen smaller works in the same state of financial coma.

Knighthood for Civic Improvement Workers

Sir Henry Newell Bate, K.B., chairman of the Ottawa Improvement Commission, who was one of the Canadians honored with knighthood recently, was born in Truro, Eng., in 1828 and came to Canada as a young man, taking up residence at St. Catharines. He has resided in Ottawa since 1854 and has done much for the development of the city. As chairman of the Ottawa Improvement Commission, he was one of the first to conceive the idea of the Rideau canal driveway and purchase of the parks, which have greatly enhanced the beauty of the Dominion's capital city. He has presided at the meetings of the commission since it was first formed in 1889. It is for his work in connection with the Commission that Sir Henry's name was included in the list of birthday honors.

Somewhat curiously another Canadian who received the same honor, Sir Edmund Walker of Toronto, is closely identified with civic improvement work in the Queen City.

More About the Lindsay Report

Commenting upon the Lindsay ozone report, the "Municipal Journal and Engineer" says: "It will be seen that the report of Dr. Archibald is based upon tests of only eleven bacteriological samples, some of which were taken when unusual conditions existed. It is unfortunate that another and more extended series was not taken when all conditions could be maintained normal. As it is, his figures (omitting one abnormal set) show that the filters removed on the average about 72 per cent. of the bacteria, the ozone about 83 per cent. of the remainder, or the two together about 95 per cent. Nothing is said of the effect on color or organic matter. The test of the representatives of the Provincial Board of Health extended over three months and was chemical as well as bacteriological. Their report expresses belief in the effectiveness of ozone, but appears to show this plant to be inefficient because of faulty aspirators. There appears in the report some confirmation of the prejudice against the plant said to be entertained by certain officials of the board; but, allowing for this, unless it can be shown that the tests themselves were incorrectly made or reported, it seems to be demonstrated that the plant cannot be considered a success although it may be possible to render it so by increasing the efficiency of the aspirators."



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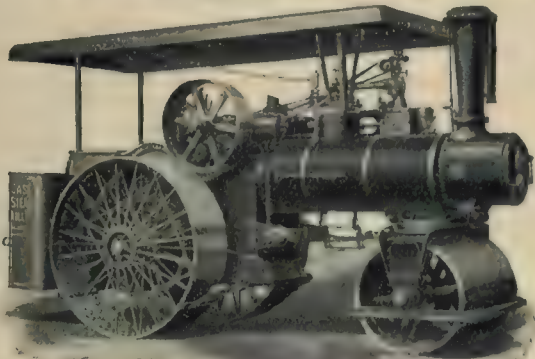
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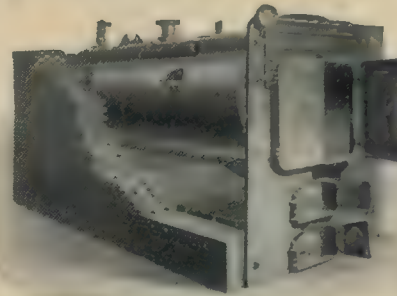
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Canadian City Engineers

J. W. B. Blackman, New Westminster, B. C.

No city in Canada to-day is more alive to the necessity for skilful engineering work than the ancient city of New Westminster on the Pacific coast. For some time the flow of settlement and industries in that direction has been steadily increasing so that where a year since one man was employed there are now five under the superintendence of the city engineer, Mr. J. W. Burnard Blackman.

City Engineer Blackman was born in Kent, England, in 1878, and educated at Highbury House College, St. Leonards-on-Sea. His early professional training was received at the hands of Mr. G. F. Miller, M.I.M.E. Later, he took a course at the Brighton College of Engineering and Science, where subsequently he held a mastership. For six years he practised his profession in the city of Brighton, Sussex. During this period he was a frequent contributor to leading technical publications. The "Builders' Journal," one of the best



City Engineer Blackman, of New Westminster, B. C.

known periodicals of the kind in London, commented very favorably upon several of his plans, and "Modern Buildings," amongst other standard books, gave specimens of his handiwork. After the early stages, however, Mr. Blackman devoted the greater part of his attention to the various phases of municipal engineering, having discovered that in this direction lay his forte. Mr. Blackman has had valuable experience in the construction of sewage disposal works, modernized systems of drain sewers and special adaptations of mechanical and scientific sanitation. He is an associate member of the Canadian Society of Civil Engineers, a professional associate of the Surveyors' Institute (Eng.), and a member of the Society of Architects of England. In 1907 he accepted an appointment as manager for Mr. J. H. Brownlee, C.E., of Vancouver, with whom he remained until March, 1909, when he went to New Westminster as city engineer.

New Westminster is a thriving city of some 15,000 people. It is situated about 14 miles from the Pacific Ocean on the north bank of the Fraser river, and is the great fresh water port of western Canada. Added importance is derived from the fact that it is the centre of a vast agricultural, mining and dairying district of nearly 5,000,000 acres. It is sometimes called the "Pacific Liverpool," by reason of the similarity of its location and that of old Liverpool, which it has

every prospect of emulating in rapidity of growth and population. Progress is the watchword of its civic administration.

The works now being carried on by the engineering department include the improvement of Columbia street, the principal business thoroughfare, the laying of a 24-inch main trunk sewer, new water and electric light mains and 14-foot cement sidewalks. With the idea of relieving to some extent the glare of the western sun, these sidewalks are finished off with a pleasing terra cotta tint, obtained by the use of oxide of iron. Columbia street is being relaid by the Hassam Paving Company, at a cost exceeding \$125,000. Double electric car lines are being put down under the supervision of City Engineer Blackman. The old fashioned wooden trolley posts are being replaced by arc lighted, steel centre poles of handsome design, located between the two sets of rails along the roadway, whilst artistic cast iron standards, capped with clusters of electric lamps, are being erected at a distance of 75 feet apart on the sidewalks. The street is 99 feet wide and is considered one of the best lighted and most attractive thoroughfares in Canada.

The civic officials and the citizens generally at New Westminster are alive to their responsibilities and sensible of the advantages they possess in the way of climate, fertility of soil, transportation and so on. The numerous industries include the Fraser River Lumber Mills (the largest in the world), an up-to-date machine works, railway car building factory, iron foundries, boiler works, cold storage plants, etc.

The city proper includes some 3,000 acres of land rising from the Fraser river in a gentle slope to a plateau of land which is rapidly being covered with well built residential homes. Over three-quarters of a million is being spent this year on this plateau. Needless to say, engineering problems in such a locality are of frequent occurrence. Among the works carried out recently may be mentioned the First street sewerage scheme and the Glen bridge.

The work now in progress includes a new pipe line of 25-inch steel rivetted water main from Lake Coquitlam, 17 miles distant, to the reservoir, from which three miles of 13-inch lap-welded steel pipe will serve the city. The pipe required in this connection was manufactured at New Westminster by Messrs. Macdonald & Company. The size first named is estimated to supply 6,250,000 imperial gallons a day. The source of supply is 442 feet above sea level and the reservoir 254 feet. The cost involved in this undertaking is approximately \$378,000.

The contract for the pipe for the Eighth street sewerage system now in hand is being carried out by Messrs. Gardiner & Johnston. This system will serve some 150 acres and is estimated to cost \$100,000. The main sewer pipes on this work will extend 10 miles in length. The city is now considering important paving schemes which will involve an expenditure of nearly \$150,000. New building by-laws are also being adopted.

The city is planned intelligently and the New Westminster of the future will not present the appearance of a city that "just happened." The ground plan is practically that all building blocks are laid out in squares with wide streets and 30-foot lanes throughout. The land slopes down to the Fraser river and has generally a southern aspect. These natural advantages admit of admirable drainage, whilst the swift-flowing current, with all the force of 700 miles of travel, removes all detritus in its passage to salt water some 12 miles distant.

The principal sewer is practically a combination pipe having two storm overflows of respectively 15 inches and 18 inches diameter. The manholes are built of carefully tested concrete and are fitted with penstocks at every opening for the purpose of flushing and to facilitate control of the sewage. All pipes are enclosed in four inches of Portland cement, whilst the surface water is received into trapped cast

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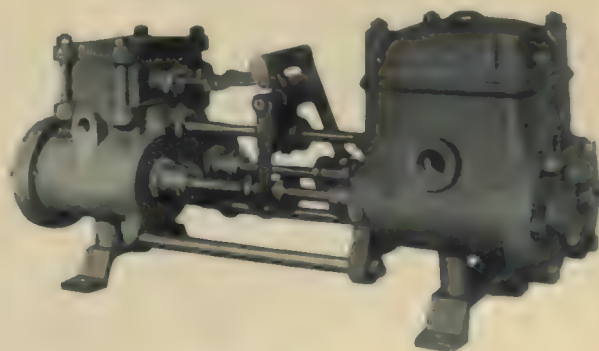
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While our interest in New Westminster centres around City Engineer Blackman and his work, a circumstance which precludes our entering into other matters connected with the city's administration, it would not be fair to close without acknowledging the services of Mr. C. H. Stewart Wade, the enterprising Publicity Commissioner of the Royal City, who is practically the author of this article.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope, and stating number of enquiry:

888. Roofing slates and tiles—A London firm wish to enter the Canadian market for roofing slates and tiles, and manufactured slate work.

956. Agent—A Yorkshire company manufacturing paints, colors, varnishes and oils, seek a suitable resident agent in Vancouver.

957. Agents—A Bristol firm desires to get in touch with Canadian firms handling builders' supplies for the sale of mortar mills. Will appoint agents.

981. Cast iron car wheels, electrical goods, etc.—A Newfoundland company usually purchasing their goods in England and the United States, desires Canadian exporters to quote them prices on the following goods: cast iron car wheels, electrical goods, including wire, fixtures, motors, transformers, lamps, etc., track spikes, boiler plates, boiler rivets and nuts, channel and angle iron, gasoline and kerosene oil engines, picks, sledge hammers, shovel handles, brass valves, babbitt metal and solder.

1009. Cement—A Dutch firm wants an agency for Canadian cement.

1119. Agents—A Liverpool correspondent wishes to appoint agents in Canada for the sale of a patent paint for the preservation of stone, brick, wood and metal structures.

1123. Road making specialties—A Liverpool firm manufacturing road making specialties, wishes to arrange for their production and sale in Canada.

The Evils of Substitution

The evils of substitution are set forth in an interesting manner in a recent issue of the New York "Evening Mail." The article in question furnishes such an excellent exposure of the "just as good" methods of some dealers that a substance thereof may prove of interest to our readers.

J. B. was building a house in a country town forty miles from New York. From various advertisements that he had seen he had formed a highly favorable impression of Cabot's creosote shingle stains (Samuel Cabot, Inc., Boston). Upon subsequent investigation he decided to use same. The architect had not specified Cabot's stains but readily conceded that they were the best. But the struggle the owner had to get what he wanted is amusing. The building was well under way and almost ready for the shingles. The builder referred the matter to his painter, who wanted to mix his own stains, which he claimed were the "same thing," "just as good," and so on. This would give him an extra profit on the job, which, however, he did not mention. The owner was told that it would take two or three weeks to get Cabot's stains from Boston, whereas the painter could mix his own stuff and proceed with the work at once. The local dealer preferred to sell another make which he considered "just as good," omitting, of course, to mention the extra discount that he would obtain on the substitute article. J. B.'s resolution, however, was only strengthened by all this opposition

that he encountered. In the end he placed an order for 150 gallons of Cabot's stain and obtained delivery in four days. The stains were applied and J. B. has every confidence in their durability. "My faith in their claims is strong," he concludes, "but how many home builders know enough of the guaranteed qualities of Cabot's shingle stains to insist upon having them as I did?"

All of which goes to show the value of advertising. No matter what merits your product may have, it may be asserted without fear of successful contradiction that in these days nothing can succeed without a fair share of publicity. The more advertising the less danger from substitution. There are many people who try to thrive by substituting—and the the worst of it is that many of them **do** thrive—but most people are beginning to understand that an advertised article of merit is the cheapest and most satisfactory they can purchase.

"Good morning, madam," volunteered the cheery salesman.

"Good morning," echoed the pleasant-looking matron. "Have you something choice in real Irish lace?"

"Well—er—no; but here is something just as good at 75 cents a yard."

"Just as good?" doubtfully.

"Yes, indeed. In fact," confided he, "superior to the real article. How much do you wish, please?"

"Just a yard," with suspicious slowness. "Here's your money."

"But, madam," in confusion, "you have made a mistake. This isn't money."

"No?" agreeably.

"Why, no. It's a matinee ticket."

"So it is. But it represents 75 cents, and while it isn't actual money, it's just as good."

And the salesman collapsed.

Dr. C. A. Hodgetts left Toronto last week for Ottawa to take up his duties as public health and sanitation expert for the Conservation Commission.

The death occurred last week of Mr. Donald Grant, formerly a well known contractor of Windsor, Ont. Several years ago he moved to Chicago, returning to Windsor about six months since.

The shortage of labor in Winnipeg is reported to be so great that contractors are offering as much as \$2.25 and \$2.50 a day. On railroad work some of the men are making \$3 a day with a little overtime.

The City Council of Prince Rupert, B.C., is adopting a frontage tax system for all work on city streets. A start on the street work will be made almost immediately. The business district will be put in first class shape this season.

A recent despatch from Seattle states that a representative of Klaw & Erlanger is on the coast in connection with the erection of a theatre in each of the principal cities. Edward G. Cooke, their agent, will visit Vancouver shortly and will make arrangements for the early construction of a handsome theatre there.

Mr. J. H. Plummer, president of the Canadian Steel Corporation, which is the title of the new steel and coal merger, states that the concern over which he presides has no intention of building any new mills, as was reported. Asked as to the intention of the corporation to go into the wire nail business he replied in the negative.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brampton, Ont.

\$2,187 will be spent on street improvements.

Cochrane, Ont.

This municipality is offering for sale \$25,000 of sidewalk debentures. F. J. Bradley, clerk.

Harriston, Ont.

Tenders addressed to W. D. McLellan will be received until July 27th for construction of drain, etc. For further information see advertisement in "Tenders and For Sale Department" of this issue.

London, Ont.

Tenders will be received until July 14th for re-surfacing asphalt pavement on Dundas street, from Wellington to Ridout. A. O. Graydon, city engineer.

Moncton, N. B.

Tenders for water pipe were as follows: Sumner Company, \$1,474.37; Canada Iron Corporation, Limited, \$1,477.17; D. Y. Stewart and Company, Limited, \$1,410; Watson, Jack and Company, Montreal, \$1,373.95. The tender of Watson, Jack and Company was recommended for acceptance. The engineer was authorized to purchase 12 electric metres from the Packard Electric Company.

New Westminster, B. C.

Tenders addressed to W. A. Duncan, city clerk, will be received until August 1st for supply of 1,000 feet of 13-inch dia. and 1,200 feet of 12-inch dia. lap-welded steel pipe, and for 13-inch dia. flexible joints. Specifications, etc., with city engineer, J. W. B. Blackman.

Ottawa, Ont.

Tenders addressed to chairman, Board of Control, will be received until July 14th, for asphalt and stone set pavement on Wellington street, etc. Specifications at office of City Engineer, N. J. Kerr.

Prince Albert, Sask.

It was decided to submit a by-law to the ratepayers asking for \$12,000 for purchase of filtration plant, that amount being sufficient to procure a plant through which 600,000 gallons of water per day could pass.

Point Grey, B. C.

For constructing a system of waterworks throughout the municipality the sum of \$500,000 is to be borrowed; \$250,000 is wanted for sewers, \$100,000 for parks, and \$100,000 for roads. By-laws for these will be submitted to the ratepayers shortly.

Quebec, Que.

Tenders are being called until July 13th for street paving. W. D. Baillarge, city engineer.

Raymond, Alta.

The waterworks by-law was ratified by the ratepayers.

Strathcona, Alta.

A by-law to provide for the raising of \$48,000 for the extension of the pipes of the waterworks and sewerage system, will be submitted to the ratepayers on the 30th inst.; also on the same date a by-law for the purchase and installation of certain meters and other appliances.

Souris, Man.

A by-law to authorize the issue of \$9,000 of debentures to instal a system of waterworks was carried by four votes. The waterworks system which it is proposed to instal is that of the J. L. White Company, of Sioux Falls, S. D.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until July 26th for construction of about 1,340 lineal feet of reinforced concrete pipe sewer, 5-ft. internal diameter.

Victoria, B. C.

The City Council has decided to purchase fifteen one-inch and five hundred five-eighths-inch Trident meters at a cost of \$2,390 for the water works department.

Vancouver, B. C.

Evans, Coleman and Evans offered a lot of eight-inch lap-welded pipe at \$59.85 per 100 feet. The offer was accepted, the pipe to be taken as needed.

Five tenders were submitted for concrete work on Little Mountain Reservoir. The following are the tenders and the figures as given on the specifications, the concrete work being estimated on the square yard basis:

Contractor		Installing Rock	
Wells Construction Company		Inlet Surface	
Waugh, Millburn		and Overflow	
J. C. Kennedy			
M. P. Cotton and Company			
G. H. Webster			
Reinforced	Bottom		
Concrete	Lining		
1.18	1.42	1.20	—
2.50	2.05	20	200
1.90	1.80	50	200
2.85	1.85	1.00	600
2.10	1.55	1.00	475

The estimated amount of concrete for the bottom lining is 10,000 square yards, while the estimated surface to be rocked will require 600 square yards, and the reinforced lining for the basin 9,000 square yards.

Winnipeg, Man.

The following works are to be advertised for tenders by the city: A 24-foot asphalt pavement on Salter street, from College avenue to Mountain avenue, estimated cost, \$2,729. A 24-foot asphalt macadam pavement on Manitoba avenue, from Salter to McKenzie streets. Estimated cost, \$20,729.

The city has signed an agreement to secure a Linkbelt asphalt mixer, with which the new pavement for city streets is to be compounded. There is much enthusiasm locally over this purchase, as it

is confidently hoped that bituminous macadam will overcome the difficulties found at present in other forms of pavement used. The cost of the machine will be about \$8,000.

The following is a statement of works passed by the civic council to June 25, but not ordered by the Board of Control for construction, and works ordered to be advertised for tenders: Asphalt pavements, \$1,297,159.00; macadam pavements, \$22,119.00; block pavements, \$20,551.00; granolithic walks, \$68,726.00; plank walks, \$27,614.00; sewers, \$129,610.00; water mains, \$143,857.00; grading, \$26,230.00. Total, \$1,736,166.00.

Tenders addressed to chairman Board of Control will be received until July 21st for supply of 2,000 half-inch water meters. Specifications, etc., at office of city engineer, corner James avenue and King street. M. Peterson, secretary.

Tenders addressed to P. E. Ryan, secretary Commissioners of the Transcontinental Railway, Ottawa, will be received until July 26th for the excavation, construction, etc., of a main sewer line for the Winnipeg Transcontinental Railway shops, extending from the pump house and terminal yard to the Seine River. Plans, etc., at office of Mr. Gordon Grant, chief engineer, Ottawa, and at office of S. B. Poulin, district engineer, St. Boniface, Man.

AWARDED.

Brandon, Man.

Thos. Chamber, builder, has the contract for the erection of new filter building at pumping station. Estimated cost, \$4,000.

Collingwood, Ont.

K. S. Macdonell, town engineer, writes that the contract for sewers was awarded to Wm. Simpson, as follows: Second street, 15 inch sewer, \$1,150.00; Fifth street, 8-inch sewer, \$450.00. The contract for the brick paving was not let, and all tenders were returned unopened.

Exeter, Ont.

The contract for erection of 40,000-gallon steel tank (100-ft. elevation) was awarded to Gould, Shaplev and Muir, of Brantford, at \$3,300, the erection not to include foundation. F. W. Farncomb, manager, London, Ontario.

Lindsay, Ont.

The contract for paving of William street was awarded to Asphalt Block Paving Company, Windsor, at \$2.40 per yard. The following bids were considered: Westrumite Asphalt Pavement—Excavation and concrete foundation, complete, per square yard, 70 cents; bituminous surface, 3 inches thick, laid according to attached specification, and known as Westrumite asphalt pavement, specification "B" pavement, including maintenance for five years, per square yard, \$1.30; 9-inch sewer pipe, laid complete, cement joints, 6 feet or under in depth, per foot, 80 cents. John Maguire Contract—Six-inch sewer pipe, laid complete, cement joints, 70 cents; concrete curb, 6-inch by 24-inch,

straight, per foot, 45 cents; concrete curb, 6-inch by 24-inch, curved, per foot, 55 cents; concrete curb and gutter, curb 6-inch to 10-inch, gutter 12-inch curved, per foot, 60 cents; headers, per foot, 65 cents; concrete sidewalk, per square foot, 14 cents; catch-basin, brick, $2\frac{1}{2}$ feet $\times$ $2\frac{1}{2}$ feet $\times$ 5 feet, each, \$28; catch-basins, greater or less depth than five feet, per foot of depth, \$6; excavation and concrete foundation, complete, per square yard, 86 cents; bituminous surface, $2\frac{1}{2}$ inches thick, laid according to specifications, and known as asphalt block pavement, including maintenance for five years, per square yard, \$1.90. Asphalt Block Company. Nine-inch sewer pipe, laid complete, cement joints, 6 feet or under in depth, per foot, 85 cents; 6-inch sewer pipe, laid complete, cement joints, 75 cents; concrete curb and gutter, curb 6 inches, gutter 12 inches, straight, per foot, 52 cents, curved, per foot, 55 cents; headers, per foot, 60 cents; catch-basin, brick, $2\frac{1}{2}$ feet $\times$ $2\frac{1}{2}$ feet $\times$ 5 feet, each \$25; catch-basins, greater or less depth than 5 feet, per foot of depth, \$5.50; excavations and concrete foundation, complete, per square yard, 63 cents. Bituminous surface, $2\frac{1}{2}$ -inch thick, laid according to specifications, and known as asphalt block pavement, including maintenance for five years, per square yard, \$1.86.

New Liskeard, nt.

Messrs. Hill and Clark, contractors, have been awarded the contract for sewerage out fall works.

Ottawa, Ont.

We are informed that the following tenders for laying pavement on Mutchmor street, between Bank and Elgin streets, were received: Ottawa Construction Company, Ottawa, \$10,950 (accepted); Barber Asphalt Company, Ottawa, \$12,348; Union Construction Company, Ottawa, \$12,553; City Engineer, Ottawa, \$13,946.

St. John, N. B.

It was recommended to the council that the contract for supply of 314 tons of c. i. pipe for water and sewerage department, be awarded to the Stavely Coal and Iron Company, of Chesterfield, Derbyshire, England, the lowest. They quoted: 12-inch pipe, \$27.15; 10-inch, \$27.30; 8-inch, \$28.10; 6-inch, \$28.60. Ten other firms tendered.

Toronto, Ont.

Contracts, etc., for the construction of the bitulithic pavements were awarded as follows, viz.: Pollis avenue, Manning avenue to Clinton street, to the Warren Bitulithic Paving Company, \$1,545; Galley avenue, Sorauren avenue to Macdonnell avenue, the City Engineer.

The contract for the construction of the vitrified block pavement, Jones avenue, G. T. R. tracks to Danforth avenue, was awarded to Page and Britnell, \$19,913, the lowest.

Contracts, etc., for the construction of the asphalt pavements were awarded as follows: Bellwoods avenue, Queen street to Arthur street, the City Engineer; Badgerow avenue, Pape avenue to east end, Barber Asphalt Paving Company, price \$2,277, the lowest; Barrett avenue, Chelsea avenue to 159 feet south, Barber Asphalt Paving Company, \$707, the lowest; Campbell avenue, south side, Antler avenue to Royce avenue, the City Engineer; Morrow avenue, Dundas street to north end, to the Barber Asphalt Paving Company, \$1,590, the lowest; Symington avenue, Bloor street to 552 feet south, to the Barber Asphalt Paving Company, \$1,407, the lowest; Wallace avenue, 10th avenue to railway tracks, the City Engineer.

Contracts, etc., for the construction of the sewers and the supply of 30-inch steel pipe were awarded as follows, viz.: Indian Grove, Howard Park avenue to 200 feet north, to the Orpen Company, \$285, being the lowest; High Park Gardens, Keele street to 450 feet west of Indian road, to the Orpen Company, \$393, being the lowest; Carlaw avenue, Danforth avenue to north city limit, the City Engineer; Whitney avenue, Danforth avenue to north city limit, to the Forcott Contracting Company, \$2,365, the lowest; Chester avenue, Danforth avenue to north end, to the Forcott Contracting Company, \$1,950, the lowest; John street (now Pretoria), Ellerbeck avenue to Don Mills road, to the Forcott Contracting Company, \$433, the lowest; Moscow avenue, Danforth avenue to north end, to the Forcott Contracting Company, \$2,037, the lowest; Danforth avenue, Broadview avenue to Sarah street, to the Forcott Contracting Company, \$536, the lowest; Sarah street, Danforth avenue to north end, to the Forcott Contracting Company, \$2,380, the lowest; Third street, Sarah street to west end, to Page and Britnell, \$195, the lowest; 30-inch steel pipe, to the John Inglis Company, price \$9.23 per lineal foot, the lowest.

The tender for treated wood block pavement on Yonge street, etc., awarded to Mr. John Maguire, has been cancelled and awarded to the Constructing and Paving Company, the next lowest tenderer, at \$11,341. They will use long leaf yellow pine treated with 16 lbs. preservative per cubic foot of wood.

Vancouver, B. C.

The contract for lining the Little Mountain reservoir with cement has been awarded to the Wells Construction Company, at its tendered prices, the engineer reporting that the aggregate tender was about \$31,620. It was stated that it had been decided to eliminate the rock surface finish. On this basis the aggregate of the other bidders was as follows: G. H. Webster, \$34,875; J. C. Kennedy, \$35,300; Waugh-Millburn Construction Company, \$43,250; M. P. Cotton, \$44,750.

J. C. and A. J. McDonald, of New Westminster, were awarded the contract on the lowest tender for the supplying of 3,800 feet of 25-inch steel water pipe at \$3.21 per lineal foot, to be delivered within ten days after signing of the contract. Other tenders were: Evans, Coleman and Evans, 22-inch steel pipe, \$2.63 per lineal foot, ten weeks' delivery; P. D. Harris and Company, 22-inch water pipe at \$2.84 per lineal foot, four to five months' delivery.

Winnipeg, Man.

The contract for construction of sewer connections and installation of plumbing has been let to S. H. Geddes and Company, this city, at \$390.

The tenders of the engineer of construction, being the only ones received for the following works, they were awarded to him: Sewer, on Andrews street, from Alfred to Burrows, \$426; asphalt pavement, on Osborne Place, from Colony street to Balmoral place, \$2,470; cedar block pavement on William avenue, from East street to a point 100 feet east, at \$1,152.

Railroads, Bridges and Wharves

Brampton, Ont.

Tenders will be received by Peter Speirs, warden, County Peel, up to 18th inst., for construction of a bridge near Brampton. C. R. Wheelock, engineer. For

further particulars see "Tenders and For Sale Department" of this issue.

Brockville, Ont.

Tenders addressed to E. R. Blackwell, C.E., road engineer, will be received until July 25th, for erection of 75-foot steel warren truss highway bridge, two concrete abutments, pile driving.

Dartmouth, N. S.

A plebiscite will be taken at an early date regarding the granting of \$50,000 towards the Halifax and Eastern Railway Company, on the condition that the terminals will be located here.

Edmonton, Alta.

Tenders are called for the Canadian Pacific Railway for the high level bridge between Strathcona and Edmonton. Estimated cost, \$2,500,000.

The tenders for the west end bridge were as follows: The Algoma Steel Company, f.o.b., Edmonton, \$22,800, for erecting, including four-inch plank on sidewalk, and painting, but not including cement pedestals or abutments, \$8,020. The company promise shipment of steel in three or four months. The Dickson Bridge Works Company submitted alternative plans, the prices being with 40-foot roadway and 5-foot sidewalks, f.o.b., Edmonton, erected complete, \$29,960, concrete floor \$7,428 extra. The other tender by this company was for 20-foot roadway and two 6-foot sidewalks, \$27,000, erected complete, \$32,000. Walker and Barnes' tender in behalf of the Canadian Bridge Company, was: Steel delivered at site, \$24,588, erected ready for planking and paving, \$30,000. The contractors submitted a plan, according to which the work would be carried out, and promised delivery in four months. Gorman, Clancey and Grindley tendered for the Dominion Bridge Company, f.o.b. site, \$24,650; erected, \$29,240; if temporary legs are supplied, \$2,606, and \$3.116 must be added to the above prices.

Kingston, Ont.

A deputation, composed of W. F. Nickle, K.C., and others, waited upon the provincial government to ask aid for the construction of a bridge over Cross Lake river, in Frontenac County. W. J. Paul, M.P.P., of Addington, presented plans. Estimated cost, \$73,000.

Montreal, Que.

Tenders addressed to J. Davidson, reeve Township of Hamilton, will be received until July 16th for erection of two cement bridges, etc. Plans, etc., at home of the above mentioned.

Milton, Ont.

We are informed that on the 6th inst. the County Council of Milton decided against the erection this year of the steel or reinforced concrete bridge on the Middle Road, between Oakville and Trafalgar.

Matana, Que.

Tenders are being called until July 26th, by the Public Works Department, for construction of breakwater here.

North Vancouver, B. C.

The city clerk was instructed to prepare two by-laws for authorization to borrow \$100,000 to purchase shares in the Second Narrows bridge.

The Imperial Car, Shipbuilding and Drydock Company have secured the subsidy for docks. It is stated that Swan and Hunter, of Newcastle, will build them at Roche Point.

Ottawa, Ont.

Tenders addressed to L. K. Jones, secretary, will be received until July 25th for superstructure of Le Pas bridge over the Saskatchewan River. For further information see advertisement in this issue.

Tenders addressed to P. E. Ryan, secretary the Commissioners of the Transcontinental Railway, will be received until July 26 for (1) Air, steam, water and oil piping system; (2) Yard water system; (3) Pipe tunnels and wiring ducts; required in connection with the Transcontinental Railway shops east of Winnipeg. Plans and specifications may be seen at the office of Mr. Gordon Grant, chief engineer of the commissioners, at Ottawa, Ont., and in the office of Mr. S. R. Poulin, district engineer, St. Boniface, Man.

Port Arthur, Ont.

Tenders addressed to J. McTeigue, city clerk, will be received until July 18th for the construction of reinforced concrete bridge over Current River, etc. Further information from corporation engineer.

Prince Rupert, B. C.

The Grand Trunk Pacific has been granted subsidy for construction of floating drydock, and the Marine Department has been authorized to construct a marine depot to cost \$100,000. It is stated work will start at once. Estimated expenditure of railway on drydock, \$1,500,000.

Prince Albert, Sask.

It is stated the Dominion Department of Public Works has issued instructions to Z. Malhoit, government engineer, to prepare plans and specifications for the construction of wharf, for which an estimate went through at the last session of parliament.

Strathcona, Alta.

A by-law to provide for the raising of \$38,000 for construction of bridge over Mill Creek ravine will be submitted to the ratepayers on the 20th inst.

Sault Ste. Marie, Ont.

Tenders addressed to R. S. McCormick, chief engineer, will be received until July 23rd for subgrading a section of the Manitoulin and North Shore Railway, a distance approximately of 18 miles. Plans, etc., at office of the above.

AWARDED.**Elder's Bridge, Ont.**

We are informed that John A. Watson has been awarded the contract for the sub-structure of the bridge here; Hamilton Bridge Works the contract for superstructure. Barber, Young, Toronto, engineers.

Ottawa, Ont.

We are informed that The Canada Foundry Company, Toronto, has been awarded the contract for the superstructure of the bridge over the Saskatchewan River, for the Canadian Northern Railway.

St. Lazare, Man.

We are informed that the Algoma Steel Bridge Company's tender for bridge over Assiniboine River was accepted at \$4,885, the only tender.

Toronto, Ont.

G. C. Lewis is the contractor for the Wadsworth arch bridge crossing the Humbre. The specifications call for length 178 feet, breadth 20 feet with road 16 feet wide.

Vancouver, B. C.

A contract for the construction of the first section of the Kettle River Val-

ley Railway was awarded to the engineering and contracting firm of Macdonell, Gzowski and Company, this city. The work awarded covers that portion of the line lying between Merritt, a station on the Spences Bridge-Nicola Railway, and the headwaters of the Coldwater River, a distance of thirty miles.

Winnipeg, Man.

We are informed the Board of Control have let the contract for the Brown and Brant street bridge over the Canadian Pacific Railway tracks for a total of \$259,800. The Cleveland Bridge Engineering Company, of Darlington, England, get the contract for the superstructure at \$205,160. The contract for the piers was let to William Newman and Company, at \$54,720. Bridge to be ready by June 1st, 1911.

The Canadian Northern Railway awarded to Foley, Welch and Stewart, railway contractors of St. Paul, the contract for the construction of the Canadian Northern Railway line from Virginia to Duluth, in Minnesota.

Public Buildings, Churches, Schools, etc.**Armow, Ont.**

Tenders addressed to R. B. Campbell, clerk, Kincardine Township, will be received until July 16th for veneering township hall with brick.

Belleville, Ont.

A campaign has been started to raise \$40,000 for a new Y. M. C. A. building. C. K. Colhoun, of Montreal, international secretary, is in charge.

The City Council granted the request of the Board of Education for grant of \$30,000 for the erection of new school. Work will start at once.

Tenders are being called by Public Works Department, Toronto, until July 19th for alterations and additions to the barn at the Institution for the Deaf and Dumb.

Berlin, Ont.

A health association was organized here for the erection, etc., of a modern tuberculosis sanitarium for Waterloo County. Winston Brewster, of Hespeler, is secretary pro tem.

Brandon, Man.

The by-laws to erect new central fire hall at a cost of \$27,000 and reconstruct city hall at an expenditure of \$20,000 were carried.

Chilliwack, B. C.

The ratepayers have sanctioned an expenditure of \$15,000 on a new city hall.

Elkhorn, Man.

Tenders addressed to C. R. Duxbury, secretary-treasurer school board, will be received until July 18th for all work in connection with the erection of a 6-roomed school building. Plans, etc., at office of W. A. Elliott, architect, Brandon.

Eganville, Ont.

Tenders addressed to J. R. Campbell, secretary public school board, will be received until July 22nd for the various trades required in erection of public school.

Fredericton, N. B.

Tenders were called until July 13th for the erection of additions and improvements to the Masonic Temple here. W. E. Minue, architect, 220 Aberdeen street.

Fort William, Ont.

Tenders were called until July 7th for a suitable site for the erection of court house and jail. A. McNaughton, city clerk.

Granby, Que.

Tenders addressed to Dr. L. A. Lessard, chairman school board, will be received until July 15th, for installation of heating and ventilating system at the convent and college here.

Gretna, Man.

Tenders addressed to Harry F. Stirk, secretary-treasurer school board, will be received until July 15th for erection of 4-roomed brick school. Plans, etc., at office of Building Exchange, Winnipeg, or at office of the above mentioned.

Halifax, N. S.

The site selected for the market building is the block bounded by Duke, Brunswick, Buckingham and Albemarle streets. Assessed value, \$17,400.

Hamilton, Ont.

Permit was issued to Stewart and Winton for brick police station, Sherman avenue, to cost \$12,000.

London, Ont.

City Architect Nutter has been instructed to prepare detailed plans for Colborne street school. Debentures to raise \$30,000 to defray cost will probably be issued shortly.

Lloydminster, Alta.

The site for the new government building has been selected. Church and Main streets.

North Vancouver, B. C.

Aldermen Irwin, Smith, McCrae, and Shultz were appointed as a committee to report on a suitable site for city hall.

North Toronto, Ont.

Debentures to the amount of \$17,000 for the purpose of erecting a new public school on Remleigh avenue, will be purchased.

Quebec, Que.

Mr. Emile Tanquay has been appointed architect for the new fire and police station, for which a site has been purchased.

Ottawa, Ont.

For further information regarding the erection of theatres, noted in issue of June 29th, address Mr. Clark Brown, general manager, Bennett Circuit, United Booking Office, New York City.

No contract for the erection of the Oneida Indian school has been awarded, all the tenders being too high.

Prince Albert, Sask.

A building to combine theatre and hotel will be built at once at an estimated cost of \$35,000. Ald. Matheson and Chas. O'Connor are interested.

Port Hood, N. S.

Tenders addressed to J. H. Murphy, secretary school board, will be received until July 19th for erection of academy building. Plans, etc., at office of town clerk. D. Henderson, architect, Truro.

Rosemount, Que.

The Catholic Board of School Commissioners will erect two new schools, one of which will be erected at once near Masson street, and will cost about \$100,000.

Benfrew, Ont.

The Board of Education adopted the plans for the Central Public School pre-

pared by Architect Garveock, Ottawa, and decided to call for tenders.

The Separate School Board are considering a new school building.

St. Catharines, Ont.

Fire Chief Early, in his report, recommends two new sub-fire stations at once.

Sandwich, Ont.

A by-law will be voted on on July 18th to raise \$20,000 for the purpose of erecting offices to be used in connection with the court house, etc.

Strathcona, Alta.

Plans for the new armory have been prepared. J. M. Douglas, M.P.P.

Toronto, Ont.

The Ontario Government has a permit for the proposed three-storey addition to Osgoode Hall, to cost \$95,000.

The Art Museum directors, it is stated, will erect a new art building in the Grange property, and about \$100,000 will be spent by the city in beautifying the grounds.

The city has a permit for 1-storey brick and steel poultry building at Exhibition Park, \$36,000.

The Northern Congregational Church, Carlton street, are looking for a new building site.

Vernon, B.C.

The contractor for the government building here is W. A. Cryderman. Estimated cost, \$50,000.

Wolseley, Sask.

The by-law to raise \$9,000 for the purpose of building a four-room addition to the present school was carried.

Wainwright, Alta.

Tenders for purchase of \$18,000 school debentures, 5 per cent., 20-year, will be received until August 15th. H. V. Fieldhouse, secretary-treasurer.

Tenders addressed to H. V. Fieldhouse, secretary-treasurer S. D., will be received until July 15th for supply and installation of heating plant in the school building. Plans with the above mentioned.

Winnipeg, Man.

The congregation of Christ church are looking for a new site. J. H. Carleton, people's warden. It is stated that a Montreal firm has bought the former site, and that a large business building will be erected.

AWARDED.

Guelph, Ont.

The contracts for Central School were let to Messrs. Stevenson & Malcolm at \$1,900 for the steam heating system; and to Messrs. McCormack & Robinson at \$2,470, for the ventilating system. Other work, such as cement foundation and cutting will be let by contract and day labor.

New Liskeard, Ont.

The contract for the fire hall here has been awarded to Hill & Clark.

Ottawa, Ont.

St. Paul's Presbyterian church is to be entirely redecorated, and new windows installed. J. A. Ewart is the architect and the contract has been awarded to Thornton, Smith and Company, of Toronto, at about \$4,000.

Thomas Brethour got the contract for the plastering of Breeze Hill avenue school, for \$1,590, and Charles Hunt the one for Hopewell avenue, for \$1,555.

Stewart, B. C.

A contract for construction of the lockup, court room, at Stewart was awarded to James Cumming, of Stewart, \$4,000.

Renfrew, Ont.

The contract for the erection of new public school has been awarded to M. J. O'Brien's Renfrew Planing Mill for \$32,000, and it is expected that it will take about \$4,000 more for equipment.

Toronto, Ont.

The contract for erection of band stand in Exhibition grounds was awarded to Orr Brothers, the lowest tenderer, at \$4,535. Others tendered as follows: \$4,697, \$4,690, \$7,787 (informal, no deposit), \$4,600.

Purdy, Mansell were awarded the contract for heating and plumbing in Osgoode Hall.

The contracts were awarded by the Separate School Board for alterations at 471 Jarvis street, as follows: Madden Brothers, carpenter work, \$200; Madden Brothers, plastering, \$115; J. W. Mogan, painting and kalsomining, \$140; D. Glynn & Son, plumbing, \$152; F. B. Bagley, skylights, \$78. A new six-foot fence will be erected at St. Francis' school. The contract for heating and ventilation of the new addition to St. Ann's school was awarded to J. E. Gray for the sum of \$1,888. Assistant secretary, J. G. Hall.

Vancouver, B.C.

The Public Works Engineering Company were awarded the contract for concrete work in connection with the new incinerator. The company tendered at \$5,675, but were given the work by day contract, plus 10 per cent. It was suggested that the chimney for the incinerator be built of perforated radial brick with concrete lining inside.

Woodstock, Ont.

The contract for the plumbing in the Beale street school was let for \$658, and that for Delatre street, at \$649.

Winnipeg, Man.

It is stated that the Vulcan Iron Works has secured contracts for all the iron and steel work in both technical schools for \$50,000.

Business Buildings and Industrial Plants

Arnprior, Ont.

About 60,000,000 feet of lumber, valued at \$1,000,000, belonging to Gillies Lumber Company, were destroyed by fire on the 4th inst.

Berlin, Ont.

The furniture factory of Baetz Brothers & Company was destroyed by fire on the 6th inst. Estimated loss, \$30,000.

Claresholm, Alta.

Twenty thousand dollars' damage resulted from a fire which broke out in Gibson's livery.

Calgary, Alta.

Ex-Alderman Watson, local representative of a Boston firm, is authority for the statement that Calgary will probably be the site for a large steel industry in a few months' time.

Fredericton, N. B.

The Scott Lumber Company's saw mill, operated by Bank of Nova Scotia, was destroyed by fire on the 3rd inst. Loss not stated.

Hamilton, Ont.

The firm of Stanley Mills & Company has offered the city a quarter of a million dollars for Gore Park. The company wants to erect a fifteen storey building on the site.

Kamloops, B.C.

Kamloops will grant the Canadian Northern Railway a site for station and car-shop purposes.

London, Ont.

The Forest City Laundry, King street, was damaged on the 8th inst. to the extent of about \$15,000.

Ottawa, Ont.

We are informed that A. Rosenthal and Sons will make their business building 8 stories instead of seven, and that the contract price will exceed \$135,000. Noted in issue of June 1.

Mr. Alex. Maclaren, proprietor of the mills at Wakefield, is quoted as having said that it is not likely that the mills will be rebuilt.

Quebec, Que.

Tenders were called on July 13th for offices here for the Levis Ferry.

Ponoka, Alta.

The Canadian Bank of Commerce will erect a branch here.

Stratford, Ont.

On July 28th the by-law to grant privileges to the Dufton Company, Limited, will be voted on.

Sydney, N. S.

A building permit has been issued to Rhodes, Curry and Company, for the erection of buildings for the Imperial Oil Company, on Kings Road. Cost \$2,000.

On the 20th inst., the ratepayers will vote to approve of the council's recommendation to offer a bonus of \$350,000 and free site to Constant & Hawthorne, naval architects, Montreal representatives of a British company for the establishment of a shipbuilding plant.

Saskatoon, Sask.

E. M. Mott, manager of Cockshutt Company, at Winnipeg, has purchased a frontage of 75 feet; it is surmised a warehouse will be built.

Selkirk, Man.

Negotiations are being carried on as to a site for the erection of a flour mill here by C. C. Bird Company, of Minneapolis, Minn.

St. John, N.B.

It is stated that the borings to determine the suitability of Courtenay Bay as a site for a drydock show that conditions for the construction of dry dock are excellent. The promoters, Harland & Wolff, will file plans and apply for subsidy.

St. Catharines, Ont.

It is announced that the Sash and Metal Works Company will expand their business. President L. E. McKinnon, Buffalo, N. Y.

Strathcona, Alta.

We are informed that the tile factory mentioned in issue of June 29th will not be erected until next year. Estimated cost of equipment of pressed brick plant, \$20,000.

Steveston, B. C.

The Burrard Canning Company's plant was destroyed by fire on the 5th inst. Loss

estimated at \$30,000. Messrs. J. Webster, Ross and Howard, Vancouver, are the owners.

Toronto, Ont.

Mr. J. Ross Robertson, proprietor of "The Evening Telegram," has requested permission to connect his present building with an addition which he proposes to have built across a lane.

Tenders will be received until July 14th for the reinforced concrete structure of building for the News Publishing Company. Bank and Smith, architects, 19 Wellington street west.

Permits were granted to the Bank of Toronto for a 3-storey building, corner of Dundas and Keele streets, \$30,000; also to Mr. F. Mauthie for a new 4-storey hotel, corner of Gerrard and Parliament streets, \$18,000.

It is stated that the Key Engineering Company, Limited, London, England, are seeking to locate a branch factory here. Leonard Andrews, representative; Dr. Orr, manager of Canadian National Exhibition, is interested.

Vancouver, B. C.

General outline for the British Columbia Electric Railway block, south-west corner of Hastings and Carrall streets, has been approved, and detailed plans are being prepared. Plans call for five storeys. Estimated expenditure, \$250,000.

The Arbutnot sash and door factory was destroyed by fire on the 29th ult. Estimated total loss, \$20,000.

Dominion Bond and Trust Company has acquired the property covering the south-west corner of Granville and Cordova streets. The plans call for the erection of a fourteen-storey business block, and are now in course of preparation. Estimated value, \$500,000. Operations will probably be started during the present season.

Winnipeg, Man.

The Canadian Pacific Railway will add two storeys to the Royal Alexandria Hotel here.

The Pullan Paper Company, of Toronto, were burned out on the 7th inst. Loss estimated at \$20,000.

It is stated the Manitoba Government Elevator Commission have placed orders for material for twelve elevators. The total amount of this order is over \$150,000.

The North-West Hide and Fur Company's building was partially destroyed by fire on the 9th inst. Loss about \$60,000.

McKenzie and Mann are having plans prepared in the east for the construction of the immense hotel which is to replace the old Manitoba, burned down in 1898. In an interview Mr. McKenzie estimated the cost of the new structure to be nearly \$1,000,000. Noted previously.

G. M. Miller, architect, of Toronto, has plans of the new Winnipeg warehouse for the Ontario Wind Engine and Pump Company. The warehouse will be five storeys high, and the estimated cost is \$50,000. (Tenders have not yet been called for.)

Tenders addressed to J. Woodman, architect, Free Press Building, will be received until July 16th for a brick and reinforced concrete bakery for W. R. Milton.

Tenders addressed to Jordan and Over, architects, 47 Canada Life Building, will be received until July 16th for all trades required in the erection of warehouse for the Gordon Mitchell Drug Company, Limited, Steveston, British Columbia.

AWARDED.

Edmonton, Alta.

Messrs. Pheasy and Batson have the contract for the erection of the 3-storey building for Moser and Ryder.

Fort William, Ont.

Contracts for the erection of Grand Trunk Pacific roundhouse and machine shops on the Mission have been awarded to the Carter, Halls, Aldinger Company. Estimated cost, \$100,000.

Ottawa, Ont.

P. M. Edey has been chosen architect for the factory of the Continental Paper Bag Company, to be erected on Wellington. The general contract has been awarded to Holbrook and Sutherland, and the construction will be begun at once. The factory will be built of concrete and brick. It will have two storeys and a basement. The factory will be 210 feet long by 80 feet wide. Noted in issue of June 8th.

Residences

Hamilton, Ont.

Permit was issued to Stewart and Witton, brick residence, Charlton avenue, for G. F. Jelfs, \$4,000.

Magnetawan, Ont.

The brick residence of Mr. E. W. Jenkins, a mile from here, was destroyed by fire on the 8th inst. Loss \$8,000.

Montreal, Que.

Recent building permits include: J. Wolfe, 894 Nicolet street, one house containing two dwellings, \$4,000; Fred, Pare, Gain street, one house containing three dwellings, \$3,000; C. J. Brown, 4257 St. Catherine street, three houses, \$11,000; H. Larose, 211 Nicolet, three houses containing eight dwellings, \$10,000; M. Larose, 2467 Hutchison street, two houses containing six dwellings, \$7,000; J. O. Proulx, 99 St. James, two houses containing six dwellings, \$6,000; J. A. A. Belanger, 1121 Mount Royal avenue, one house containing four dwellings, \$12,000; Jos. Shea, 2182 St. Denis, one house containing three dwellings, \$5,000; R. Forget, 271 Nicolet street, one house containing two dwellings, \$3,000; F. Samuels, 5680 Sherbrooke street, two houses, \$4,000; N. Des Troismaisons 118 St. James one house containing three dwellings \$3,000.

Ottawa, Ont.

Among the recent building permits are: Mrs. Klock and Miss Bangs, dwellings on Frank street; Andrew McCreadie, builder, \$4,000; J. Belanger, dwelling, Preston street, \$3,800; T. J. Somerville, dwelling, James street, \$6,000; F. E. Latimer, dwellings, Florence street, \$5,000; J. H. McCullough, dwelling, Centre street, R. A. Kemp, builder, \$3,300; W. D. Hopper, dwelling, Carling avenue, R. A. Kemp, builder, \$4,000; James Gillespie, Center street, dwelling, \$2,500.

Peterborough, Ont.

Bulk tenders or tenders for the several trades in connection with the erection of St. Paul's Presbyterian manse, addressed to J. C. Shook, chairman building committee, will be received until July 16th. W. F. Nelson, secretary.

Toronto, Ont.

A building permit has been issued for the residence in connection with Victoria College, \$230,000.

Permit was issued for a three-storey apartment house on Maitland street, for Mr. George Meech, \$16,000.

Mr. Frank McBain, 1000 Bloor street west, has purchased eighty feet of land east end of Castle Frank, Rosedale. Two first-class detached houses will be erected.

Victoria, B. C.

Permits have been issued as follows: To S. E. Matthews for a dwelling on Pendergast street, \$2,500; to the Victoria Wather Works Department for a caretaker's dwelling at the Smith's Hill Reservoir, \$2,500; S. Millington, dwelling, Linden avenue, \$3,000; T. A. Johnston, dwelling, Richardson street, \$4,000; L. S. V. York, dwelling, Cook street, \$3,000.

Winnipeg, Man.

E. D. Moore, 92 Colony street, is one of a company now having plans drawn for an apartment block, which it is proposed to erect on Osborne place, at a cost of approximately \$200,000. The plans are not completed, but information on the project could be secured from the above.

Power Plants, Electricity and Telephones

Fleming, Sask.

Tenders addressed to S. H. Greenwood, secretary, will be received until July 15th for construction and installation of telephone system and switchboard.

Grand Falls, N.B.

It is announced that arrangements have been completed between the Grand Falls Power Company and Sir Wm. Van Horne and other owners of property by which the latter will take over the old company and develop power at the falls.

Strathcona, Alta.

A by-law to provide for raising \$10,000 for extension of the city's electric light and power system will be submitted to the ratepayers on the 20th inst.

St. Catharines, Ont.

By-laws, giving the Buffalo, Niagara and Toronto Railway Company, and the Ontario Power Company rights over city streets, will be voted upon July 29th.

Winnipeg, Man.

Permit was issued to city for power sub-station, corner of Hillock and McPhillips streets, \$11,400.

Yorkton, Sask.

The Town Council passed a resolution authorizing the preparation of a by-law to expend \$35,000 on a municipal electric light plant.

AWARDED.

London, Ont.

The Water Commissioners awarded the contract to the London Foundry Company for 76 ornamental electric light poles at \$29 each. The Northern Electric Company, of Toronto, were given the contract for line hardware, amounting to \$1,700.

Prince Albert, Sask.

Goldie & McCulloch, of Galt, Ontario, obtained the contract for boilers for the electric light works.

Toronto, Ont.

Watson, Jack and Company, of Montreal, have recently been awarded a part contract from the Hydro-Electric Power

(Continued from page 26)

Tenders and For Sale Department

City of Belleville

Waterworks Pumping Plant

Sealed tenders endorsed Pumping Plant will be received by the City Clerk up to 20th JULY, for the following pumping equipment:

A. Two turbine pumps, direct connected to proper motors, with lightning preventive apparatus, and starting apparatus.

B. Two triplex pumps, also direct connected to similar motors and apparatus.

Note.—Equipment to be installed by contracting company. Each pump to have a guaranteed capacity of 1,000 gallons per minute against a head of 240 feet. Three phase alternating current, 60 cycles, 2,200 volts. Supplied with water meter.

Further particulars can be obtained on application to the undersigned.

The lowest or any tender not necessarily accepted.

JAMES G. LINDSAY,
City Engineer.

Belleville, July 4th, 1910.



Department of Railways and Canals, Canada

Quebec Bridge

Tenders for Superstructure Notice to Contractors

Sealed tenders, addressed to the undersigned and endorsed "Tender for Quebec Bridge Superstructure," will be received at this office until 12 o'clock noon, not later than SEPTEMBER 1ST, 1910, for the superstructure of a Bridge across the St. Lawrence River near the City of Quebec.

Plans and specifications may be seen and forms of tender obtained on and after July 1st, 1910, at the office of the Quebec Bridge Board of Engineers, Canadian Express Building, Montreal, and at the Department of Railways and Canals, Ottawa.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signatures, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$500,000, made payable to the order of the Minister of Railways and Canals of Canada, must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted and in accordance with the terms stated in the form of contract accompanying the specifications.

Cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The lowest or any tender not necessarily accepted.

L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 17th June, 1910,

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

FOR SALE

Kelly Steam Pump Horizontal Cross Compound, in good condition, capacity 2,000,000 imperial gallons, must be removed to make room for electric equipment. Inquire the Water Commissioners, London, Ontario. 31

NEW HAMBURG

Debentures for Sale

Tenders will be received by the undersigned up to 2 o'clock p.m., JULY 18TH NEXT, for the purchase of \$8,000 4½ per cent. Electric Light Debentures of the Village of New Hamburg, payable in thirty equal annual instalments.

WM. MILLAR,
Clerk.

New Hamburg, June 23rd, 1910. 28

Canadian Pacific Railway

Central Division

Tenders are hereby requested for the construction of Piers, Abutments and Pedestals for Bridge over the Kaministiquia River at Fort William. Plans, specifications and forms of proposal can be seen at the office of the Engineer of Bridges, Montreal; Division Engineer, Toronto, and Division Engineer, Winnipeg. Proposals must be made out on the Company's standard proposal form, and sealed in an envelope, plainly marked "Proposal for Kaministiquia River Bridge, Fort William." These must be delivered at the office of the Division Engineer, Winnipeg, by 12 o'clock JULY 15TH. The right is reserved to reject any or all proposals.

(Signed) FRANK LEE,
Division Engineer. 28

City of Moose Jaw Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A," "Tender B," etc., will be received by the undersigned City Clerk until 8 o'clock, p.m., on MONDAY, JULY 18TH, 1910, for the following:

Contract "A." Supplying material for and constructing Sewage Disposal Plant complete, and laying Trunk Sewer.

Contract "B." (1) Supplying and installing a complete Air Lift System; (2) Supplying and installing one electrically-driven Centrifugal Pump and Auto Starter.

Contract "C." Supplying and delivering 3,000 cords of Field Stone.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw, and also at the office of the "Canadian Engineer" at the following addresses:

Toronto, 62 Church Street.
Montreal, B33 Board of Trade Building,
Winnipeg, Room 404 Builders' Exchange Buildings.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer. W. F. HEAL, City Clerk.

Moose Jaw, Sask., July 16th, 1910. 28

Tenders

Sealed tenders endorsed "Tender for Etobicoke Bridge," addressed to Peter Speirs, warden, County Peel, Mayfield P. O., Ont., will be received up to 9 o'clock p.m. on MONDAY THE 18th OF JULY, 1910, for the supplying of material, construction and erection of a 50-foot span steel highway bridge, near the town of Brampton. For specifications and form of tender write to the undersigned.

C. B. WHEELLOCK,
County engineer,
Orangeville, Ont.

Orangeville, July 5th, 1910. 28

Tenders Wanted

Tenders will be received by the secretary-treasurer of the town of Coaticook up to and including the 23rd OF JULY, INST., for the construction of a reinforced concrete arch bridge over the Coaticook River, in the town of Coaticook, Bridge to be 100 feet span. Plans and specifications may be seen at the secretary's office or at the office of the undersigned, and returnable plans and specifications will be mailed upon request. An accepted cheque equal to 5 per cent. of the contract price to be mailed with each tender, and the lowest or any tender not necessarily accepted.

FRED. C. DAVIS,
Consulting engineer,
Sherbrooke, Que. 28
P. O. box 206.

City of London

Tenders will be received by the Water Commissioners of the city of London up to noon of the 29th DAY OF JULY next for the following:

Section "A."—Two 3,000,000 gallon turbine pumps, 250 ft. head, 750 R. P. M.

Section "B."—Two 250 H.P. 750 R. P. M. self starting synchronous motors with direct connected exciters.

Section "C."—Two 350 K. V.A. 3-phase, 13,200 to 2,300 volt self cooled transformers.

Section "D."—Switchboard equipment for "B" and "C."

Section "E."—Switchboard equipment for incoming line and outgoing power and lighting line, with lightning arresters, etc.

Section "F."—One 25 K. W. single phase self cooled 2,300 to 110 volt lighting transformer.

Frequency of all current 25 cycles.

Form of tender, instruction to bidders, plans and specifications may be procured from the undersigned or from Mr. H. J. Glaubits, consulting engineer, Continental Life Building, Toronto, Ontario, or

O. ELLWOOD, secretary,
Board of Water Commissioners. 28

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—A large quantity of galvanized steel, suitable for re-inforcement. Would cut to sizes to suit purchasers. Enquiries solicited. GOOLD, SHAPLEY & MUIR COMPANY, Limited, Brantford, Ontario. 28

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 inch x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail. —WM. LESSLIE, Walkerville, Ont. TF

Tenders Wanted

Sealed tenders will be received by the undersigned up to 1 o'clock p.m. on WEDNESDAY, JULY 27th, 1910, for the construction of a drain in the Township of Minto, known as Municipal Drain No. 3.

The work consists of the excavation of a new drain in places and the deepening and widening of a drain or ditch already constructed, and deepening and straightening of a creek or water-course, in all 85,000 feet in length. The work is divided into three sections and tenders will be received for one or all the sections.

Plans and specifications may be seen at the office of the undersigned, and forms of tender may be had on application.

W. D. McLELLAN,
Clerk of Minto,
Harriston, P. O.

29



Department of Railways and Canals, Canada

Hudson Bay Railway

Saskatchewan Bridge

Notice to Contractors

Sealed tenders, addressed to the undersigned, and endorsed "Tender for substructure of Le Pas Bridge," will be received until 16 o'clock on MONDAY, JULY 25, 1910.

Plans, specifications and form of contract to be entered into, can be seen on and after this date, at office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Chief Engineer, Hudson Bay Railway, at Winnipeg, Man., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$10,000.00 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals.
Ottawa, July 2, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 29

Power Plants, Electricity and Telephones

(Continued from page 27.)

Commission of Ontario for both the suspension type and strain type high tension insulator.

Contracts for the various trades in connection with the erection of a sub-station on Macpherson avenue for the Toronto Hydro-Electric system have been awarded as follows: Masonry, Brown and Love, \$25,005 (if Roman stone is used instead of Ohio stone, deduct \$1,800); roofing, R. Gilday, \$160; plumbing, Fred Armstrong \$415; painting, Jas Casey, \$85.

Victoria, B.C.

It is announced that the Dominion Government intends to rebuild the entire tele-

phone line from Kamloops to Lower Nicola. Contracts have been awarded to Thompson & McClughan for poles from Kamloops to Quilchena; J. Nash, from Quilchena to Nicola to Lower Nicola.

Winnipeg, Man.

The tender of the Winnipeg Foundry Company, at \$1,630 for the supply of castings for conduit manholes for the civic electrical conduit system has been accepted.

Miscellaneous

Toronto, Ont.

Recent building permits include: Parisian Laundry, 3-storey brick addition, corner King and Portland, \$15,000; City of Toronto, 1-storey brick and steel poultry building, at Exhibition Park, \$36,000; J. S. Case, 4 detached 2½-storey brick dwellings, Indian road, \$16,000; B. C. Finch, 1 pair semi-detached 2-storey and attic brick dwellings, Glendale, \$4,600; F. L. Beecroft, 3 attached 2-storey brick dwellings, 21-23-23½ Cowan avenue, \$5,500; H. J. Rea, 2½-storey brick dwelling, Binscarth road, \$5,500; Dr. J. H. Black, 2½-storey brick dwelling and infirmary, Queen street east, \$6,000; P. Dallamatta, 2-storey brick theatre and dwelling, on Queen and Booth, \$8,000; Robt. Luxton, 3 detached 2-storey rough-cast dwellings, brick fronts, 28, 29, and 30 Globe avenue, \$4,800; R. E. McDonagh, 1 pair semi-detached 2½-storey brick dwellings, Major and Sussex, \$4,500; A. Ionson, 1 pair semi-detached 2½-storey brick dwellings, corner Queen and Boston, \$5,500; E. Bracewell, 2-storey brick dwelling, on Perth, \$4,600; Massey-Harris Company, 3-storey brick printing department, King and Strachan, \$8,000; T. McIlwain, 2-storey brick dwelling, on Indian road and Howard Park avenue, \$5,000; J. J. Downey, 2 detached 2-storey and attic brick dwellings, College street, \$7,000; Pure Gold Manufacturing Company, 2-storey brick warehouse and factory, on College, \$20,000; Laughton Brothers, 1 pair semi-detached 2-storey brick dwellings, 151-3 Gilmour avenue, \$4,400; Geo. Meach, 3-storey brick apartments, Maitland street, \$16,000; J. Pierce, 4 attached brick dwellings, Brock avenue, \$7,200; Mr. Bingham, 2-storey and attic brick dwelling, Indian road and Constance street, \$5,000; Jas. Gibson, 9 pair semi-detached 2-storey brick dwellings, Royce and Campbell, \$32,000; John New, 1 pair semi-detached 3-storey brick stores and dwellings, Bloor west, \$8,000; A. E. Brobyn, 3 pair semi-detached 2-storey brick dwellings, Campbell avenue, \$12,000; Mrs. E. L. Green, 1 pair semi-detached 2-storey brick dwellings, 122-4 Bloor street west, \$10,000; Douglas G. Ross, 2-storey and attic dwelling, Walmer road, \$10,000; Chas. Wetz, 2 pair semi-detached 2-storey and attic brick dwellings, Kendal avenue, \$9,600; H. Sparrow, 1 pair semi-detached 2½-storey brick dwellings, Grandview and Hampton, \$5,000; Jos. Lavoie, 3 attached 2-storey brick dwellings, Garden, \$6,000; R. Buckell, 2 pair semi-detached 2½-storey brick dwellings, Montrose and Sulley crescent, \$10,000; Caplan Brothers and Laafskay, 1 pair semi-detached 2½-storey brick dwellings, Grange avenue, \$6,000; W. S. Grimshaw, 6 attached 3-storey brick stores and dwellings, Shaw and College, \$24,000; Mrs. C. Vair, 2½-storey brick dwelling, on Allan avenue, \$5,000; O. McEachren, 2-storey and attic brick dwelling, Garden and Keele, \$5,500.

Walkerville, Ont.

The Detroit Dredging Company secured the contract for dredging the Little River

drain—58,500 cubic yards for \$5,640. Owen McKay is the engineer.

Winnipeg, Man.

The following building permits have been issued during the past week: Eastern Townships Bank, east side of Main, between Portage and Lombard, \$44,000. Winnipeg School Board, technical school, west side of Salter, between Church and Machray, \$330,000. Rumford and Brock, laundry building, north-east corner of Wellington and Horne, one storey, 40 by 100 feet and will cost \$19,000. C. N. B., engine house in yards, \$40,000. G. J. Gudmunson, house, west side of Bimeco, \$3,000. D. J. Ross, double dwelling, north side of QuAppelle, \$9,000. F. Metcalf, house, north side of Jubilee, \$2,500. A. T. Davidson, house, north side of Beresford, \$2,500. G. W. Ford, three houses, west side of Home, \$12,000. L. H. Shepley, house, east side of Nassau, \$3,000. Aslip Brick, Tile and Lumber company, stable, south side of Nairn road, \$3,000. Johnson and Anderson, house, west side of Home, north side of Rathgar. J. D. Watson, house, east side of Clifton, \$5,000; T. Weber, house, north side Jessie, \$5,000. Thomas Ryan, terrace and stores, north side of Logan, \$9,000. M. Simon, two dwellings, north side Bannerman, \$4,000. Dominion Bridge Company, storehouse, south side Dublin, \$3,000. Baudeen and Fraser, dwelling, east side of Home street, \$3,500. D. McQuatt, dwelling, south side Welseley, \$5,000. Mrs. H. E. Sharpe, dwelling, north side Gertrude, \$4,500. G. G. Teeton, dwelling, north-east corner Maplewood and Hay, \$5,000. W. W. Fleming, dwelling, east side Chestnut, \$4,000.

AWARDED.

Winnipeg, Man.

The tender of T. D. Robinson and Sons for the supply of 1,000,000 feet, B.M. lumber, at \$25,143.75, was accepted by the city at the last meeting of the council.

New Companies

The Schomberg Telephone Company, Limited, Schomberg, Ont., capital \$15,000. Incorporators, F. Amey, A. Mawer and W. F. Chantler, all of Schomberg.

Kiamiaka Valley Lumber Company, Routhier Station, Quebec, incorporated, capital \$20,000. Incorporators: J. Dumas, Lac-aux-Ecorces, Quebec; O. Lalonde, Val Barette.

Bitulithic Paving Company, Limited, Montreal, Que., incorporated, capital \$150,000. Incorporators, W. Gordon MacKendrick, W. J. Evans, contractor, J. M. Goffrey, barrister, both of Montreal, and W. A. Henderson, barrister, Toronto.

The Canadian Hassam Paving Company, Limited, Montreal, Quebec, incorporated, capital \$40,000. Incorporators: W. D. Hassam, engineer, and A. Thomas, manufacturer, both of Worcester, Massachusetts; L. DeGuise, bank manager; T. Leclaire, contractor; and O. Asselin, journalist, all of Montreal.

National Fire-Proofing Company, Toronto, capital, \$1,000,000.

The United Electric Company, Limited, Winnipeg, Man., Arthur E. Johnson, barrister-at-law, and William Pope, electrician, Winnipeg, Man.

Taggart Iron Works, Limited, Man., capital \$10,000. Incorporated to carry on the business of manufacturers of and dealers in all kinds of machinery, electrical apparatus, railway cars, etc. Incorporators, Arthur R. Taggart, manufacturer, and Albert H. Luce, accountant, both of Winnipeg, Man.

Bronze Doors for Royal Bank, Winnipeg

The ornamental iron department of the Canada Foundry Company has just completed a pair of very fine bronze doors for the Royal Bank at Winnipeg which are particularly interesting from a standpoint of quality and workmanship in this finest of all lines of art metal. Those who have visited New York and Chicago know the marvellous extent to which fine bronze is introduced on public and monumental buildings. In fact, it has become one of the best features of the later work. The

banking institutions in Canada, with a view to obtaining the very best possible, have been introducing to their buildings this same quality of bronze work, together with granite and fine marbles.

All the good work of this kind had to be imported from American cities until very recently, when the Canada Foundry Company undertook to develop a department which would be able to cope with American competition. It has taken some four years to get into good shape but an inspection of these doors will convince anyone that the workmanship is not far short of

the best that is done in New York City. It is, therefore, no longer necessary to go across the border to obtain the best results in this class of work. Even the New York architects who are doing work in Canada are well satisfied with the Canada Foundry Company production and all their current new buildings in Canada are in the hands of this company as far as bronze and ornamental iron work are concerned. The city of Winnipeg is setting the pace for Canada in the erection of fine bank and office buildings and spares no expense to make its work the very best obtainable. The Royal Bank, by Carrere & Hastings; the Bank of Montreal, by McKim, Meade & White; the new union station, by Warren & Wetmore; the Great West Life, by John D. Atchison; the Bank of Nova Scotia and the proposed new building for the Bank of Commerce, by Darling & Pearson, are all in the very front rank of architectural quality.

Value of Cement Grouting

European engineers are appreciative of the value of cement grouting for repairing defective masonry, lining wells, and for making tunnel roofs water tight. In Germany a well polluted by infiltrations was put into satisfactory condition by lowering into it a sheet iron drum, filling the space between the drum and the walls of the well with Portland cement, and withdrawing the drum after the cement had set. The damaged masonry of a tunnel was repaired by injecting liquid cement under pressure. Air at a pressure of 78 pounds per square inch sufficed to force the cement into place.

Bridge Still Confident

Mr. Howard Bridge, whose system of water purification at Lindsay has met with such an unfavorable check, expresses his intention of returning to Lindsay and remedying any defects which may appear after the impartial tests which are to be made by the water commissioners of the town. He states that he will remain at Lindsay until everything is settled satisfactorily.



Handsome Bronze Doors Manufactured by The Canada Foundry Company, Limited

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Time Limits in Contracting and Responsibility for Errors

Regarding the tenders for the Quebec bridge, some criticism was heard concerning what was apparently a very limited time for the preparation of tenders. As a matter of fact, however, in this instance, intending bidders were invited by the Government to get into communication with the Quebec bridge engineers several months ago and those who availed themselves of the invitation were provided with plans as fast as they were completed. In this case, therefore, it would appear that no hardship was inflicted by virtue of the closing date being set at Sept. 1st. At the same time, however, the margin is on the wrong side. If the interests of fair competition are to be served and if there is the proper desire to serve those interests, a generous time allowance must be made in the case of all important works so as to afford every opportunity to American, British and continental firms to submit a figure. In the case of the Quebec bridge there may be some excuse for what is on the face of it, an entirely disproportionate time allowance for the preparation of plans for a work of such magnitude, but all the same the principle is violated to a certain extent. As has been pointed out before in these columns, this stinting of the time allowance is productive of many evils. In the first place, it means less competition and consequently greater cost. Then the reduced number of tenderers works towards monopoly and helps to encourage graft and all sorts of unsavory accompaniments.

If the authorities, when calling for tenders on some large work, openly discriminated against British firms

there would soon be a public outcry. But what difference is there between this and so fixing the time limit that they are handicapped out of the running? It is an old saying about competition being the life of trade but it is none the less true on account of its age—rather the contrary. We are just at that stage of development now when we need all the competition we can get and it is up to us to avoid unfavorable comments on the score of treating outside firms badly. Canada has a reputation to *make* rather than to sustain, and the fair administration of matters of this kind will help her good name materially.

Time for Execution of Work—Not only does one hear complaints about inadequate time for tendering but also in regard to the insufficient period allowed for the completion of the work. One large contractor told us the other day that in not one job out of a dozen was sufficient time allowed for the proper completion of the contract. Apparently a good many contractors take on work in a sort of Micawber-like spirit, "waiting for something to turn up" to help them out of the hole. If Providence fail to "turn up" that "something," they often fall a great deal farther than they anticipated. So much for the contractor's indiscretion, but how about the architect. Surely architects must know, or *ought* to know, that under the very best conditions a certain length of time must be allowed for certain quantities and classes of work to be properly handled. A good practical man will know when a job will keep a contractor busy for one year and when for two, and will recognize the absolute futility and injustice of compelling a contractor to agree to a time limit which is bound to beat him at the end.

Responsibility for Mistakes—Another difficulty encountered by contractors is the unwillingness of the architect to assume responsibility for mistakes which have been made by contractors in different trades, owing to lack of information or changes in the plans and specifications after the work has been let. Contractors make mistakes, and many of them—and so do architects and engineers. The difference lies in the reluctance of the average architect to admit of anything that savors of error on his part. It is not an unheard of thing for an architect to send out plans and specifications to firms with instructions to those firms to assume that they have the contract and prepare their own detail plans from the information given. Contracts are awarded and the details approved after a more or less cursory examination. The injustice of blaming a contractor in the event of some subsequent mishap is apparent. The responsibility for all details of design lies with the architect and engineer. It is essentially their business to have their plans in such shape that they can be translated as easily by the contractor, who has to figure on them in a limited time, as by the architect who, by virtue of weeks of toil, knows them off by heart.

It takes a live fish to swim upstream. Any old lobster can float down.



1.—C.P.R. Bridge over St. John River, Upper Woodstock, N.B.

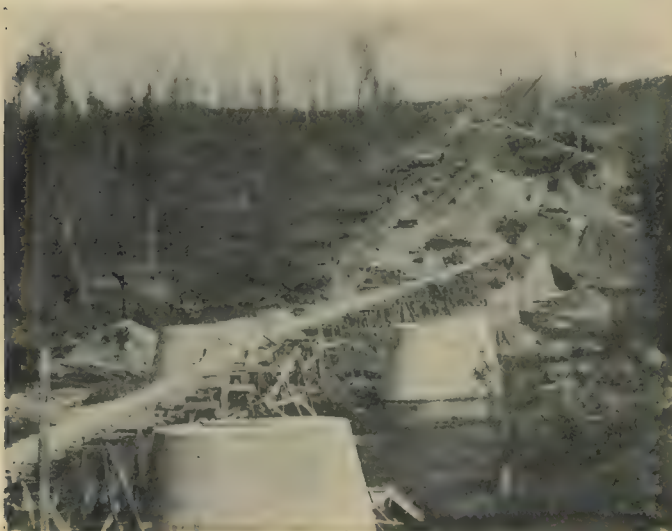
Railroad Contracting in New Brunswick

Interesting Constructional Views of C.P.R. Bridge work and Erection of Viaducts on the Transcontinental—An Account of the methods employed

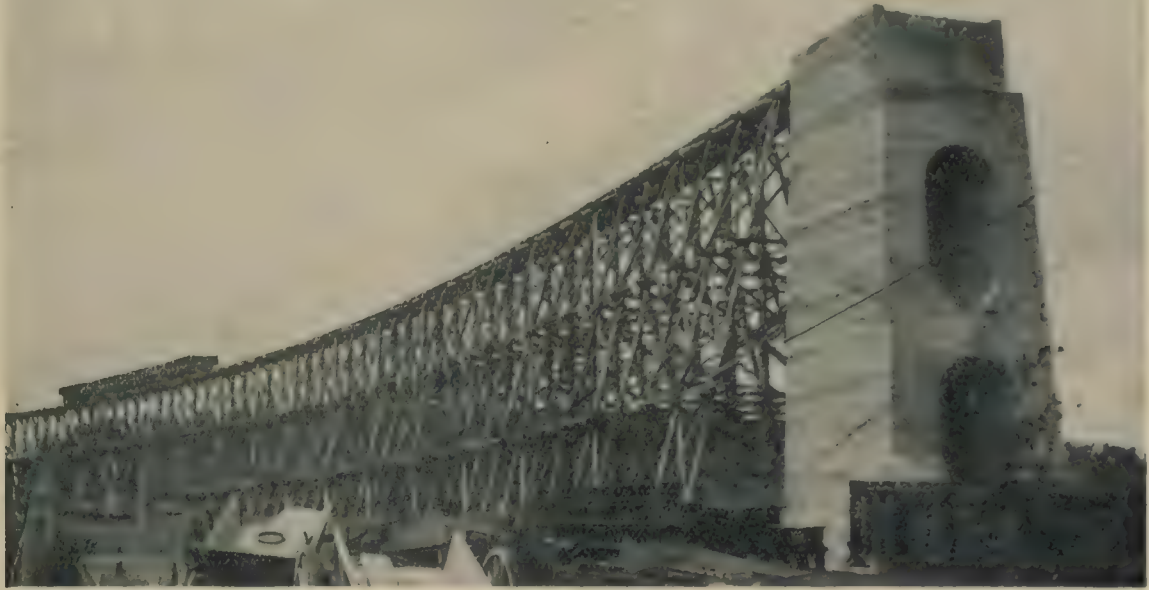
The accompanying photos show some of the recent work carried out by the contracting firm of Powers & Brewer, of Woodstock, N.B. The above illustration is a view of the C.P.R. bridge across the St. John river at Upper Woodstock, N.B. This structure was erected to replace the old wooden Howe truss spans and wooden piers. It consists of four through spans and three girders resting on concrete piers and abutments. For the concrete, gravel of good quality was obtained from the Island and hauled to the mixer by a steam hoist on an inclined track. A No. 5 Smith mixer was used and the concrete was placed on a cableway of 1,350 feet span. Ledge was reached in all foundations except pier No. 6 and the north abutment. At pier No. 5 the water was 16 feet deep and the excavation was carried down to the ledge at a depth of 31 feet below water level. Pier No. 6 rests on a pile foundation 28 feet below the level of the water and 8 feet below the river bed, the excavation being carried to that depth to avoid scour. The

upstream ends of piers were reinforced by granite cutwaters to protect them from the heavy run of ice and logs. Atlas cement was used for this work.

Illustrations 2, 3 and 4 are views of the viaduct at the crossing of Little river, on the Willard Kitchen Com-



2 and 3.—Work on the new viaduct of the Transcontinental Railway at the crossing of Little River, near Grand Falls, N.B.



4.—Progress view of construction on Transcontinental Railway Viaduct, Grand Falls, N.B.

pany's section of the Transcontinental, near Grand Falls. This viaduct is 1,242 feet long and 100 feet from base of rail to water level. Crushed field stone was used. The sand was brought from Macaguadavic, on the line of the C.P.R., to Grand Falls and was hauled by teams to the site of the viaduct, three miles distant. A No. 2½ Smith mixer was used and the concrete carried

across the water on a trestle in bottom dumping buckets, and picked from the car and deposited at the work by derricks. International Portland cement was used. The fifth picture shows the viaduct at the crossing of Little Salmon river, eight miles from Grand Falls, on the Transcontinental Railway. This structure is 3,918 feet long and 200 feet from base of rail to water. It is perhaps the largest structure of its kind on the line. About 7,000 tons of steel will be required in its erection. Gravel was obtained by the contractors about one mile from the site of the viaduct and hauled by teams. International Portland cement was used. The concrete was mixed by three Smith mixers, one No. 5, one No. 2 and one No. 1, with side loading device. The structure crosses a swampy flat and steam pumps were constantly at work.

Another view is that taken at an early stage of operations on the Caton Brook viaduct on the Transcontinental Railway. This structure is 142 feet from the base of rail to water. Gravel was hauled from Little Salmon river, 1½ miles.



5.—Caton Brook Viaduct, Transcontinental Railway



6.—Little Salmon River Viaduct, Transcontinental Railway

Unsafe Practices in the Erection of Water Tanks

The heavy loss of life and the burning of the "Herald" building in Montreal recently, following the collapse of a water tank supported by the roof, emphasize again the danger of the unsafe practices of some architects and engineers, and also the danger of making buildings of poor construction support immense weights. Three years ago, John Edwin Curtis, an insurance engineer, writing on the hazard of the sprinkling tank, criticized unsafe practices in erecting water tanks on the roofs of buildings as a water supply for automatic sprinkler equipments. His criticism was directed chiefly at the size of tanks called for by the underwriters. The smallest tank which they recommend is one of 5,000 gallons capacity. Five thousand gallons of water weigh more than 20 tons. In 1909 at least ten water tanks that were located on roofs collapsed. Several years ago, after a number of tanks had collapsed from the rusting of flat hoops, underwriters suggested round hoops, because their entire surface could be kept protected against rust by frequent painting. This apparently had the desired effect, as there is no record of a tank collapse due to the rusting of round hoops. The wisdom of placing tanks on the roofs of buildings of poor construction is another matter. Ten thousand gallons of water weigh more than 40 tons. Thirty thousand gallons, the capacity of the largest roof tank ever called for, weigh more than 124 tons. In many instances the additional weight of the supports may be a big item. The gravity roof tank is an important factor in automatic sprinkler protection, and the Montreal disaster demands the fullest investigation to determine the cause and on which to base new requirements to remove this danger. A careful inspection of all roof tanks that are supported by old buildings is also in order. Some engineers have recommended a single water supply from a street main under favorable conditions.—Insurance Engineering.

Economy of the Piece Work System in Handling Supplies*

If we are going to get the largest possible output for the smallest cost, we must interest the man doing the work more than paying him by the hour. A man's interest must be vital if we are to get the best there is in him. We must pay for what we get, and not for what we do not. We must get 100 cents worth of work for every dollar paid out. This the piece work system accomplishes, as its organization and introduction shows.

At first blush it would seem to be a difficult matter to resolve the handling of supplies into given factors or units. This is not so, as we have a unit to issue or receive everything we handle in the store department, and a record to refer to that is permanent. Lumber is handled per thousand feet B.M. Iron, castings, coal, sand, etc., are handled by the ton. Pipe is handled by the foot. Mixed merchandise is handled by per package of 100 pounds or less, over 100 pounds to 200 pounds, etc. Filling requisitions and delivering material to the shops is handled by per item, per piece or per pound, depending upon the kind of material and the local conditions.

Filling requisitions and delivering material shows a very large saving put on piece work, due to the amount of lost motion that creeps in under the day work basis. Shop men will ask what has happened to the store men after they have been put on piece work, as they no longer stop to talk, but drop the material and hurry away for

more. The men group their work, taking or getting all the material wanted from the different sections at one time. One foreman, planning the getting and placing of material, is only one part efficient as compared with a whole gang of four to eight men planning the same thing. In establishing piece work for a delivery gang composed of foreigners, who did not know the material and could not understand English, the prices were based on what was considered fair. The foreigners could not make one-half their day rate with the prices set, and were transferred. English speaking laborers were hired in their place, and they, being able to use their heads, made from 30 to 50 cents per hour.

The men should be given to strictly understand that after a price is approved it will not be changed unless conditions are changed. They can make as much money as it is possible for them to make, and will be paid accordingly. As soon as the men are assured that they will be paid for what they do they will work with their heads as well as their hands and feet, and will take advantage of everything possible. For instance, in one of our yards a derrick gang use long bridge bolts to handle 6-inch cast iron pipe. These bolts are put in the end of the pipe to slip the sling around, enabling them to handle very quickly six to ten pieces at a time. These bolts are carried on the derrick to be used when needed. When loading a small order the men run ahead of the derrick with bolts and sling and load the pipe without stopping. It is impossible to get work done this way at an hourly rate, but there is money in this method for both the men and the company, as shown below:

Work done on hourly basis on which price was based:

Labor	\$2.50
Use of derrick	2.00

Total \$4.50

Work done piece work in one-half the time:

Labor, P. W. rate	\$2.00
Use of derrick	1.00

Total \$3.00

Saving, \$1.50, or 33½ per cent.

We had four men in one of our lumber delivery gangs and the day we were about ready to start piece work one man quit, and the other three refused to work until another man was put in his place. The piece work system was explained to the three men, and they were asked if they would do the work on this basis, which they agreed to do. Soon after, one of the three left the service of the company, and the remaining two are handling this work, together with a large increase, in about 70 per cent. of their regular working time, making a high rate of pay. The company is saving one man's time and about 30 per cent. of three men's time on this particular work.

At one of the large icing stations, where an average of 100 cars per day are iced, and some days as many as 250 cars, it was necessary under the day work system to take a large force of men from one of the other departments to help during rush hours. However, since piece work has been installed the regular force has handled the work without delaying a single train or having a complaint from the shippers. The men know the more they hurry the more they make.

On one of the scrap docks it was impossible under the day work system to keep the pile of miscellaneous mixed scrap sorted and cleaned up as fast as it came in with the regular gang assigned to this work, it being necessary to put on additional help to prevent congestion. Ninety days after piece work was installed the

*A paper by D. C. Curtis before the Railway Storekeepers' Association, St. Louis, Mo., May, 1910.

regular gang cleaned up this scrap without additional help, and now take care of it and have time to do other work; yet a better foreman than the man in charge of this rock cannot be found.

It is impossible to work unintelligent foreign laborers to advantage. A gang cannot be divided, sending one man for a given article, another to the shop for manufactured material and have others sorting out material. The foreman has to take the whole gang with him, or have part idle, to get even a given size of bolt or article of any kind, as the thing wanted has to be pointed out and motions used to direct their movements.

With the piece work system we are able to hold the men after we have them educated. In May, 1908, a storekeeper hired 50 Austrians who had just come to this country, and they, after becoming familiar with the conditions, were put on piece work. Thirty-five of the original 50 are still working for this storekeeper, one having died and the others leaving the service. The men are making good wages, and it is needless to say they are an efficient force. For increased and intelligent effort men make enough for the work to be attractive. The longer men stay, the more proficient they become, the more money they make, the fewer mistakes and breakages occur, and discipline is easier.

Piece work keeps men and methods of doing work out of ruts, as the men are continually scheming short cuts and new kinks. It gives us machines and tools with which to handle work quickly. To show a saving in having machinery to handle material is a very simple problem in arithmetic when on a piece work basis; i.e., lumber handled by hand costs 5 cents to 85 cents per 1,000 feet B.M.; with a derrick, 15 cents per 1,000 feet B.M.

Piece work forces the storing of material in the most convenient places for handling. In one of the large new storehouses recently built the connecting rods for engines are kept in a closed rack in the centre of the house, without lifts of any kind to handle them with. Piece work would very quickly show the saving to be made by putting these rods where they could be handled with a small crane at a great saving.

Piece work gives a contented set of men, each man in business for himself. Men would rather work piece work than day work, as is shown by the engine men and trainmen being paid by the mile, miners by the ton, etc. These men would not think of going back to the hourly unit. The rapid, intelligent workman receives wages in proportion to work done. Ability is rewarded.

Report on Montreal Water Supply

Messrs. Fuller & Hering, the New York experts who were engaged to report upon the purification of the Montreal water supply, have issued their report, a voluminous document covering 150 typewritten pages. The report begins by stating that Montreal Island does not afford a water supply by means of artesian wells, but that a gravity supply from the Laurentians is feasible, though it would also have to be filtered, and the cost would be much more than water from the St. Lawrence. The cost of the Laurentian supply is estimated at \$12,000,000 for 50,000,000 gallons a day, and \$18,000,000 for 100,000,000 gallons daily.

The report discusses what should be done to convert the raw river water into a good, safe, drinking supply. The engineers estimate that the cost of filtering a supply of 50,000,000 gallons a day would be \$1,500,000, exclusive of the land required.

The engineers also discuss the question of the hardness of the St. Lawrence water proper, as that is the

water proposed to be supplied by the new intake, but they do not find it objectionable.

They inform the city that the filtration plant can be completed in a year and a half.

In substance, the finding of the New York experts is a confirmation of the works outlined by Supt. Janin. It prefers the river water to the lake water, and approves of the extension scheme of the aqueduct, which has been in progress for two years.

Pointers on Cellar Excavation Work

We are quite likely to slight the parts of a building which are out of sight, and the cellar of a house is one part which sometimes gets slighted more than it should.

It is generally best to have a cellar under the entire house, but in cases where this is not desired care should be taken that the excavation for the walls are sufficiently deep to avoid trouble from frost and to provide good drainage, so that there will be no large amount of water under the walls.

In excavating for the wall it is well to go eight or ten inches beyond the line of the walls. This gives a chance to lay a line of tile outside the wall and have it low enough to take care of all water which may ever be there.

You are likely to get a better wall excavating beyond its face than you would if it were laid against the bank. Then you may have the wall plastered on the outside and may have the dirt puddled and rammed in against the wall, all of which tends to make a dry cellar.

Another reason for excavating beyond the wall is that you want a footing course which shall extend at least six inches beyond each side of the wall. This may be of broken stone or of concrete and should be entirely below the level of the floor. You should also see that the drain is below the level of the floor and that the floor will have a slight slant toward the drain.

In places where drainage is not practicable, additional precautions should be taken to guard against trouble from frost. This means to make the excavations and footings deeper and to keep the water out of the wall by waterproofing the outside.

Excavations for porch piers or for any wall, not enclosing a cellar, should be deep enough to have the bottom below frost, from three to four feet.

The same caution should be observed in excavating for drains. The best method of doing the excavating will depend largely on circumstances. In most cases, a team, plough, scraper and wagon can be used to good advantage.

In some cases it will be desirable to save the top soil for grading. If this is done it must be removed to suitable places. The proper disposal of the dirt will depend on the nature of the soil, the depth excavated, the nature of the site and the size of the cellar.

After ploughing the area and scraping out as much as is practicable of the dirt, we can use a wagon by leaving an easy grade at one corner or by digging out where the cellar-way is to be. If there is not room to turn a team and wagon in the cellar, they can be backed in. When the site is on a hill, considerable dirt can be wheeled out in wheelbarrows, either through the cellar-way or through excavations for the drain.

If the cellar is small and not too deep a man can throw out considerable dirt with a shovel, but, of course, cannot throw it far.

It will generally be necessary to employ this means at the last and there will be enough dirt to be shovelled out after making use of other methods.—National Builder.

Selection and Care of Field Equipment

Careful Study of Conditions Essential in this as in every other Department of Contracting—Practical Hints worth noting

In proffering advice to the experienced and careful contractor as to what he should select for an equipment in order to carry along a certain piece of work, about all there is to say is, "Study conditions," and the writer knows from experience that a great deal is embodied in those two words.

Many a dollar has been wasted or thrown away that could have been honestly put away as profit at the end of a job simply because the contractor did not think it worth while to spend the time to go to the comparatively small expense it would mean to look over the situation thoroughly and in detail and ascertain just how it differed from his last piece of work or in what respects an entirely new equipment would pay for itself. For instance, wheel scrapers and bottom dump wagons are money makers for a contractor if the conditions are such that they can be used to advantage; but the former is a poor thing to get out rock with, and the latter is equally poor to deposit excavated earth with or to bring sand or gravel to a job when dumping area is limited. Too much cannot be said on this subject, as immense "leaks" from the profits of a well engineered and carefully figured contract are often due to the fact that a proper billed equipment was not sent to the job.

It costs money, money, money, to "try to make things do," when they are entirely unsuited to the work in hand. A mixing board and a half dozen laborers will do very well for a few yards of concrete; on the other hand it will be found that a stone crusher, mixers, sand conveyors and all apparatus of like nature will yield good returns, if they are not absolutely necessary, if the work is of sufficient magnitude and the conditions warrant their installation.

Care of equipment is another very important factor in the success of a contractor. There has never been a dollar made by economizing on the care and attention due to machinery, tools and material used in carrying along construction work of any kind.

An hour's labor by an ordinary man and a half-gallon of oil or grease used where required may save a hold-up of an indefinite number of mechanics and possibly a bearing, friction clutch or something similar that it may require several days to replace; and all this means money.

The care of ropes cannot be too carefully attended to as it is not only poor economy to allow a rope to be cut, chafed or worn out before it has done its duty, but almost any thing in the way of a damage suit may result from the use of a rope that is unfit for the service demanded of it.

The writer has seen absolutely new, clean ropes fail, with an ordinary load, due to the fact that they had "dry rotted" in warehouse or store before being put into use; and at times it is hard to discover a fault of this kind as such a rope may be weak in but one foot in a thousand of its length.

In order to guard against trouble of this kind the best advice is to buy of a house that is constantly turning over its stock so that there is no such thing as old stock in the place and no time given for dry rot to set in.

Do not be afraid to allow a sufficient margin or factor of safety in all kinds of apparatus used in rigging and

hoisting as it not only pays to be safe, but it will be found that good results will be obtained in wear and tear if the equipment is heavy enough.

Figure out what blocks, shackles, etc., will seem to be required and then add a few snatch blocks to the total, as the jobs are few on which about every snatch block in reach will not be of service at one time or another.

In erecting steel work the best equipment is none too good, as the nature of the work and the men engaged on it demand a great many tools of the best quality.

A poorly fitting "spud wrench," or one of poor quality will mean time lost and possibly a man dashed to the ground; and this applies to all tools for this class of work. A good rivetting gang will keep a heater busy, and it is poor economy to furnish him with a poor forge.

Four men are required to drive button-head rivets and all must work at the same speed; and if one man is believed, because of lack of ability or energy or because he is hampered by poor tools, the result at the end of the day is the same in work done and the cost of it, and it is strictly "up to" the man in charge in either case.

No doubt it would be out of place for the writer to enumerate what tools are required in field work, but a few suggestions based on personal experience may be of value to some of our readers, and make the reading of this article worth while.

If there is to be any amount of "lugging" or "bulling" piles, heavy timbers, steel columns, or similar shapes, a tip up cart will be a valuable asset.

A "steamboat ratchet" may be seldom used, but it is generally needed badly when at all, and will often solve a proposition that would be a difficult one without it and save the labor of a number of men.

Good tools are never expensive in the long run, and cold cuts, rivet ousters, chisels of the various kinds and shapes, and tools in general that will "stand" and do the work required of them, will yield better results and show a much greater profit than those costing less and which require much more dressing and grinding.

Steam, air and electrically driven tools and machinery are valuable if conditions warrant. And again the same warning "Study conditions" comes to the front and makes itself felt.

If the writer felt that this article was for the benefit of beginners, much could be written in the way of advice as to what equipment would be required on various kinds of actual field work, but he assumes that his readers are experienced, careful men and the suggestions and advice given herewith, are given in the hope that his experience and the little points noted, may have been overlooked by some who are engaged in construction work and be valuable to them. The Contractor, Chicago.

John Laxton and Thomas McQuillan, carrying on a contracting business under the firm name of McQuillan & Company, have, after five years, secured judgment against the township of Whitby and the Water and Light Commissioners of the township, for upwards of \$1,300 for the installation of a system of waterworks. The case was tried on September 18, 1905.

Hydro-Electric Plant at Kenora

The Kenora 5,000 horse power hydro-electric power station is one of the most interesting of moderate-size plants in the Province of Ontario, located at the northerly end of the Lake of the Woods. The town of Kenora is situated near the point where the lake empties into the Winnipeg river and has a population of about 8,000 people. The Rainy River district is drained by the discharge of the Lake of the Woods through two outlets entering the Winnipeg river, the drainage area being about 23,000 square miles. There is a fall of about 21,000 feet at the end of these outlets and about 5,000 horse power is developed when the complete plant is operating under normal conditions. About 750 horse power is utilized for operating the pumps of the Kenora waterworks system, and for lighting the streets, stores and residences, while about 1,000 horse power is utilized by the Maple Leaf flour mills. The accompanying illustration shows the power house under construction. A

concrete walls to the rocky banks. There is a log-shed provided through the wall on the western end of the power house in order to take care of any lumbering which may require a future passage.

It may be stated that the wheel chambers are covered with a 6-inch slab of reinforced concrete, forming a floor with manholes in the same, 7 feet in diameter, for getting at the present water wheel units and the installation of future turbines.

There are seven concrete flumes 18 feet wide, with concrete dividing walls measuring 4 feet. The central flume is divided into two equal compartments by a 2-foot reinforced concrete wall. It contains the two exciter wheels, thus providing for six power units and two exciter units.

There is a 12-inch cast iron pipe and valve provided for filling each flume in order to equalize the water pressure on both sides of the head gate before opening them. There is also provided an 8-inch valve for emptying the



Starting the Forms in the Construction of the Kenora Power Plant.

timber crib coffer dam was built in an average depth of water of 16 feet at a point about 200 feet above the head of the falls in order to unwater the side of the power house. The total length of this coffer dam was 175 feet and it was built under difficult circumstances due to the swift current at this point washing out the sand and gravel and undermining the crib. The leakage through the dam was largely overcome by sinking large sections of entwined roots and weeds of a floating island, in front of the coffer dam. The lower coffer dam below the power house site, measuring 265 feet in length, was constructed across the stream from bank to bank in water varying from 17 to 24 feet in depth. Excavation was started as soon as the water had been pumped out between the two coffer dams, the total depth of the excavation before bed rock was reached being 28 feet as a maximum. The concrete work included the placing of about 7,500 cubic yards, the excavated material being about double this amount.

The power house was constructed of concrete, brick and steel, the stone for the concrete consisting of a very hard rock, being quarried in the bed of the river at the side of the falls. The building extends completely across the stream from shore to shore, being joined by heavy

flume for repairs or in case of inspection of the wheels.

In this plant there are three main hydraulic units each consisting of two pairs of 10-inch turbines of the Samson type, mounted on horizontal shaft and with flange couplings direct connected to the electrical generators which operate at a speed of 150 revolutions per minute.

Lombard water wheel governors are utilized for controlling the large turbines which drive revolving field alternators of the three-phase type, supplying a current of a frequency of 60 cycles per second and a pressure of 2,400 volts. These revolving field generators have a capacity of 625 kilowatts each, the current being conducted from these machines through lead covered cables carried through ducts in the floor and up to the face of the bulk head wall to the switchboard of blue Vermont marble, consisting of 12 panels.

The switchboard includes three generator panels for the present installation and three panels for future alternators, together with one exciter panel and five feeder panels, no pressure above 110 volts being found on the front of the switchboard, the arrangement being such that the switches, bus bars and feeder mains are to the rear of the operating board a distance of 9 feet

Construction of Extensive Intake System

Montreal Water & Power Company's Interesting Project — Problems Encountered by Engineers and Methods Employed in their Solution

An interesting installation of a new intake system has just been completed for the Montreal Water & Power Company. This important contract was carried out for the company by Messrs. Laurin & Leitch, construction engineers, who commenced initial operations in May, 1909. The bulk of the work was done in the fall of the same year and was finally turned over to the owners a few months ago.

The Montreal Water & Power Company supplies water to many of the outlying districts of Montreal, including Cote St. Paul, St. Henri, St. Cunegonde, city of Westmount, Cote des Neiges, Outremont, St. Louis,

locate it at a point about 1,200 feet further up stream and close to Nun's Island.

By going further up it was estimated that no purer supply of water could be obtained. This, however, presented an objection on account of the muddy water that would have reached the old intake pipe, so that it was found necessary to dig a channel inshore of the old intake cut to protect the old source of supply.

Material Used—For the new intake, lock bar steel



General View of an early stage of the work, showing Dredge Pipes, etc.

St. Denis, Delorimiere, and Maisonneuve. For some time they had been handicapped in supplying their customers owing to the limited capacity of their intake pipe, which was constructed of wood, 36 inches in diameter.

The company's works and pumping station are located on that section of the St. Lawrence river to the south of the Island of Montreal and opposite Nun's Island. In constructing the new intake system it was decided to



View of Trestle, Showing Diver's Scow.

pipe five feet in diameter by 7/16-inch in thickness was employed, about 2,000 feet being required.

In dredging the channel for the pipe about 1,000 feet of rock were encountered and this was removed by blasting. In all, approximately 4,000 cubic yards of rock excavation were made.

The work was carefully planned and while about 50 men were employed on the average, it was more a matter of machinery than of men. For excavation one 2½-



Two Trestles for lowering Pipes. One 150-ft. length has just been launched here.



Three Sections of Pipe ready to be placed in position. Note Pile Drivers and Dredges. 861. 861

yard dipper dredge and a floating derrick and pile driver were used, also scows and other marine apparatus.

Method of Laying Pipe—The pipe was riveted and caulked up in lengths of 150 feet with steel bulkhead placed in each length. When ready these were launched and floated out into position and by means of a special valve the air was emitted and water let into the pipes. In the meantime the 150-foot length of pipe was suspended from trestles and lowered gradually by the workmen until in their required position.

The different lengths were then connected by 14 special submarine joints.

The intake crib consisted of an extensive timber structure, 60 feet by 30 feet. This was filled with stone and capped with five feet of concrete.

This intake construction has cost the Montreal Water & Power Company in the neighborhood of \$200,000, but they are now assured of a continuous water supply. At present they are delivering 20,000,000 gallons a day throughout the city of Montreal.

Economic Aspects of City Planning

City planning is designed to secure the orderly development of a city so that each section will be arranged for the purpose for which it is best and most economically adapted, and so that a harmonious entity will result. This development must be for the common good and not for private gain, said B. C. March, before a meeting of municipal engineers in New York.

City planning in this country has been chiefly æsthetic. In foreign countries much more emphasis has been laid upon the need for improving the condition of living of the poorer classes and setting a high standard of housing for unskilled wage-earners.

We have inverted the procedure in this country. American cities farm out their poor to be exploited by the land speculators. The American system of *laissez faire* has resulted in permitting the shrewd and grasping real estate speculators and tenement sweaters to make fortunes from the poverty stricken members of the community.

These are some of the important features of comprehensive city planning:

- (1) Proper housing for the city's masses for a reasonable proportion of fair wages, and within easy access of their work.
- (2) Direct and adequate roads connecting the main business centres of a city with smaller roads of such width and construction as not to impose an unnecessary and burdensome cost upon the occupants of small houses.
- (3) A proper system of water supply, sewage disposal and of pipes and wires.
- (4) The economic location of factories and the prohibition of factories in districts where they will be an injury to the neighborhood; and as a necessary corollary, the provision of means of carrying freight.
- (5) The elimination of the cost of carfare to the working population, so far as possible.
- (6) The decentralization of the city's business, pleasure and educational interests.
- (7) The provision of adequate parks, playgrounds and open spaces with space for public buildings to furnish not merely sites, but settings.
- (8) Such control over the location and volume of buildings for manufacturing and office purposes as will enable the city authorities to anticipate and provide adequate means of carrying passengers.
- (9) The control of the development of new and unbuilt sections of a city, and the incorporation of adjacent area so that their development may similarly be controlled.

The standard of housing for the working population is a matter which must be determined by each city and may require variation for different sections of the same community. In order to secure the harmonious development of a city in the interest of all the citizens, including the owners of the valuable property lying in the business sections of great cities, it is necessary that we should have a proper extension of the police power of the city, and that this should involve not merely regulations as to fireproofing, but also restrictions on the use of buildings. In addition there should be an extension of the taxing power of the state, which should be considered part of the police power. Under the police power there should be included an extension of the control of the city over the location of factories.

The most important point to be considered in city planning is the preservation of the outlying sections of the city from the duplication of those evil conditions recognized and deplored in the built-up sections. To prevent the duplication of the deplorable conditions of most cities requires not only a reasonable amount of genius, but equally a considerable amount of courage on the part of city officials, and this is the task to which all our cities are summoned.

The elimination of the cost of carfare to the working population is a most important feature of proper city planning. Most American cities have lost their heads over rapid transit and are obsessed with the idea that daily wage earners want to spend an hour and a half or two hours a day riding to and from their work. The cost of transportation is a serious economic waste. There are nearly 700,000 workers in factories in New York. A minimum of \$30 each for carfare means a waste of more than \$21,000,000 a year, which is nearly 1-11 of the total wages paid in 1905 in all manufacturing concerns in the city. The time spent on the cars is also a serious loss which should be prevented by the distribution of factories and offices and the decentralization of the various interests and business sections in great cities.

Winnipeg Builders' Exchange

At a recent meeting of the Winnipeg Builders' Exchange a revised code of practice and several new by-laws were adopted. A noteworthy clause in the new code of practice is that architects shall accept the lowest tender. It was stated at the meeting that it was no unheard-of thing for a contractor to go to the architect after the tenders were opened and offer him a new bid below the lowest tender.

Representatives of the committee of seventy members appointed to canvass the 400 members of the exchange with a view to having them take stock in the Selkirk centennial, submitted a report of progress. The exchange hopes to dispose of stock to the value of \$75,000.

Some interesting comparisons of the production of structural and building materials in Canada for 1910, covering cement, clay, stone, lime and similar materials, have been made by the Canadian Department of Mines. These show cement produced during the year at a value of \$3,709,954, while clay bricks of all kinds, including common, pressed, paving, moulded and ornamental, were produced to the value of \$3,577,426; 3,601,468 bushels of lime were produced, valued at \$712,947. The building stone was valued at 1,800,000; flagstone, \$6,298; granite, \$282,320; slate, \$13,496; sand-lime brick, \$152,856; fire clay and products, \$110,302; fireproofing and architectural terra cotta, \$170,211.

Tests of Brick and Terra Cotta Columns

Strength of Brick and Block Structures Affected Greatly by the Quality of Mortar Used—Noteworthy Features of Tests

The results of some interesting tests of brick and terra cotta block columns made at the Engineering Experiment Station of the University of Illinois, may prove helpful to some of our readers.

For brick, stone and terra cotta masonry structures designers commonly use stresses which are low in comparison with the strength of the constituent materials. Various reasons exist for this—possible variations in material, chance for poor workmanship, opportunity for settlement and resulting unconsidered stresses, the desire to avoid tensile stresses in masonry, imperfect knowledge of the properties of the completed structure, etc. In some types of structure mass and volume are important considerations and strength is subordinate. In many applications, however, the strength of the structure is of first importance, and a knowledge of the actual properties of the structure is essential to safe and economical construction. Frequently designers use stresses as high as their information and the usual rules of practice will permit and make sections as small as these considerations warrant. The utilization of the working capacity of a structure is generally advantageous. This is especially true when the better grades of material are used and when the workmanship is known to be first class. Much information is available on the strength and other properties of constituent materials like mortar, brick, stone and terra cotta, but relatively little is known of the properties of built-up structures. Anything that adds to our knowledge of such construction should be helpful; and it was with a view of obtaining further information on the properties of short built-up columns or piers that the tests herein described were undertaken.

Dimensions of the Columns

The work described in this bulletin includes tests of 16 short columns or piers of brick and 16 columns built of terra cotta blocks. Although long column action seems not to enter into these compression test pieces, they will be termed columns by analogy to the use of the term column for other compression members of not greater slenderness ratio. The length varied from 10 feet to 12½ feet. In lateral dimensions the brick columns were 12½ x 12½ inches, and in the terra cotta block columns the range was from 8½ x 8½ inches to 17½ x 17½ inches. The brick used in the construction of the columns were of two grades—an excellent class of building brick and a soft grade selected as representative of inferior brick. The terra cotta blocks were of good quality. Different qualities of mortar and different grades of workmanship were used. The loads were applied continuously to failure in most cases, but tests were also made with repeated applications of the same load. Central loading of the column was used in most cases, but in some tests the load was applied eccentrically.

All the tests were made in the 600,000-pound Riehle vertical screw testing machine in the Laboratory of Applied Mechanics of the University of Illinois. The machine head moved at the rate of 0.05 inch per minute; except in some cases, where the load was repeated, when a speed of 0.10-inch per minute was used. The load was generally applied by increments of about 25,000 pounds on the column, but for the columns built of lean mortar or of clay brick the increment was smaller. The load was applied through a spherical bearing block, except where the column was loaded eccentrically. In arranging the columns for eccentric loading, a ½-inch square steel bar about 20 inches long was placed 1-inch off

the centre of the column under the lower bearing block, and a similar bar in a corresponding position on top of the upper bearing block. The load was applied to the column through these bars.

In all of the brick column tests the first evidence of distress observed was a faint popping sound which seemed to proceed from the interior of the column. As the load was increased the popping noises were heard more frequently and were louder. As the load was further increased the action of the columns depended to a great extent on the quality of the mortar used. The columns in which the richer and stronger mortar was used gave little or no additional evidence of distress until a load a little below the maximum was reached, when spalling of the mortar at the corners of the column, or the formation of longitudinal cracks through the vertical joints gave warning of impending failure; after the beginning of spalling or the formation of longitudinal cracks was observed, the failure was generally very sudden and complete. In this class of columns (those with 1:3 Portland cement mortar) the debris shower that failure was precipitated by the formation of longitudinal cracks through each vertical joint. These cracks generally extended throughout about the upper two-thirds of the length of the column, beginning near the middle and extending both ways. Such failures were extremely violent and sometimes involved hazard to observers and often proved destructive to measuring instruments. The failures came with such slight warning that, despite repeated efforts, the operator was unable, except in two tests, to stop the movement of the testing machine after evidences of failure were observed in time to avoid reducing the upper two-thirds of the column to a mass of broken bricks and mortar scattered over the laboratory. The design of this machine is such that it may be stopped and the motion completely reversed almost instantly. The columns referred to were the ones laid up carelessly. They were less rigid than the others of the same materials and hence took on load more slowly.

Features of the Tests

The phenomena of the test of the clay-brick columns did not differ greatly from those of shale brick with 1:3 Portland cement mortar, except that on account of the reduced rigidity the load was applied more slowly and the failures were less sudden and violent.

The failures of the columns in which the 1:5 Portland cement, natural cement or lime mortar was used were similar to those described above, except that they rarely got beyond the spalling and cracking stage. In these tests the formation of the vertical cracks could readily be observed. The freedom from sudden collapse was probably due to the yielding of the joints and the fact that the testing machine does not follow such yielding instantaneously. It must not be inferred that under an actual load such columns would not have failed as suddenly and completely as the others. Where natural cement or lime mortar was used the mortar gradually disintegrated and reduced to powder.

No direct comparison of the strength of the lime mortar columns with the strength of the mortar can be made (since no tests of the lime mortar were made), although it is evident that the low values observed are due to the low crushing strength of the mortar. From the action of these columns during the tests it seems evident that the lime mortar broke down at a load which was proportionally very much lower than that carried by the cement mortar. From the

early signs of distress exhibited by these columns it seems doubtful if they would continue to carry a load greater than about one-third the maximum load given in the test, while for the shale brick columns built with Portland cement mortar, the load at which the first signs of distress were observed is from 50 per cent. to 75 per cent. of the maximum load carried.

For the two columns built of underburned clay brick and 1:3 Portland cement mortar, the average load carried was 1,060 pounds per square inch. The ratio of this load to the load taken by the shale brick columns tested at the same age is 0.31. The ratio of the crushing strength of the clay brick to that of the shale brick is 0.37.

It is evident that the strength of any brick or block structure is influenced greatly by the quality of the mortar used. These comparisons indicate that for the columns tested the strength of columns built from the same brick is closely proportional to the strength of the mortar used in their construction, and the strength of columns built of different brick using the same mortar is closely proportional to the crushing strength of the brick. Of course, these conclusions may not be expected to hold for all combinations of brick and mortar. A mortar might be used of such low crushing strength that the strength of the poorest brick would be great in comparison.

These tests indicate that the crushing strength of the brick is as important a factor in the strength of a structure of this kind as the quality of the mortar used. The most economical structure would seem to result from using a mortar comparable in strength with the brick. Such considerations are generally unnecessary except in design of columns, piers, etc., which are to sustain excessive unit loads.

If the load at which the column first shows signs of distress by popping sounds represents the maximum permanent load which the column would carry, then this load is the one on which the factor of safety should be based, and not the load carried momentarily before failure.

The terra cotta block columns were built and tested in two lots, an interval of about one year separating the times of making the tests. The cement used was the same brand in both years though the lots were different. The columns were generally made in sets of two, each set being constructed and loaded similarly. The tests resembled those of the brick columns in many respects.

The Terra Cotta Columns

Generally the terra cotta block columns gave no signs of distress until a load near the maximum was applied, when cracking noises similar to those described for the brick columns were heard. This was soon followed by the formation of longitudinal cracks through the vertical joints or the spalling of the horizontal mortar joints at the corners of the column, either of which was immediately followed by sudden collapse of the column. The failure of these columns were even more violent than those described for the brick columns. The smaller columns showed more variation in the manner of failure than the large ones. The characteristic form of failure for the $12\frac{1}{2} \times 12\frac{1}{2}$ -inch columns was a sudden total collapse immediately following the appearance of longitudinal cracks through the vertical joints near the middle. Failure sometimes occurred with no warning except the continued shortening of the column under the increasing load.

The columns loaded eccentrically failed by splitting from end to end along the vertical mortar joint which was parallel to and nearer the loading bar.

Both brick columns and terra cotta block columns gave high strengths in all cases where strong mortar and care in buildings were used. For central loading, the strength of the brick columns ranged from 3,220 to 4,110 pounds per square inch, and the strength of the terra cotta block columns from 2,700 to 3,790 pounds per square inch, the columns having the highest resistance not failing at the full capacity

of the machine. The effect of the strength of the mortar is apparent in the carrying capacity developed in the columns; lower loads were found in columns built with 1:5 Portland cement mortar than in those with 1:3 Portland cement mortar, still lower loads in those with 1:3 natural cement mortar, and still lower loads in those having 1: lime mortar. The effect of the quality of the brick is shown in the columns made with inferior brick, which carried only 81 per cent. as much as columns built with the better grade of brick. In the case of the terra cotta columns, the blocks which were culled out as somewhat inferior gave a column strength perhaps 30 per cent. less than the columns built with superior blocks. The effect of the attempt to represent hurried or careless workmanship in two brick columns and in three terra cotta block columns was a loss in strength of about 15 and 25 per cent., respectively.

The ratio of the strength of the columns to the comprehensive strength of the individual brick and block is of interest. In the well built brick columns loaded centrally the ratio of strength of column to compressive strength of individual brick ranged from 0.31 to 0.37, and in the underburned clay brick column the ratio was 0.27. In the terra cotta block columns with central loading the ratio of strength of column to that of individual block was 0.74 for the incomplete test and 0.83, 0.85 and 0.89 for the others. If, as seems to be the case, the strength of the brick or block to resist cross breaking is an element in determining the strength of the built-up column, a deeper or thicker brick would give higher column strength. It is possible that this partially accounts for the fact that the ratio is found to be higher for terra cotta block columns than for brick columns. The tests suggest that the ability of individual pieces to resist transverse strength is an important element in the strength of the completed column. This suggestion may have an important bearing on the advantageous size of the component blocks which may be used in a compression piece where high strength is desired.

Strength of the Columns

The strength of the column is greater than the strength of the mortar cubes in both brick and terra cotta block columns, excepting only the soft brick columns which had brick of low compressive strength. It is evident that the strength of individual brick or blocks and the strength of the mortar both enter into the resistance of the column. The relative effect of the two depends upon the character of the material. It is evident, however, that the better the individual piece the more important it is to have a mortar of high resisting strength.

The results obtained in applying the load eccentrically were found to agree very well with those obtained from ordinary analysis. When the amount of eccentricity in the application of the load is known or may be estimated closely, the ability of the column to resist this action may be calculated quite closely. It is apparent from the results that the calculated resisting stress in the column on the side of maximum compression is higher than that which causes failure in centrally loaded columns. The higher stress developed with eccentric loading is probably due to the influence of the restraint of the less stressed inferior portion. The tests made by applying and releasing a single load a number of times gave failures at loads below those which produced failure in similar columns at a single application of the load. The phenomenon is common in materials of the nature of brick and terra cotta.

Quality of Workmanship

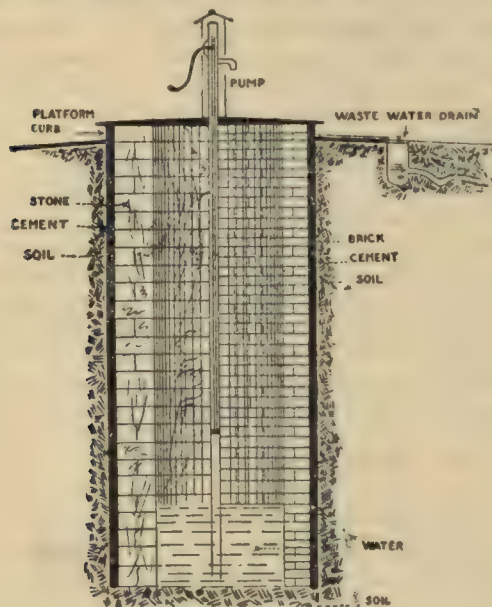
It is apparent that the quality of workmanship in laying up such columns has an important bearing upon the resisting strength. The work of building columns, however, is not difficult and requires only ordinary care. Full joints and an even bearing are important, and the ordinary workman ought to be able to construct columns of high strength. In the tests

made on columns intended to represent poor or careless workmanship the decrease in strength was not as much as anticipated. However, it must be understood that careful and trustworthy work is essential and that a few poor joints will materially reduce the strength of the structure. Wherever good material and good workmanship are ensured the strength of masonry of this kind may be utilized with advantage.

Proper Construction of a Well

The accompanying illustration shows the proper construction of a well in brick or stone. Large vitrified drain pipe with cemented joints would answer equally well when there is an abundant supply of water. But in those cases where the supply of water is less, a larger area is needed, and a stone or brick well is necessary.

Reference to the illustration will show that every endeavor is made to prevent surface water entering the well. The walls are impervious, and the earth or clay is well rammed



Plan of Model Well.

against the outer wall. The curb is carried well above the surface of the ground. The waste water is conducted by means of a catch basin, trap and drain away from the well and the well opening is properly covered. All water entering such a well must percolate through a considerable depth of soil, and undergo purification by means of the aggregations of living bacteria in the soil spaces, a casting out of devils by means of Beelzebub, the prince of devils.

Quebec Section N.T.R. Nearing Completion

Mr. A. E. Doucet, resident district engineer for the National Transcontinental, states that the Quebec district of that railway, known as district "B," will be completed by 1912. The complete mileage of this district is 507 miles, extending from the New Brunswick boundary to 303 miles west of Quebec.

Up to date, with the exception of a few breaks, amounting to the bridge on the Jacques Cartier river, and the yards at Caprouge, rail is laid on the north shore west of the Quebec bridge for 188 miles, to the crossing of the St. Maurice river, and about eight miles east of Way Montachene as far as the Hudson Bay post.

The grading is partially complete for 72 miles west of that, and at the end of this season rail is expected to be laid to the crossing of the Gatineau river, about 235 miles

from Quebec, leaving about 60 miles in the district west not yet under construction.

On the south shore of the St. Lawrence rail is laid on a good distance. All the grading has been done, and it only requires filling, and the completion of the bridges and viaducts. The average number of men employed daily is 3,700, and the number is being constantly increased.

Reinforced Concrete Piers

Two reinforced concrete piers were recently built in the harbor of Genoa, Italy, in order to carry a light steel bridge of a grain unloading plant. Each reinforced pier, according to "Engineering," London, is 35 feet high and carries a masonry pier to 19 feet high above water level. The piers are 13 feet 11 inches by 17 feet 3 inches in plan and have a working chamber at the bottom, 5 feet 11 inches high, so that they could be sunk by the pneumatic process. The walls vary in thickness with the depth, the maximum being 7-inch. They transfer the pressure on them to vertical beams which, in turn, are stayed by horizontal reinforced concrete struts running to the beams in the opposite wall. Beam and strut sizes are also reduced with the diminishing water pressure. The walls of the working chamber are of solid concrete, reinforced in both faces, 23.6-inch thick at the top and 7-inch at the bottom, where they are shod with a cutting edge of the concrete by straps placed at intervals, looped over the reinforcing bars in the concrete and rivetted to the upturned legs of the channel. The piers were built on shore, floated to place and then sunk.

Mr. A. O. Graydon, who has been city engineer of London, Ont., for the past 19 years, has resigned, owing to ill health. It is probable that Mr. Graydon will be retained as consulting engineer to the city.

Chief Justice Sir William Meredith has been appointed by the Ontario Government a single Provincial Commissioner to prepare new legislation for the compensation of workmen for injuries sustained during employment.

The preliminary report of the three engineers, Messrs. Schreiber, Kelliher and Grant, who, as a board of arbitration, have been considering the claims of over-classification in the building of the National Transcontinental Railway, shows that on contracts aggregating about \$15,000,000 on section "F" the total amount of over-classification is only about \$200,000. On section "E" the over-classification amounts to less than \$25,000.

Mr. W. R. Sweeney, who has been acting as contracting agent for the Civic Electric Department at Toronto, has been appointed general manager of that department by the Board of Control at a salary of \$2,700 a year. Mr. Sweeney graduated from the Maryland Technical School, Baltimore, in 1887. For some time after graduation he was engaged in electrical construction work and later became connected with the engineering firm of Stone & Webster, Boston, which he left to enter the electrical department at Toronto.

The contract has been signed for the construction of the Nova Scotia Eastern Railway from Dartmouth, N.S., to Guysboro, N.S. The signatories to the contract were Hon. C. P. Chisholm, Commissioner of Public Works and Mines, representing the Provincial Government; J. B. Bartram, Toronto, and G. E. Boak, Halifax. The company, which is backed by London capitalists, receives a total subsidy of \$12,800 a mile and agrees to start construction by September 1st next. The limit for completion is September 1st, 1913.

The Construction of Broken Stone Roads

Practical Directions of Interest to Road Superintendents, Engineers and others—Approximate Cost of Ordinary Stone Road—Tools and Machinery

By HIRAM DONKIN, C.E., Halifax, N.S.

In addition to shovels, picks and spades and other ordinary implements of construction, a four or six horse road plough, an ordinary road machine or grader and several wheel scrapers are usually needed. Several wagons with dump boards for hauling stone are essential. Bottom dump or spreading wagons will save money if such construction is to be undertaken, but are not a necessity. Water plays a great part in making the stone cement together, so a watering cart or sprinkler should be secured. A roller of from five to ten tons is indispensable. Fairly satisfactory roads have been built with heavy horse rollers, but so much better and quicker work can be done with a steam roller that it is safe to say that nothing else should be used. A ten-ton steam roller can be bought at prices ranging from \$2,000 to \$2,750 according to the make. As a steam roller will do several times the work of a horse roller in a day, it is evident that the steam roller is much the cheaper. If it is decided to use local stone and there is no crusher available to do the work, it will also be necessary to buy a crushing outfit. A good, portable outfit, consisting of a crusher, engine, screens and bins, will cost from \$1,500 to \$3,000 complete, according to capacity.

Stone—The principal qualities needed in stone for road purposes are hardness, toughness and cementing value. The trap rocks, including diabases, diorites and a few other igneous rocks are the best materials. The harder limestones, some granites and felsites are also excellent. Sandstone, slates and quartzites have little value as surfacing materials, but when sound and moderately hard, they can be used for the bottom or first course.

Width of Country Roads—This question is a much discussed one. In some places 12 feet has been adopted as the least width of the stone surface, some 14 feet and some 10—the width required depends upon the amount of travel. For the majority of roads nine feet of stone (or gravel) with a graded width of 20 or 24 feet between ditches is ample. Approaching towns and cities and on other much travelled roads 12, 14 or 16 feet of stone may sometimes be needed. Anything beyond this width is out of the realm of country roads and becomes a street. A 9-foot road will not, it is true, allow two teams to pass on the stone surface, but it is comparatively seldom that two heavily loaded teams have to pass, and when they do the shoulders offer a surface harder and firmer than the usual country road. As it is estimated that a farmer turns out not over once a mile on the average, it seems better to first get length and afterwards width when the need arises, rather than build the extra width to turn out when an occasional meeting occurs. In other words, with a given amount of money, it is better to build a mile and a half of road 9 feet wide than to build one mile 16 feet wide.

Grading—Cuts should be made at least 20 feet wide at the bottom and fills 22 feet on top. On any roads to be macadamized, the hills should be reduced to a grade of not over 6 per cent. (6 feet of vertical rise in every 100 feet of horizontal distance), unless there are insurmountable physical or financial difficulties. It is almost impossible to maintain a good road on grades steeper than this, and the expense of maintaining them is much more than the interest on the cost of cutting would be. Heavy grades can often be lessened by re-locating the old road and the required grade secured, even with the land damages added to the grading cost, at less expense than the cutting down of the original

hill. Bumps and hollows should be smoothed and even, regular grades secured.

Grading Construction—No work of importance should be undertaken without securing an engineer or surveyor to make a survey and to take levels and plan the road carefully. Such services cost little in comparison to the total cost of the work, and will result in the saving of many times their cost in improved grades and lines, and in getting the material in the proper place at first, rather than moving it several times before the desired grade is secured.

Culverts and Drainage—Culverts and bridges should be put in or repaired, so that all water will be quickly and effectively taken care of. It should be remembered in constructing these that the road is to be a permanent one, and only the best material and construction should be secured. Reinforced concrete construction is recommended for all bridges up to 30-foot span. They are indestructible and require no plank floor renewals as do wooden bridges, and no painting, as do steel structures.

Tile sub-drains should be put in where the sub-grade is continually wet from springs or ground water, and should be placed not less than three feet below the surface. The tile should be 3 inches to 8 inches in size and should be placed under the ditch on the side of the road from which the seepage comes, or under the centre of the road in cuts and flat places. It is well to fill in around the pipe and for several inches above it with the largest size of stone used in building the road, as this increases the capacity of the drain and prevents earth from getting into the joints. The open end of the tile should be covered with a small mesh wire screen. A trench of the same depth filled with 4-inch stones or brick bats will serve practically the same purpose. A fall of 6 inches in each 100 feet should be secured in the side ditches whenever possible. Tiling is much cheaper than the method usually employed, of filling in with large stones until the bottom is reached, or of putting in a foundation of large flag stones, as is often done, and it is even more effective.

Sub-Grade—The sub-grade is the roadbed on which the stone is to be placed. Most of the dirt to be moved in making the trench for the broken stone can be plowed and thrown out with an ordinary road grader at small expense. Some of the trimming must be done by hand, but the greater part can be moved successfully by an ordinarily expert road machine operator. Shoulders should be made two or three inches higher than their final shape when they are made by filling, to allow for their being compacted by the roller. Care should be taken not to deposit soggy dirt from the ditches, sod, etc., on the sub-grade in the grading work. Only the best material at hand should be used and with a little care in this respect, much better results can be obtained with no additional cost.

When the roadbed has been brought to shape, the trench should be thoroughly rolled until it is hard and firm. Hollows and humps should be removed by cutting or filling and the whole sub-grade made hard, smooth or even, and of the same cross slope as that of the finished roadbed. A cross slope of not less than one inch to the foot is the proper amount. This slope drains water off quickly and preserves the crown of the road longer than a smaller slope. Remember that the sub-grade must be shaped and rolled properly. Bumps and hollows in the sub-grade will clearly show up in each succeeding course. After the trench is made, always

cut drains through the shoulders to the side ditches in all low places before leaving the work. This will save many day's work in laying stones. It will keep the sub-grade dry when otherwise it would be flooded at every downpour of rain. These drains should be filled with 3-inch stone when the stone for the first course is spread. They can serve as permanent drains for the stone roadbed if water by any chance should get into it.

First Course Construction

When the sub-grade has been thoroughly rolled the first course of stone is spread. This ordinarily consists of broken stone from 2 inches to 3 inches, but some little latitude may safely be allowed, say from 2 inches to 3½ inches—stone larger than 3½ inches in any dimension, should be broken with a napping hammer. Stone for the first course need not be of especial hardness or toughness—ordinary good hard stone of any kind may be used. The thickness of this stone (like every feature of the road) varies with local conditions. On good soil, 4 inches loose is sufficient, but in some cases 5 inches and even 6 inches should be used. A course of over 6 inches cannot be thoroughly rolled and should never be used. Twelve inches of stone loose in the two courses is all that is ever necessary, that is, two courses of 6 inches each, without the dust. The present tendency is to attempt to make up for poor methods of construction by using a foot or even more of stone or gravel, when a well-made six-inch road would be cheaper, better, and more lasting.

Stone for any course should not be dumped on the place it is to be used. If spreader wagons are not used, the stone should either be dumped and raked or shovelled into place, or spread with shovels from the wagons. This may seem an unnecessary nicety, but if the stone is bodily dumped by the wagon load and raked down, the centre of the pile is more solid than the rest of the stone, and rolling simply serves to accentuate the unevenness. Roads built in this way show up bumps where each separate load of stone was dumped. If pockets of the fine stone occur they should be shovelled out and replaced by stone of the proper size, as the fine stone will grind up faster under the wheels and a hollow will be formed in the road. Both courses of stone should be spread with blocks cut to the depth of loose stone desired. One block should be placed in the centre and one at each side and the stone carefully levelled to the top of these. When 100 feet or more of stone is spread and carefully shaped, rolling should commence. Always commence to roll at the sides and when both sides are firm, work gradually towards the centre and finally roll on the centre when all danger of spreading the stone is past. If this is not done, the roller will mash the stone out flat and spoil the crown. When the stone is thoroughly rolled, one should be able to walk over it without causing much movement of stone, except just under the feet. Experience will soon teach the builder as to how much to roll any particular kind of stone used, and when to stop. Do not roll too much. At a certain point the stone ceases to consolidate and further rolling simply causes the stone to become rounded and poor for road purposes. With a sandy sub-grade, it is usual to spread an inch or two of earth, gravel or straw before placing the stone, in order to prevent waste of stone by pushing it down into the sand.

Second Course

The first course having been thoroughly rolled, the second course should be spread the same width as the first. This course should consist of the best material economically available; which means the material that for a fixed sum will produce the greatest road value, not for a year, but for twenty years or more. For instance, a sandstone road may be locally made for \$1 per cubic yard on the road. A good trap rock may in many cases be brought in by rail and put on the road for \$1.50 per yard. The latter would be economically best, as it would be a road when the sandstone road had long since been washed into the gutters and blown away. In general,

the limestones are best for surfacing roads with small or moderate travel, and granite or trap rocks, for the heavily travelled roads.

The second course should consist of stone broken in size from ¾-inch to 2-inch, and be screened as closely as possible to these sizes. It should be spread with blocks to a depth of not less than 3 inches, nor more than 6 inches in any case, varying with the hardness of the stone, etc., and the total depth of road desired. This course must be spread with the same care as the first course, and rolled in the same manner. In commencing to roll the second course, the outside wheel of the roller should rest partly on the stone and partly on the shoulder, so as to keep a uniform slope to both, and to pack the shoulders in order to keep the stone from spreading.

Whenever possible, the shoulders should be rolled for a distance of at least two feet from the stone at this period of the road's progress. Roll to the centre as before, until the stone is firmly in place, so that a gentle kick will scarcely dislodge a stone, and the whole is firm and even. The road is then ready for the third or binder course. Before spreading this, all depressions or bumps in the stone should be levelled or filled with additional stone of the same size as the rest of the course, all wheel tracks smoothed out and the roller run over such places again, so that the surface of the stone is hard and smooth, and of even cross and longitudinal slope.

Third Course

The third or binder course should consist of stone screenings varying from dust to ¾-inch in size. It is usual to have this of the same material as the second course, though small gravel and sand can be used as binder for some rocks, with good results. With a granite second course it is better to use limestone screenings, as granite dust has small cementing power. The dust should be spread with shovels from the wagons or from piles along the road side, but never dumped directly on the stone surface. It should be applied with a quick, jerky motion, so that a shovelful goes over a large area, until the second course of stone is entirely hidden and there is a uniform coat of say ¼-inch over the whole surface of the stone. Then the road should be firmly rolled as before until the dust is well pressed into the space between the stone and a coating left on the surface. Bare places, as they show up, should be covered with more screenings until the whole is firm and hard and none of the stone in the second course show.

The road should then be thoroughly sprinkled with water from an ordinary street sprinkler, to wash the screenings into the voids of the stone, and when it flushes or rises to the surface it shows that the voids in the stone have been properly filled. A road is properly flushed when the steam roller following closely behind the sprinkler has a wave of water continually going before the wheels. This flushing may cause the dust to settle so that bare places show again. Cover these with more screenings and wet and roll until the whole is firm and hard, and uniformly covered with a thin coat of dust. The great mistake usually made is in applying too much dust—enough to cover the stone at all stages of the finishing should be used and no more. Too much dust soon ruts, travel becomes concentrated in these ruts and water standing in them soon causes a soft place in the stone below and the ultimate destruction of what would have been an excellent road.

Trimming

When the road is about finished as above, a road machine with the blade set to the proper slope, should be carefully run over the shoulders and all surplus dirt removed until the road has as nearly as possible the desired shape, and the slope from the centre of the road to the ditches is smooth and uniform, so that water falling on any part of the road surface, is quickly carried to the ditches. Bumps and depressions can be levelled with a road drag by anyone expert

in road dragging. Probably some picking and shovelling will be needed, but with practice much of this can be done with the road machine and earth drag and a large part of the expense of trimming saved.

The roller should then be run as closely as possible to the ditches or edge of the shoulders, so that the whole is made hard and firm and offers an opportunity to teams to turn out wherever necessary. Before leaving a road as completed, go over it carefully and see that all ditches, culverts and under-drains, etc., are clean and open, and that slopes are in clean and even condition. In cuts, the slope should be made not steeper than one foot horizontal to one foot vertical, and on fills not steeper than one and a half feet horizontal to one foot vertical.

Summary

It is best to secure a heavy roller.

The road should be carefully graded and drained.

The sub-grade should be carefully shaped and rolled.

The first course should consist of from four to six inches loose of any sound broken stone from 2 inches to 3½ inches in size.

Second course should consist of three to six inches of good road metal, of ¾-inch to 2-inch in size.

Third course should consist of stone screenings, or gravel and sand, varying in size from dust to ¾-inch.

Roll all courses thoroughly, commencing at the sides and working to the centre.

Bumps in any course or in the sub-grade should be removed and all depressions filled with material of the same size and kind as that being rolled.

Flush with water until mud comes to the surface.

Clean all ditches, culverts, etc., and leave the slopes and sides of the road in clean, unobstructed condition.

Do not attempt to make a good road with unscreened material, that is, with stone of all sizes unmixed.

Do not use clay for a binder; it makes a muddy surface in wet weather and a dusty road in dry weather, and, above all, makes weak spots in the road which will cause the road to wear unevenly.

Approximate Cost of Ordinary Stone Road

	Cu. yards.
Stone for 1 mile, 9 feet wide, 6 inches thick	1,174
Screenings for 1 mile, 9 feet wide, 1½ inches thick	220
Total stone	1,394
Add one-fifth for tons	279
Tons of limestones required	1,673
Stone, 1,673 tons at 60c.....	\$1,003.80
Freight, 1,673 tons at 25c.....	418.25
Unloading, 1,673 tons at 5c.....	83.65
Loading and unloading teams, 1,673 tons at 5c...	83.65
Hauling one mile, 1,673 tons at 20c.....	334.60
Laying macadam, 5,280 sq. yds. at 20c.....	1,056.00

Total cost

\$2,979.95

An ordinary stone road will, therefore, cost about \$2,979.95, exclusive of grading or culvert work. Of course, local circumstances may raise or lower these rough figures, but they should come within 10 per cent. of the actual cost as far as the labor items are concerned, and can be used with confidence as an approximate estimate.

If it is decided to set up a local crusher it can be safely said that stone can be quarried and crushed for less than 60c. per ton, and from this it will go as high as \$1. Do not set up a crusher where loose field stone has to be collected by wagons and hauled to the crusher unless stone cannot be gotten for less than \$1 per ton delivered; crushed stone will cost that or more if collected in that way. The most satisfactory way to crush stone is from a quarry with a good breast, or from stone piles. Moving the crusher plant, un-

less provided with portable bins, will cost about \$100 each time, and it will not often pay to set up for less than 1,000 cubic yards at a place.

The above will give each community some idea of what modern stone roads will cost them per mile, and there are very few communities in which there is not a mile or two of road which should be improved in accordance with the above method. The cost of the material on the road is the same per mile, whether well or poorly built, and this cost is so great a percentage of the whole cost, that no section can afford to build roads in poor fashion, when well-made stone roads that last, can be built at a cost of not more than \$1,000 per mile above that of the old methods. The well-made road will probably last for 50 years if properly cared for and be always satisfactory. The built-as-you-please roads will last probably one-third as long and never be satisfactory.

Mr. W. Owen, C.E., of London, England, representing a British syndicate, has concluded arrangements for the establishment of a large steel plant at Vancouver, B.C. It is stated that the works will cost \$15,000,000, will give employment to 5,000 men, and will be commenced next fall. Mr. Owen has now returned to England in connection with the registration of the company, which will probably take place at the end of next month.

At a luncheon given recently to Mr. Albert Vickers, chairman of the English firm of Vickers Sons & Maxim, by the Montreal Harbor Commissioners, the guest of honor spoke optimistically concerning the prospects of his firm becoming shortly "an integral part of the marine and industrial development of Canada." The proposed works will be built in conjunction with the new dry dock planned by the Montreal Harbor Commissioners.

At a meeting of the Toronto Board of Control last week, a protest was made against a contract being awarded for American treated blocks for the Yonge street pavement, south of King, in preference to Canadian blocks. It was pointed out that the Canadian pavement would cost only \$9,500, against \$11,400, the price of the successful bid. City Engineer Rust said that he was not prepared to recommend the Canadian blocks. The matter was referred to council.

Construction work is booming at Outremont, Que. A year ago the building permits issued by Inspector Reid showed an estimate of \$400,000 for the opening three months of the season, and the year's work ran to close on the million dollar mark. For the quarter closing with June of the present year the valuation of new buildings authorized was about \$800,000 and there are already in view a number of buildings that in course of the next few weeks will give the figures a further boost, so that 1910 promises to be a banner year.

The marriage of Miss Adeline Susanna Peddar, of Stowmarket, England, to Mr. Phillip John Turner, Fellow of the Royal Institute of British Architects, was solemnized June 14th at St. Martin's Church, Montreal. Mr. and Mrs. Turner are spending their honeymoon at Lake Memphremagog. On their return they will reside in Montreal. The "Contract Record" extends heartiest congratulations to one of Montreal's most popular architects.

The name and style of the Dominion Iron & Steel Corporation is being changed to the Canadian Steel Corporation. Mr. J. H. Plummer recently announced that they had issued considerably over \$31,000,000 worth of common stock of the new corporation for shares in the Steel & Coal Company. They now hold over \$18,000,000 worth of Steel stock, and over \$12,000,000 of Coal stock.

The Montreal Herald Disaster

No Blame Assigned at Investigation—Interesting Evidence Given by Architects and Engineers

The coroner's jury, appointed to investigate the collapse of the Herald Building at Montreal, has found that no one is responsible for the calamity. In the verdict is contained a suggestion that a by-law be passed to compel the inspection of overhead tanks every three months, but the blame is not located.

One or two interesting points were brought out at the renewed inquiry:

Building Inspector Chausse stated that in 1905 a permit had been granted, but that he knew nothing about the presence of the tank upon the building until after the accident. He said that permits would be granted for the erection of tanks upon old walls if they came up to the requirements of the city by-law. Many such tanks had been so erected, some on walls, some on a separate base and some on steel work. The inspection before the granting of a permit for such structures consisted in examining the ground, the foundations, the walls and the quality of material employed in their construction. Permits had been granted for such tanks to be placed upon 12-inch walls. Had he been consulted before the erection of the tank he would probably have granted the permit in view of the existence of the 12-inch walls and the concrete piers. He had examined the building since the collapse and had found the strip of wood which ran the whole length of the building, front to back, between the brick wall on either floor. This he was of the opinion did not tend to weaken it. There might be a shrinking soon after its construction, but its presence was a safeguard, as it would arrest the cracking of the wall between each floor.

In his judgment one of the floors had given way, disturbed the equilibrium of the centre wall and caused one floor to come down upon the others. The weakest portion of the floor was at the back upon the western side on the fourth floor, where the steel floor had been placed beneath the metal tank. The presence of an opening to the stairway also served to weaken it.

Mr. Chausse suggested a possible remedy against such catastrophes by having a specially built brick tower erected with the tank on top. He was not partial to the use of steel.

Mr. Chausse further said that he had been accompanied by Mr. Guyon, Inspector of Factories, and that in his report to the commissioners he had stated that in his opinion some shock or explosion caused the equilibrium of the centre wall to be disturbed. In his deduction that the back wall had been the weakest, he said he had based his assumption on the architect's plans, as when he visited the scene the rear wall and floors were a mass of debris.

Since the catastrophe he had received a few letters from owners to go and inspect their buildings, but previous to the accident he had not inspected the Herald Building. When questioned as to the cost of erecting a tank upon a new wall as against one upon a steel structure, he stated there would be a slight saving in the use of the latter.

He had found the beams, which were placed under the metal pot, intact in portions of the flooring. He was not able to surmise how much weight the building was designed to carry. The general practice was for the owners or the contractors to obtain permits. The penalty for not doing so was a fine of \$40 or two months' imprisonment. In his opinion the effect of the 60 tons of weight distributed by the tank did not have any effect upon the stability of the wall.

Mr. Louis Guyon, factory inspector, testified that he knew the Herald Building well, and had often visited it when the Bishop Engraving & Lithographing Company, the previous tenants, were in possession. His inspection dealt more particularly with regard to the safety of the employees against accidents by machinery, stairway exits and fire escapes. If, however, he saw what he thought was too heavy a load on any floor he would order its removal or distribution, and where there was pronounced vibration he would advise regarding the shafting. During 1906-7 he had called at the Herald regarding the fire escapes, and he was also aware of the presence of the water tank, though he had no occasion to inspect it.

In his opinion the floors gave way and brought down the centre brick wall as one floor crashed upon the others. He did not think the tank caused the collapse by reason of its lo-

cation in the southwest corner, two hours after the fire. It did not strike him that there was too much machinery, because the Bishop Company had used heavier machinery on the top floor than that utilized by the Herald. This machinery employed by the former tenants was weightier than the contents of the stereotyping room.

Mr. Walter J. Francis, civil engineer, Commercial Union Building, said that in his opinion the collapse was due to faulty floor construction which no one could foresee. Three days after the collapse he had examined what remained of the building and found that the floors were in part supported by two rows of cast iron pillars and the centre brick wall. Transverse beams ran from these columns with longitudinal beams front to rear.

At the top of each pillar was a floral capital of rough casting, and in the beam resting on this cap a square plate, cast iron, also rough. Upon this plate was a ten-inch cast iron rod which supported a like square plate which carried the pillar on the floor above—a very "tippy" construction which he likened to an irregularly built column of children's toy blocks. Any fracture in this hidden detail might cause the collapse of the floors and carry down the centre wall.

Regarding the weight of the tank on the centre wall, the greatest strain would be at the ground floor, where, in addition to the bulk of the tank, the proportionate strain of each floor had to be borne as well. This base portion of the wall was still standing when he went over the ruins.

Mr. J. S. Archibald, architect, said that he visited the building in 1905 and had inspected the wall only in regard to the weight of the tank. In a general way in 1905, 1906 and 1907 he had been consulted regarding the floors. In the stereotyping room he had noted a sagging in the centre, and marked vibration from the machinery. In 1906 he had recommended the placing of steel beams on the west side of the second floor under a press. He had also suggested the removal of the shafting in the stereotyping room, and in 1905 he had recommended a row of piers on the second floor. In 1906, too, he had recommended the removal of all machinery from the rear of the building to the front on the east side. In the same year he had been consulted regarding the construction of a pit in the basement to accommodate a new press, and that was his last visit. In every instance he had merely given advice, and not called to see whether it had been acted upon.

Visiting the scene after the fire, he found fully two-fifths of the tank intact, and in his opinion it must have plunged from roof to basement without obstruction of any kind.

Montreal Contractors Standing Firm

Peter Lyall, of Peter Lyall & Sons, Montreal, is not very much concerned over the strike of the union bricklayers and stonemasons in that city. He states that the work of his firm is going on with very little interruption. It is not expected that the master builders will concede the demands made by the men as the former have been anticipating the present movement for some time and have been prepared to make just such a stand as they did in the case of the bricklayers' strike. On the other hand the men are well backed by funds and state their intention of fighting to a finish. It is admitted by the union men that the strike operations are largely aimed at Messrs. Peter Lyall & Sons and Messrs. Byers & Anglin, both of whom have large contracts in Montreal and throughout Canada.

The proposition of the men is to secure closed shop, and a written contract with the master builders, for three years, covering a rate for bricklayers of 50 cents an hour for the first year, 55 cents an hour for the second, and 60 cents an hour for the third year, with proportionate increases for the stonemasons.

Paving Contractors Suing City of Montreal

Action is being brought by Messrs. Hyde & Webster, contractors, to restrain the city of Montreal from signing \$190,000 of contracts for scoria paving blocks on the ground that discrimination was shown in the acceptance of the tender. The firm tendered for Metropolitan blocks, and contended that they were not placed on an equal footing with others who tendered. In the form of tender handed to them by the city

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official the number of blocks required was stated as 180,000, while on blanks supplied to other firms the number was three millions. Further, on the day that tenders were called by the city for artificial paving blocks, other tenders were also called for the placing of scoria. This, the petitioners contend, shows that the Board of Control had already decided to accept scoria apart from the merits and prices of other blocks to be submitted.

The reply filed on behalf of the city states that the figures quoted in the form of tender supplied to Hyde & Webster was a clerical error. With regard to the tenders for placing blocks, scoria had been mentioned to indicate the size of the blocks which would be used. City Attorney Lavallee contended that the firm had been guilty of negligence in not presenting their petition before the report of the Board of Control had been passed by the City Council. Although the contract was not formally signed, the city was already in agreement with the contractor for scoria. Were the petition now granted, permanent work on paving would be paralyzed and the city would suffer considerably. The matter is in abeyance.

Hon. Mackenzie King Explains Duties of Royal Commission on Industrial Training

The first meeting of the Royal Commission on Industrial Training and Technical Education was held at Ottawa last week. The Minister of Labor, Hon. Mackenzie King, outlined the scope of the commission, and noted the exceptional opportunities of national usefulness which the work of the commission afforded. There had been many commissions appointed by the Federal and Provincial Governments, but he doubted if there was ever one which gave to its members an opportunity of national service as far-reaching and certain as that afforded the present commission. Owing to the limitations which the constitution imposed, the scope of the commission was necessarily confined to that of gathering information, which would subsequently be placed at the disposal of the several provinces. It was important, he said, for the commission to bear in mind that education as such was a subject assigned to the provinces by the British North America Act, and that the Federal Government did not intend in the appointment of the commission to in any way encroach upon the jurisdiction of the provinces. As a matter of fact, the consent of the Premiers of the several provinces to the establishment of the commission had been obtained before its appointment was decided upon. Mr. King hoped the commission would make it a point when visiting the several provinces to call first of all upon the Premiers of the provinces and ascertain from them any points which in their opinion it was especially desirable to note.

The Minister suggested that before travelling abroad it would be desirable for the commission to make an industrial survey of the Dominion by visiting the several provinces and ascertaining the nature and extent of the several industries and trades and their relative importance. Coincident with this, it was desirable that the commission should ascertain all that was being done at the present time, through Governmental or private agencies, in the way of promoting efficiency by industrial training and technical education. Having in this way familiarized themselves with the industrial methods and industrial equipment of the Dominion, they might then visit other countries, the United States, Great Britain, France and Germany, and ascertain the methods by which these several countries were promoting industrial efficiency. It was important that those engaged in the work of technical education, the boards of trade, factory inspectors, employers' associations, trades unions and other organizations, should be given every opportunity of having their views fully presented. The Government would do all in its power to facilitate the commission's work.

Mr. R. E. Carter, Toronto, having disposed of his interests in the Hamilton Brick Company, Limited, has resigned his position as president of the board of directors of that company.

The judges at the aviation meet now being held in Toronto include Mr. T. C. Irving, Jr., Dr. Galbraith, City Engineer Rust and Mr. R. P. Fairbairn, Deputy Minister of Public Works.

A contractor named W. J. Taylor, of Woodstock, Ont., had a narrow escape from death last week by falling 40 feet from a scaffold and alighting on a pile of bricks. He was badly cut and bruised but not seriously injured.

Mr. L. A. Vallee, Chief Engineer of the Public Works Department of the Province of Quebec, has also been appointed engineer of the Public Utilities Commission. Mr. Vallee's connection with the Department extends over more than 30 years.

The new building inspector at Edmonton is Mr. Catterelle, who was trained at Mason's College, Birmingham, and later identified with S. Pearson's, Limited, one of the largest British contracting firms, and also with the Hennibique Reinforced Cement Company.

A deputation from the Engineers' Club of Toronto waited upon Hon. W. J. Hanna last week to ask that the club be granted supplementary letters patent. Dean Galbraith and City Engineer Macallum of Hamilton presented the case of the engineers. The matter will be taken up with the Provincial Secretary's Department.

Mr. W. Chase Thomson, M.Can.Soc.C.E., assistant engineer of the Dominion Bridge Company, Montreal, resigned his position at the end of June and has assumed charge of the Canadian office of the Cleveland Bridge & Engineering Company, Limited, of Darlington, Eng. His office is in the Canadian Express Building, Montreal.

Mr. H. Y. Parker has been appointed city engineer of Cranbrook, B.C. City Engineer Parker was born in New York State and came to Canada six years ago, taking up residence at Calgary, Alta., where he occupied the position of resident C.P.R. engineer. After spending a year at that point, Mr. Parker was transferred to Cranbrook, where he acted in a similar capacity for 18 months. He left the C.P.R. employ to engage in a general engineering business and, prior to his present appointment, executed various commissions for the city of Cranbrook to general satisfaction.

An old time civil engineer of British Columbia passed away recently in the person of Mr. J. W. Balmain, of North Vancouver. Mr. Balmain, who was 71 years of age, was a native of Scotland and obtained his engineering training in the old country. Early in life he went to India, where he supervised some important government works. Upon the completion of these projects he crossed the Pacific to Vancouver and entered the service of the C.P.R. under Mr. H. J. Cambie. Later he entered the employ of the city of Vancouver. A few years ago he served as engineer for North Vancouver. For several years prior to his death he had been engaged in private practice in which he enjoyed an extensive connection.

The Alexander Milburn Company, of Baltimore, Md., manufacturers of portable acetylene lights, have furnished us with an interesting catalogue of their products. During the ten years that the company have been manufacturing the Milburn light they have sold in Europe and America over

60,000 lights, exceeding in aggregate 60,000,000 candle power. For use in building and contracting work of all kinds these lights appear to us to represent the acme of economy and satisfaction.

J. C. Kennedy, C. E., Vancouver, B. C.

Vancouver, B.C., newspapers announce that Mr. James C. Kennedy, C.E., has opened an office for private practice in that progressive city, and also make reference in eulogistic terms to the qualities and practical experience which commend Mr. Kennedy to the confidence of the public.

Mr. Kennedy, who is a member of the Canadian Society of Civil Engineers, began his professional career in the "seventies," on the construction of the Ottawa water works, under that eminent veteran, Mr. Thos. C. Keefer, C.E., then chief engineer of the work. As the undertaking neared completion, Mr. Kennedy was engaged by the chief engineer of the Toronto water works, Mr. P. A. Peterson, C.E., who was also chief engineer of Government railways for the Province of Quebec, to proceed to Toronto as assistant engineer, and to assume charge of the re-laying of some two miles of 4-foot conduit, a work that had previously proved troublesome and that had provoked considerable controversy between the city and the contractors who had laid the pipe.

After the successful completion of the Toronto work, Mr. Kennedy was re-engaged by the Ottawa Water Commissioners and sent to Philadelphia, Pa., entrusted with the supervision of waterworks contracts under execution by a manufacturing firm of that city. Since that time he has directed and designed many important works, both for municipalities and for private corporations and in various localities between the Atlantic and the Pacific. His latest engagement was with the Stave Lake and the Western Canada Power Companies, and covered a period of over three and a half

years as engineer in charge of the construction of the well known 40,900 horse-power hydraulic development at Stave Falls, B.C. In the last named connection Mr. Kennedy has established an enviable reputation for professional ability.

Associated with Mr. Kennedy will be his two sons, Mr. H. C. Kennedy, C.E., and Mr. W. A. Kennedy, B.Sc. Both are graduates of McGill, and each has had the advantages of exceptional practical training in various parts of the Dominion.

While wire cloth has the advantage over perforated metal for sieving purposes, in many cases the rough or uneven surface of the former has been a great disadvantage. This has been overcome by passing the cloth between heavy rolls to flatten the crowns of the wire. The B. Greening Wire Company, Limited, Hamilton, Ont., have always done more or less of this work, and lately finding the demand for same very largely increased, they installed rolls to take care of the demand for medium weight screens. This proved such a success that the firm was encouraged to put in heavier rolls. These rolls are now installed, and are without doubt the heaviest rolls to be found in any wire cloth plant on the continent. The installation of these rolls marks the completion of a wire weaving plant that is equal to that of any concern in the world making the same class of work.

SCHAW QUARRY

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.

Tenders are being called until August 1st for compound duplex pumping engine. H. Hymmen, superintendent Berlin waterworks. For further information see "Tenders and For Sale Department" in this issue.

Estevan, Sask.

A by-law will be submitted for issue of \$10,000 debentures for the purpose of constructing cement walks; also for \$6,300 for the purpose of making a common sewer.

Collingwood, Ont.

Tenders are being called until July 30th for street paving. K. S. Macdonell, town engineer. For further information see advertisement in this issue.

Calgary, Alta.

Tenders will be called for shortly for lining the new city reservoir with cement. J. T. Child, City Engineer.

Kamloops, B.C.

This municipality is inviting tenders for modern cement sidewalks.

Longueuil, Que.

Improvements to the water front at this point by the construction of a boulevard is rumoured.

Montreal South, Que.

Preliminary steps for the establishment of a water and sewerage system are under way. Mayor Labonte and Councillors Kilgallen, Glenie and Duquette are the committee in charge.

Marysville, N.B.

The installation of sewage disposal works is being considered. A. D. McPherson, town clerk.

Montreal, Que.

Tenders will be called shortly by the City of Montreal for the construction of sewers on St. Timothee street, from St. Catherine to DeMontigny streets; Ontario avenue, from end of existing sewer to Pine avenue. Information at the office of the City Surveyor, John R. Barlow.

The civic authorities have voted \$5,000 to assist in decorating city streets for the Eucharistic Congress.

Outremont, Que.

Tenders will be received until July 20th for sewer construction; also 80 man-hole covers. J. Kruse, secretary-treasurer.

Ottawa, Ont.

The Carleton County Council has authorized the issuing of 5 per cent. 20-year road debentures for \$20,000.

Revelstoke, B.C.

The by-law to raise \$27,000 for the extension of water system was carried. Work will be commenced at once.

Sydney, N.S.

On the 26th of July the ratepayers will vote on a proposition to borrow \$10,000 for extension of water system.

Swift Surrent, Sask.

Tenders addressed to G. W. Bilbrough, secretary-treasurer, will be received until August 2nd for the following: (A) laying sewer and water mains; (B) constructing sewage disposal works; (C) constructing concrete settling tank and intake; (D) constructing frame building. Plans, etc., at town hall or at office of the engineer, J. Darlington Whitmore, Regina.

St. John, N.B.

The following tenders for permanent paving in Germain street were received: Carritte, Patterson Manufacturing Company, \$12,676; McDonald & McLeod, \$12,920; Westrumite Paving Company, Limited, \$13,032; A. R. Clarke, \$14,250. Mr. Clarke sent in an alternative bid for Apposite paving on Haseam foundation which amounted to \$11,380. This was recommended for acceptance.

Toronto, Ont.

Tenders are called until July 26th for supply of 16, 20, 24 and 36 inch stop valves and 20 and 24 inch check valves. G. R. Geary, chairman Board of Works.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until August 2nd for supply of water meters for the year. Specifications, etc., at office of City Engineer.

Tenders are being called until July 26th for construction of the following: asphalt, bitulithic, and concrete pavements; travis macadam reconstruction, concrete curbs; concrete walks. G. R. Geary, chairman Board of Control.

Vancouver, B.C.

The following details of tenders for lining Little Mountain Reservoir have been sent in:—M. P. Cotton, Vancouver, concrete lining in bottom, \$1.85 per sq. yd.; reinforced lining on sides, \$2.85 per sq. yd.; rock surfacing, \$1 per sq. yd. Geo. H. Webster, reinforced lining, \$2.10 per sq. ft.; plain lining, \$1.55 per sq. ft.; rock surface, \$1 per sq. ft.; inlet and outlet, etc., \$475. J. C. Kennedy, reinforced lining, \$1.90 per sq. ft.; non-reinforced lining, \$1.80 per sq. ft.; rock surface, 50c per sq. ft.; inlet and outlet, etc., \$200. Waugh-Mulburn Construction Company, reinforced lining, \$2.50 per sq. ft.; non-reinforced lining, \$2.05 per sq. ft.; cement grout for rock surface, 20c per sq. ft.; oedistil, etc., \$250. Wells Construction Company, Vancouver, reinforced concrete lining, \$1.88 per sq. ft.; plain concrete lining, \$1.42 per sq. ft.; rock surface, \$1.20 per sq. ft.; inlet and outlet, etc., \$500. Award given in last issue.

Winnipeg, Man.

Tenders addressed to Chairman Board of Control, will be received until July 21st for construction of water mains on four streets. M. Peterson, secretary.

AWARDED.

Brantford, Ont.

The Westrumite Company obtained contract for surface paving of Lorne Crescent at \$1.29 the square yard, and the Warren Bituminous Paving Company that for Darling street at \$1.63.

Guelph, Ont.

The contract for paving Norfolk street (about 6,000 feet) has been awarded to the Westrumite Company at about \$12,000.

Grand Falls, N.B.

The contract for installation of water system here has been awarded to Powers & Brewer, contractors, and embraces furnishing and laying 20,000 feet of cast iron pipe, reservoir, pumping station and pump.

London, Ont.

The board accepted the tender of the Barber Asphalt Company for resurfacing Dundas street from Wellington to Ridout, at \$12,716.

Morden, Man.

Herman Campbell was given the contract for constructing 1,500 square yards of cement sidewalks at \$1.30, and \$2.50 for crossings. Other bids were: A. G. Selley, Morden, \$1.40; Main & West, Winnipeg, \$1.83; Geo. Gordon, Morden, \$1.62.

Montreal, Que.

The contract for the sixth section of Sherbrooke street sewer was awarded to Keegan & Dillon for \$68,768, the lowest.

Nanaimo, B.C.

Contractor Wardsworth of Victoria, has been engaged to lay seven miles of cement sidewalk here.

Ottawa, Ont.

We are informed that the contract for laying asphalt pavement on Wellington street was awarded to the City Engineer at \$17,825.10. Others tendered as follows: Barber Asphalt Company, Ottawa, \$19,267; Ottawa Construction Company, Ottawa, \$20,616; Union Construction Company, \$24,867. N. H. H. Lett, secretary Board of Control.

Peterboro, Ont.

The Township of Monaghan has awarded to H. Thurter, a contract for concrete walk construction at 12 cents a foot.

Sydney, N.S.

The following list of tenders for sewer construction in this city this year were sent in: Wm. Cooke, North Sydney, \$22,661.50 (recommended for acceptance); Sutherland & Redding, North Sydney, \$25,552.90; J. H. Treen, Sydney, \$24,436.70; McDonald & McLeod, St. John, \$27,055.50. Contract prices cover labor only, city supplying all materials, pipe, cement, brick, castings, etc. D. McD. Campbell, city engineer.

Toronto, Ont.

The contract for asphalt block pavement on College street between Manning avenue and Dovercourt road has been awarded to J. Maguire at \$42,486.

Vancouver, B.C.

The tenders received for asphalt pavement were as follows: Broadway, from Prince Edward street to Scott street, Palmer Bros. & Henning, \$46,322; M. P. Cotton, \$48,453; Christian & Hartney, \$51,799; T. R. Nickson & Company, \$44,000; award-

ed to T. R. Nickson & Company. Broadway, from Ontario to Prince Edward, Palmer Bros. & Henning, \$53,612; M. P. Cotton, \$57,580; T. R. Nickson & Company, \$49,000; awarded to T. R. Nickson & Company. Dunlevy avenue, from Hastings to Harris, Palmer Bros. & Henning, \$22,614; M. P. Cotton, \$24,335; awarded to Palmer Bros. & Henning. Sewers—Tenth avenue sewer, M. P. Cotton, \$64,000; J. C. Kennedy, \$32,000; H. McDonald, \$53,232; Palmer Bros. & Henning, \$59,475; W. D. Grant, \$66,578.

Railroads, Bridges and Wharves

Calgary, Alta.

The proposed extensions to the street railway include several large concrete and steel bridges. Estimates passed provide for an expenditure of over \$250,000 for the whole.

Colchester, Ont.

Tenders are being called by the Public Works Department for extension to pier here. Plans, etc., at offices of H. J. Lamb, district engineer, London; J. G. Sing, district engineer, Toronto, and on application to local post-master.

Fort George, B.C.

A route map of the proposed line of railway from Edmonton to this place has been filed for approval with the authorities at Ottawa, as compiled by the Pine Pass Railway Company.

Headingley, Man.

There is a movement on foot to build a \$40,000 vehicle and passenger bridge from West Winnipeg over the Assiniboine river.

Laprairie, Que.

Work will shortly be commenced on improvements at this point, to include construction of new quay, estimated cost \$8,000; raising river road between St. Lambert and Laprairie, estimated cost \$30,000.

North Vancouver, B.C.

The City Council has decided to invest \$100,000 in the Second Narrows bridge.

Penticton, B.C.

A wharf will be built here, 900 feet long, at a cost of \$20,000.

St. Vincent de Paul, Que.

The residents of this community are petitioning the Dominion Government to construct a bridge across the Riviere de Prairie opposite this town.

Sydney, N.S.

The ratepayers will vote on the proposition to borrow \$10,000 for the installing of a subway at McQuarrie's crossing. James J. Curry, city clerk.

Toronto, Ont.

The G. T. R. have made preliminary arrangements for depression of tracks from Bathurst street to Sunnyside, which will entail, it is estimated, about \$500,000.

Victoria, B.C.

Plans for the bridge to span Fraser river at Pennys are now in preparation by the Government. Estimated expenditure, \$30,000.

Winnipeg, Man.

The city of Winnipeg is securing estimates on the cost of constructing a subway beneath the C. P. R. yards at Salter street. It was planned to reconstruct the overhead bridge at this point, but should the figures of the city engineer recommend the subway it will take the place of the

bridge. If constructed the tunnel would be almost half a mile in length.

AWARDED.

Kingston, Ont.

The Ontario Bridge Company was awarded the contract for rebuilding the Cataract bridge (110 feet), lowest tender.

Levis, Que.

The Department of Public Works, Ottawa, has accepted the tender of Mr. Horace Dussault for the construction of a wharf, \$283,064.

Ottawa, Ont.

The following contracts have been awarded by the Department of Public Works: Extension to Kingsport, N.S., pier, H. McAloney, Parrsboro, N.S.; wharf extension at Sault Ste. Marie, Ont., J. F. Boyd, Sault Ste. Marie, Ont.; wharf construction at Angers, Que., J. H. and R. H. Murphy; and wharf extension at Maria, Que., Peter Nadeau & Sons, Grand Caspédia, Que.

Public Buildings, Churches, Schools, etc.

Bladworth, Sask.

A new public school, costing \$8,500, is to be built.

Brantford, Ont.

It is announced that a new Children's Shelter will be erected. \$7,000 is now available.

Belleville, Ont.

The amount of \$41,342 was raised for erection of new Y. M. C. A. building, which was over the amount aimed at.

Beaverton, Ont.

Tenders will be received up to July 26 for the supplying and installing of a system of steam and hot air heating for a new town hall in Beaverton, Ont. L. J. Cameron, chairman of Building Committee. For further particulars see "Tenders and For Sale Department" of this issue.

Calgary, Alta.

The ratepayers on July 28th will vote on a bylaw to raise \$61,000 for exhibition buildings.

Chatham, Ont.

The Knights of Columbus will erect a hall here. Estimated expenditure, \$25,000.

Cloverdale, B.C.

Tenders addressed to C. N. Clow, architect, New Westminster, will be received until July 29th for erection of 4-room school. Plans, etc., at offices of the above mentioned, also at office of R. E. McBride, road superintendent, 39 Fairfield block, Vancouver, and at office of D. Haddon, this place.

Campbellton, N.B.

The following public buildings are reported to have been burned in the recent fire: Opera house, telegraph and telephone offices; Presbyterian and Baptist churches.

Edmonton, Alta.

Tenders were called until the 15th inst. for alterations and additions to City Hall; also for erection of fire hall on First street. Specifications at Builders' Exchange and at the office of architect James Henderson, 42 Jasper west.

Enfield, Ont.

Tenders are being called until August 8th for the erection of brick school house, S. S. No. 15, township of Darlington. Plans, etc., at Mr. A. Ormiston's. R. Pascoe, secretary.

Grand Valley, Ont.

Tenders addressed to M. G. Varcoe, chairman Public School Board, will be received until July 23rd for the work required in the additions and alterations to the school here. Plans, etc., at office of secretary-treasurer, W. McIntyre.

Guelph, Ont.

It is announced that the Ontario Government will erect a residence for the Agricultural College here.

Gretna, Man.

Over \$12,000 will be expended on the new public school, for which tenders have been called.

Grand Forks, B.C.

W. King, of Revelstoke, is preparing plans for the new provincial public buildings here and at Kaslo.

Humboldt, Sask.

The by-law for new fire hall and town hall, \$25,000, was defeated.

Hamilton, Ont.

The Library Board has accepted the plans of Mr. A. W. Peene for the new Carnegie library.

Halifax, N.S.

Architects all over Canada will be asked to send in designs for the Memorial Tower, donated by Sir Sandford Fleming, Ottawa, to be erected.

Langham, Sask.

An addition is to be built at once to the Flowery Dale School. O. E. Simonson, secretary.

Miniota, Man.

Tenders were taken to July 7 for erection of a Council Hall. Jas. Boyce, Miniota.

Moose Jaw, Sask.

Tenders for the isolation hospital were received ranging from \$14,786 inclusive down to \$11,350 exclusive of heating and plumbing.

Tenders addressed to W. F. Heal, city clerk, will be received until July 25th for erection of market building. Plans, etc., at office of W. Zimmerman, architect.

Mortlach, Sask.

Tenders were called until the 20th of July for erection of Church of England. A. Cooper, secretary, Building Committee.

Moncton, N.B.

R. A. Frechett, architect, is preparing plans for the following:—Roman Catholic churches at St. Bernard, Digby County, N.S., steel structure of slate, stone and granite base, almost 251 x 76 feet; at Neguvas, N.B., a stone building, 150 x 66 feet, with basement; at Socuminec, N.B., a stone building, 130 x 57 feet.

Magog, Que.

Tenders are being called until July 25th by Public Works Department for Armory fittings in public building here. Plans, etc., on application to Mr. Lacasse, caretaker public building here, or at the above Department.

Montreal, Que.

A project to remodel the main entrance of the City Hall is mooted.

Permit was issued to General Hospital, Dorchester street east, for building, \$435,000.

Plans for the new Y. M. C. A. buildings are nearing completion and tenders will shortly be called for the erection of a central Y. M. C. A., Drummond street, and

Extension to the Civic Library are being discussed at the present time.

also for those in Westmount and Fairmount. Messrs. Ross & McFarlane, architects.

Nelson, B.C.

Damage to the extent of about \$6,000 was done to the Government stock quarantine station on the 6th inst.

Nanaimo, B.C.

Ste. Anne's convent and residence of Rev. Father Heymen were destroyed by fire on the 12th inst. Total estimated loss, \$30,000.

New Westminster, B.C.

The congregation of the Sixth Avenue Methodist Church have decided to build at once. A lot has been secured on Sixth avenue. The total cost is estimated at \$10,000.

North Vancouver, B.C.

Tenders closed on the 18th July for erection of new school in North Lonedale. Plans, etc., at office of G. Campbell, secretary, or at office of Hope & Barker, architects, 603 Hastings street, Vancouver.

North Toronto, Ont.

The Public School Board appointed Mr. Forsey P. Page architect to prepare plans and specifications and to oversee the construction of the proposed new school at Bedford Park.

Ottawa, Ont.

Tenders were called until July 14th for electric light fittings for the Registry Office. Specifications at office of J. A. Ewart, architect, 193 Sparks street. J. Henderson, city clerk.

J. B. Lamb and W. A. Lamb have started a warehouse on Queen street to be occupied by the Dominion Analyst. It will cost about \$10,000. C. J. Meredith is architect. T. C. James has the masonry, and W. G. Adamson the carpentering work.

Phoenix, B.C.

We are informed that A. Wilkie is the architect in charge of the new school to be erected here. Noted in issue of July 6th.

Prince Albert, Sask.

The council are looking for a site for a new city hall, which will probably not be erected for some time.

Regina, Sask.

Fraser & Hutchinson, architects, have plans for a 4-room brick school.

Plans and sketches for a group of buildings to form the Methodist College at Regina are being prepared by Messrs. Brown & Vallance, Montreal, Que. This is the college project towards which the Massey Estate recently made a large contribution. It is expected that construction work on several of the buildings will be commenced next spring.

Stewart, B.C.

The Presbyterians will erect an institutional church here in the near future. Dr. Richards, chairman board of management; Mr. Vaughan, secretary.

St. Charles, Man.

A new municipal hall is to be erected. Frank Ness, secretary.

St. John, N.B.

The question regarding the erection of school on Weldon lot, for which authority was obtained to issue \$40,000 debentures, was referred to a building committee and architect with instructions to report after plans and specifications had been modified somewhat.

Tenders will be called shortly for steel ceiling in court house; also for painting and wiring the same. Councillor McGoldrick, chairman, building committee.

St. Lambert, Que.

It is expected that work will be commenced this season on the construction of new post office for St. Lambert.

Saskatoon, Sask.

Plans and specifications have been prepared and tenders are being received for the erection of Anglican College for University of Saskatchewan; and also for principal's residence in connection therewith. Brown & Vallance, architects, Montreal, Que.

Toronto, Ont.

Sufficient funds (\$7,000) has been raised for the construction of the Sunday school hall for the Chester Baptist church. Work will commence on the return of the pastor, Rev. Juson McIntosh, next month.

Permit was granted to the Reformed Presbyterian Church for new edifice on Bloor street east, near Sherbourne street, at a cost of \$12,000.

The time for receiving plans in the competition for designs for the new Government House has been extended to August 10.

Viridien, Man.

Tenders addressed to A. W. H. Smith, secretary-treasurer, will be received until July 26th for erection of collegiate. Plans, etc., with V. W. Horwood, architect, Winnipeg.

Vancouver, B.C.

A 10-storey building is planned by the Salvation Army in this city. Colonel Turner of Toronto has charge of the financial arrangements.

Victoria, B.C.

The women's auxiliary of Jubilee Hospital recommend strongly the remodelling of the hospital. Secretary-treasurer, Mrs. Hasell.

The school board will appeal to the ratepayers in a short time for the sum of \$45,000 for school purposes, which will be expended as follows: \$20,000 on the necessary extension of the Victoria West school; \$20,000 for the erection of a school on the Bank street site purchased last year, and \$5,000 for additions to the Kingston street school.

Tentative plans have been prepared for the new isolation hospital, and the by-law providing for the expenditure will be submitted to the ratepayers at the earliest possible date.

Tenders for heating office annex, Parliament buildings, will be received until July 21st. F. C. Gamble, public works engineer.

All Souls' Unitarian Church have secured a building site corner Buell and Furby streets.

Winnipeg, Man.

Plans are being prepared for an addition to St. Alban's Anglican Church.

The Icelandic Lutheran Synod are considering the erection of a church school or academy.

The Trades and Labor Council have plans for a new labor temple.

The Evangelical German Lutheran congregation of Ohio at its recent meeting of Synod advocated a college being erected in Saskatchewan.

Tenders are being called for by J. H. G. Russell, for the construction of a children's hospital on north Main street.

The city of Winnipeg will call for tenders after the 18th inst. for construction of two police sub-stations, to be identical in construction; two storeys and basement; of solid brick construction. Building Inspector Rodgers has the specifications. The

police patrol and signal station, addition to the present police station, will also be tendered upon within a week. This building will be either three or four storeys in height, but the dimensions are not definitely settled.

AWARDED.

Belleville, Ont.

Messrs. Thompson Bros. of this city were awarded the contract for addition and improvements to hospital at \$28,000.

Canning, N.S.

We are informed that contract for construction of the Baptist church building has been given to A. W. Allin & Sons, of Middleton, N.S., for \$6,400. This does not include foundation, plumbing, seating, heating and lighting. The structure complete will cost \$8,000.

Fort William, Ont.

The contract to install drinking fountains in the Central, Franklin, Isabella and Francis schools was let to the Superior Heating & Plumbing Company. The contract was awarded to A. W. Churcher for painting and kalsomining the several schools; to Alex. Cameron for plumbing in the Central School.

Montreal, Que.

The general contract for additions to the Church of Ascension, Park avenue, has been awarded to Messrs. Sparrow & McNeil. Mr. H. C. Stone, architect.

The general contract for the erection of a school building on Latourne street, Maisonneuve, for the Board of Catholic School Commissioners, have been awarded to Jos. Trudel, steel contract awarded to Phoenix Bridge Company.

The Council of Montreal West have awarded the general contract of new town hall building to Messrs. Reid, McGregor & Reid. Sub-contracts have been awarded as follows: carpentering, D. F. Deslauriers; roofing, G. W. Reed & Company; plumbing and heating, Dominion Camp Equipment Company; lathing and plastering, R. D. Clark & Son; artificial stone work, T. A. Morrison & Company, representing Roman Stone Company; steel work, Structural Steel Company. Architects, Messrs. Peden & McLaren.

Contracts have been awarded as follows in connection with the erection of the First Presbyterian Church: Tiling, J. H. Ward; steel work, Structural Steel Company; concrete work, Church, Ross & Company; roofing, Richardson, Simard & Company; carpentering, D. M. Long; plastering, R. G. Hamilton; painting and glazing, W. E. Potter; electric wiring, Collyer & Brock; plumbing and heating, Alex. MacKay. Architects, Messrs. Peden & McLaren.

North Battleford, Sask.

T. J. Brocklebank, of Melville, Sask., got the contract for the new school at \$13,700. The Alberta Construction Company's figure was \$14,440, and P. D. Laird & Son's, \$15,300.

Owen Sound, Ont.

The contract for the brick, stone, concrete work and excavation in connection with annex to General Hospital has been awarded to Messrs. Middlebro & Cruickshank, the carpentry to A. Greene. Estimated cost, \$30,000.

Ottawa, Ont.

The contracts have been awarded for the Bell Street Methodist Church. George Crain gets the masonry and brick work; McCreddie & Company, the carpentering. Estimated cost, about \$25,000. Mr. J. P. McLaren is architect.

The alterations in the Water street hos-

pital contract has been awarded to Joseph Photo Company, Montreal. W. E. Noffke is architect. The alterations will cost \$12,465.

Rosthern, Sask.

Henry Wegener secured the contract to erect the new frame school house at Laird, Sask.

Stewart, B.C.

Mr. James Cummins has secured the contract for the building of the \$4,000 court house and government office building.

Toronto, Ont.

Tenders for the new fire hall to be erected on Main street were awarded as follows: Masonry, Page & Company, \$14,195; carpentering, M. Hutchinson, \$6,380; heating, W. Schulkins, \$1,300; plumbing, J. E. Gray, \$745; electric wiring, W. J. McGuire, \$330; roofing, Reggin & Spence, \$668; plastering, A. Petrie & Company, \$1,110; painting and glazing, John Faircloth, \$560; total, \$25,238.

The contracts for the new central lighting and heating plant for the University of Toronto have been awarded as follows: L. K. Comstock, New York, were given the erection of power house and building of tunnels, and supplying of some of the machinery; contract for boiler was awarded to Babcock & Wilcox, Glasgow; W. J. McGuire, Toronto, was given the contract for heating mains. Darling & Pearson, architects.

Waskada, Man.

We are informed that the contract for municipal building was awarded to D. McLean, contractor, Waskada, at \$2,614. S. Robinson, Waskada, tendered at \$2,700.

Woodstock, Ont.

Contract for heating and ventilating the two new schools has been awarded to Mr. E. S. Coppins at the following prices:—For Princess (Beale St.) School, \$2,163, plus \$385 for the fan and motor, and for Victoria (Delatre St.) \$1,857, plus \$350 for fan, totalling \$4,755.

Winnipeg, Man.

Board of Education awarded contracts as follows: The work of renovating the plumbing of Balaclava street school, James Williams, for \$412; the figures of other tenderers were: E. B. Dixon, \$582; Hamilton & Stott, \$425; C. Bull, \$454, and Ingram & Davey, \$418. The successful tenderers for the work at Manitoba street school were as follows: Masonry work, George A. Ponsford; carpenter work, A. Morris, \$3.90; plumbing, J. Williams, \$295. There were several tenderers for the plumbing, these being: E. B. Dixon, \$416; Hamilton & Stott, \$375; C. Bull, \$341.12; Ingram & Davey, \$545. Architect Darach.

J. H. G. Russell has awarded the contract for excavation for new Westminster Church, corner Maryland and Buell streets, to G. H. Vincent. The total cost of the church and school will be near \$150,000. Local stone will be used.

Business Buildings and Industrial Plants

Borden, Sask.

The Board of Trade are asking the Northern Crown Bank to build at once or they will secure another bank for the town. An elevator is also needed.

Brandon, Man.

McCabe & Company's elevator at Beverly, 30 miles south of here on the Great Northern, was completely destroyed by fire

on Saturday night. The loss is about \$25,000.

Tenders will be called for next Wednesday for the construction of the Canadian Northern Railway's new combined depot and hotel at Brandon. Ralph Pratt, of Pratt & Ross, Winnipeg, is the architect.

Campbellton, N.B.

In the recent fire here the following companies are reported to have lost as follows: The Shives Company, \$100,000; McLennan Foundry Company, \$30,000; total Intercolonial Railway loss, about \$100,000; Richards shingle mill, \$30,000; Harquail Woodworking Company, \$40,000.

Paul Lea Company, Limited, of Moncton, N.B., who own a large woodworking factory there, intend erecting a branch warehouse at Campbellton, N.B., to meet the demand which will be occasioned by the recent fire.

Chatham, N.B.

The plant of the Miramichi Pulp & Paper Company was damaged to the extent of about \$3,000 on the 12th inst.

Carlstadt, Alta.

The Union Bank will have a 2-storey building erected here at once.

Calgary, Alta.

It is stated that work will be commenced on the combined depot and hotel of the C. N. E. within the next fifty days.

Tenders are called until July 21st for erection of 6-storey brick and reinforced concrete hotel. Burroughs & Richards, architects, Crown Building.

The Alberta Pacific Elevator Company will build nine more elevators in Alberta at once. A. A. Smith is building superintendent.

Fort William, Ont.

Tenders for heating and plumbing will be received until July 22nd, Enzer block; also Frodsam block. Hood & Scott, architects.

Harcourt, N.B.

On the 9th inst. the factory at Mortimore, belonging to the Miller Tanning & Extract Company, was completely destroyed by fire. Estimated loss, \$20,000.

Hamilton, Ont.

The Oliver Chilled Plough Company is asking for tenders for the following: forge building, 514 x 100 feet; machine shop, 200 x 70 feet; dock, 800 x 100 feet.

Kamloops, B.C.

Fire destroyed the warehouse of S. C. Allan, and other buildings. Total estimated loss, \$75,000.

London, Ont.

Wilson & Son, architects, Chatham, Ont., are preparing plans for the new Watt threshing machine factory, 300 feet in circumference. Drawings have also been prepared by the same architects for a suite of offices for the Sydenham Glass Company, of Wallaceburg.

Lachine, Que.

The construction of a factory for the manufacture of illuminating gas is under way. Messrs. D. A. Decary, K.C., and Alderman LePailleur are interested. \$30,000 are to be expended.

The Canadian Railway Signal Company, Limited, is erecting an extensive factory corner of Broadway and Twentieth avenue, and will occupy a lot 250 x 60 feet. A substantial building of reinforced concrete will be put up, and with the plant it is expected over \$100,000 will be invested.

Lakefield, Ont.

The grain warehouse and coal sheds of

Charlton Bros. were destroyed by fire on the 17th inst. The loss is \$10,000. The building was owned by the Dixon Company, of Peterboro.

Laprairie, Que.

The St. Lawrence Brick Company, capitalized at \$300,000, are preparing to commence operations in this town. Kilns will shortly be constructed and machinery installed.

Mahone Bay, N.S.

Dumaresq & Cobb, architects, Halifax, are preparing plans for a new building for the Bank of Montreal here.

Moose Jaw, Sask.

Gordon Ironsides Company, it is stated, will have larger plant than at first planned; \$100,000 to be spent in buildings this year.

Moncton, N.B.

Mr. Whelpley, of Greenwich, Kings County, has consulted with the council as to the location of a skate factory here. Ald. W. G. Jones, chairman Industrial and Advertising Committee.

Montreal, Que.

Tenders will be received until July 23rd for the erection of a store building for Mr. Jno. Allan. Messrs. Ross & McFarlane, architects.

Permits were issued to C. P. B. Company for additions to Place Viger Hotel, to cost \$200,000; also for new Windsor station, \$1,250,000; also to Dominion Express Company, office building, \$600,000.

Tenders will be received until Saturday, July 23rd for the general construction of the Windsor street station. W. S. Painter, architect.

Tenders will be received until Monday, July 25th, for the construction of an extensive 1-storey car shop building for the Montreal Street Railway Company. Messrs. Marchand & Haskell, architects.

Mr. Carl Rosenberg has purchased the premises at the southwest corner of St. Lawrence boulevard and Ontario street with a total frontage of 180 feet. It is stated that a new six storey office and commercial building will be erected on this property.

Fire completely destroyed the Victoria-ville chair factory on the 16th inst. The loss was \$30,000.

Nelson, B.C.

The Kreyescher shingle mill, and Kootenay engineering plant were destroyed by fire on the 6th inst. Losses respectively, \$5,000 and \$20,000.

Owen Sound, Ont.

Fire did damage to the extent of about \$10,000 to the factories of the Keenan Woodenware Company here.

A million dollar drydock, shipbuilding and repairing plant for Owen Sound is a proposition on which in August the ratepayers are to be asked to vote fifty thousand dollars bonus and fifty thousand dollars investment in stock towards the shipbuilding plant. Mentioned in our issue of June 1st.

Ottawa, Ont.

Permit has been issued for the new factory for the Continental Bag & Paper Company. The building will be of solid brick, two storeys high, and will be 121 by 82 feet. Cost, \$30,000.

A. H. Caplan & Company, Limited, have decided to establish a 3-storey rabbit metal and solder foundry on Queen street, together with a smelting and refining plant. Cement blocks will be used. Work will start at once.

Portage la Prairie, Man.

The Bank of Commerce are considering an addition to their building.

Port Arthur, Ont.

F. S. Wiley, manager of Tudhope & Lindsay, says the new wagon works will be erected at once.

Prince Albert, Sask.

Architect Albrechtson has completed plans for Pollock's new three-storey block.

Among the proposed new business blocks are one for T. E. Baker, one for Contractor Ittner, and another for Wm. Knox. T. D. Agnew and J. H. Pollock also contemplate building.

Regina, Sask.

The Imperial Oil Company is to have a \$12,000 extension made to their warehouse.

The Farmer's Co-Operative Company, Limited, have purchased four lots on which to erect a warehouse. W. J. Traynor, of Davidson, Sask., is manager and secretary.

The re-organized Sawyer & Massey Company, manufacturers of engines and threshers, at Hamilton, Ont., and capitalized at \$7,000,000, have decided to establish their provincial headquarters here. G. Kirkland, manager. R. Harmer, president.

Saskatoon, Sask.

Brown & Brown, Montreal, are the architects for the \$70,000 addition to J. F. Cairns' store here.

St. Thomas, Ont.

Architect N. R. Darrach has prepared plans for the additions and alterations to the Red Foundry (extension to Norseworthy Company's foundry). The plans provide for the erection of a brick building, 60 x 110 feet.

St. Catharines, Ont.

An additional 2-storey brick building, 92 x 115 feet, will be built to the Reo Motor Car Company's factory at once. J. H. Thompson, Lansing, Mich., secretary-treasurer; J. P. Fillingham, local manager.

Toronto, Ont.

It is understood that a large warehouse will be erected at 50 Richmond street, recently sold by Goulding & Hamilton.

Vancouver, B.C.

Messrs. Parke & McDonald will build on their property on Pender street adjoining the site of the 4-storey building to be erected by Hon. F. Carter-Cotton. Mr. E. K. Silver, owner of the property adjoining McLennan & Campbell block, has plans for a 4-storey building.

Permits were issued recently for warehouses to Gray Bros. for a three-storey block corner of Homer and Davie, \$56,000; and to W. R. Arnold, for four storey structure of the reinforced concrete type on Homer street, \$48,000.

Winnipeg, Man.

A company is being formed to erect a summer hotel at the G. T. P. crossing of the Winnipeg river.

Tenders are wanted for all trades (except heating) for erection of business block on Pacific avenue for R. & J. Johnston. F. R. Evans, architect.

The site corner of Main and Rupert is to be cleared and five stores pulled down for McLaren Bros.' new hotel. Noted in issue of June 8.

Permit was issued during the week to Wilson Stationery Company, printing house, Gertie street, between McDermott and Notre Dame, \$35,000.

Tenders addressed to the Engineering Department, Manitoba Elevator Commis-

sion, will be received until July 23rd for supply of following materials: gasoline engines, dump scale, bushel hopper scale, etc.

AWARDED.**Brandon, Man.**

Wm. Bell was awarded the contract for the erection of the warehouse for Cock-shutt Plow Company, of which J. O. B. Inkster is local manager. Estimated cost, \$25,000.

Fort William, Ont.

The G. T. P. have awarded to Carter-Halls-Aldinger Company, of Winnipeg, the contract for their roundhouse and machine shops on the Mission. The buildings will cost about \$100,000.

Holden, Alta.

The Prairie Lumber Company secured the contract to build a new elevator here.

Ottawa, Ont.

The excavation is nearly completed for the new Hope building, which will be nine storeys high and cost about \$100,000. Mr. W. E. Noffke is the architect. Holbrook & Sutherland have the contract for the masonry, brick and fireproof work, Alex. Christie the carpentering, and Charles Hunt the plastering. Otis-Fensom Elevator Company has the contract for the elevator.

Suffield, Alta.

W. White has been awarded contract to build a 35-room hotel here.

Vancouver, B.C.

British Columbia Telephone Company has awarded the contract for a central exchange building in North Vancouver to McDonald & Wilson. Pressed brick and stone will be used on the frontage.

The contract for the construction of a five storey warehouse for Joseph Brown on Princess street, has been let in two sections to A. Gray and W. J. Davidson.

F. R. Evans, architect, has awarded the contract for the construction of a warehouse and sample rooms on Pacific avenue to A. J. Bonnett, of Winnipeg, at \$27,000. This building will be two storeys in height.

Residences**Halifax, N.S.**

Dumaresq & Cobb, architects, are preparing plans for residence Towel Road for Mr. A. L. Melvin.

Hamilton, Ont.

Permits were issued to Sam Easter, brick dwelling, Fairleigh avenue, for Fred Elems, \$2,500; W. H. Northeott, brick dwelling, Orchard Hill, \$2,500.

Moncton, N.B.

W. C. Barnes, architect, is preparing plans and specifications for a two and a half storey residence for Dr. F. A. Taylor.

Montreal, Que.

Tenders have been received for the erection of a residence on Cedar avenue for Mr. A. McFarlane. Messrs. Saxe & Archibald, architects.

North Battleford, Sask.

The Roman Catholic Church will have a rectory built at once. Rev. J. Paille is in charge.

New Westminster, B.C.

Arrangements are being perfected by Dr. A. D. Buchanan for the erection of a modern apartment house at the corner of Tenth street and Queens avenue, to cost about \$50,000.

Ottawa, Ont.

Weeks & Keefer, architects, are calling for tenders for a residence on Carling avenue for Dr. J. E. Taggart. Estimated cost, \$10,000.

Sydney, N.S.

Building Contractor F. L. Dixon has a permit for the construction of a residence for Mr. Geo. J. Ross on Whitney avenue, to cost \$5,000.

Victoria, B.C.

Building permits have been issued to S. E. Matthews for a dwelling on Pendergast street, \$2,500; to the Victoria waterworks department for a caretaker's dwelling at the Smith's Hill reservoir, \$2,500; S. Millington, dwelling, Linden avenue, \$3,000; T. A. Johnston, dwelling, Richardson street, \$4,000; L. S. V. York, dwelling, Cook street, \$3,000.

Winnipeg, Man.

Recent building permits include: J. A. Machray, house, southeast corner of Nassau and River avenue, \$12,000; the Hall Company, Limited, three houses, east side of Arlington street, between Ellice and Sargent, \$10,000; H. McKinney, two houses north side of Machray, opposite Sinclair, \$3,200; F. Weichen, house, north side of St. John's, between Powers and Andrews, \$2,600; J. A. McDiarmid, house, north side of McMillan, \$3,500; A. Macaw, house, south side of Grosvenor, \$5,000.

AWARDED.**Dauphin, Man.**

Hafenbrak & Steen secured the contract to erect a fine residence for Adam Justice.

Halifax, N.S.

Dumaresq & Cobb, architects, have awarded the contract for Mr. R. Forrester Macintosh's new residence, Pleasant street, to S. M. Brookfield, Limited.

Montreal, Que.

General contract for the erection of two houses on Ontario avenue for G. A. Grier, Esq., has been awarded to John Stewart & Company, general contractors, 153 Hillside avenue, Westmount. Architects, G. Kenneth Rea, 54a Beaver Hall Hill.

Contract for the plumbing and heating of two houses on Drummond street for the Natural History Society has been awarded to John A. Gordon, 301 St. Antoine street. Architects, Hogle & Davis, 80 St. Francois Xavier street.

Contracts have been awarded as follows for the erection of a residence at Lachine for Robert Lucas: Masonry and brick work, John Wighton; carpentering, J. B. Pauze & Son. Mr. H. C. Stone, architect.

Contract for alterations and additions to residence of H. S. Holt, Stanley street, has been awarded to Chas. Thackery & Company. Mr. H. C. Stone, architect.

Ottawa, Ont.

N. D. Porter is making extensive changes to the Burlridge residence, James Robertson has contract for masonry, R. Holmes for carpentering work.

The residence of Russell Blackburn, corner of Lisgar and Cartier street is being entirely renovated. Smith Brothers have the contract. Joseph S. Irwin's residence, corner of Cartier and MacLaren, is also being altered. Mr. Alex. Christie has the carpentering work and T. C. James the masonry. W. E. Noffke is architect for both houses.

Victoria, B.C.

Contract for the construction of a \$14,000 residence on St. Charles street for Mr. Justice Galliber has been awarded Nelson-Benneck & Sons by P. L. James, the architect.

Tenders and For Sale Department

Tenders for Pavement

Sealed tenders will be received by the Town Engineer of the Town of Collingwood until noon, on SATURDAY, JULY 30TH, 1910, for approximately 3,636 square yards of Street Paving. Tenders will be received for either Brick or Bituminous Paving on a concrete base. All tenders must be accompanied by an accepted cheque for 2 per cent. of the amount of the tender.

Plans and specifications can be seen at the office of the undersigned. Lowest or any tender not necessarily accepted.

K. S. MACDONELL,
Town Engineer.

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Tenders Wanted

Sealed tenders will be received by the undersigned up to 1 o'clock p.m. on WEDNESDAY, JULY 27th, 1910, for the construction of a drain in the Township of Minto, known as Municipal Drain No. 8.

The work consists of the excavation of a new drain in places and the deepening and widening of a drain or ditch already constructed, and deepening and straightening of a creek or watercourse, in all 35,000 feet in length. The work is divided into three sections and tenders will be received for one or all the sections.

Plans and specifications may be seen at the office of the undersigned, and forms of tender may be had on application.

W. D. McLELLAN,
Clerk of Minto,
Harriston, P. O.

29



Department of Railways and Canals, Canada

Hudson Bay Railway

Saskatchewan Bridge

Notice to Contractors

Sealed tenders, addressed to the undersigned, and endorsed "Tender for substructure of Le Pas Bridge," will be received until 16 o'clock on MONDAY, JULY 25, 1910.

Plans, specifications and form of contract to be entered into, can be seen on and after this date, at office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Chief Engineer, Hudson Bay Railway, at Winnipeg, Man., at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labour, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of \$10,000.00 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheques thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, July 2, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

29

Tenders for

Pumping Engine

Tenders will be received by the undersigned up to AUGUST 1ST, NEXT, for a Compound Duplex Pumping Engine, capable of pumping two million imperial gallons per day, against a head of 125 pounds per square inch. A second-hand pump will also be considered.

For further information apply to

H. HYMMEN,
Superintendent Berlin Waterworks.

Berlin, Ont., July 18th, 1910.

30

Town of Beaverton

Province of Ontario

Sealed tenders addressed to the undersigned will be received up till 12 o'clock noon, JULY 26TH, for the supplying and installing of a System of Steam and Hot Air Heating for a new Town Hall in the Village of Beaverton; also sealed tenders addressed to the undersigned will be received up till 12 o'clock noon of AUGUST 10TH for the Electric Wiring of the above Town Hall.

Specifications for the above and forms of tender can be seen at the offices of W. Fletcher Sheppard and J. Harvey Self, Associated Architects, 486 Yonge street, Toronto, or John McArthur, Town Hall, Beaverton.

Firms tendering for the above heating will be given an opportunity of explaining their system before the committee on the evening of July 26th.

A marked cheque for \$50 payable to the order of L. J. Cameron must accompany each tender, and will be retained as security for immediate execution of a construction contract and satisfactory guarantee bond.

Deposit cheque of tenderers will be returned if unsuccessful, or if successful, on execution of construction contract and guarantee bond.

The lowest or any tender not necessarily accepted.

L. J. CAMERON,
Chairman Building Committee.

Beaverton, Ont., July 12th, 1910.

29

City of Winnipeg Electrical Distribution System

Tenders for

Underground Cable

Sealed tenders on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope "City of Winnipeg Electrical Distribution System, Tender for Cable," will be received at the office of the undersigned up to noon on THURSDAY, SEPTEMBER 1ST, 1910, for the manufacture, delivery and installation, 46,000 feet of thirteen thousand volt, three-core cable.

Copies of the specifications and form of tender may be obtained at the Power Engineer's Office, Carnegie Library Building, Winnipeg.

These specifications may also be examined at the offices of Messrs. Smith, Kerry and Chace, Confederation Life Building, Toronto, Ontario.

Each tender must be accompanied by a certified cheque for one thousand dollars, which cheque will become forfeit to the corporation in the event of the successful tenderer refusing or neglecting to sign a satisfactory contract when called upon so to do.

The city reserves the right to reject any or all tenders or to accept any bid which shall appear advantageous.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, July 15th, 1910.

31

FOR SALE

Kelly Steam Pump Horizontal Cross Compound, in good condition, capacity 2,000,000 imperial gallons, must be removed to make room for electric equipment. Inquire the Water Commissioners, London, Ontario.

31

TO CONTRACTORS

Sealed bids will be received by the undersigned up to noon, FRIDAY, JULY 29TH, for all trades required in the erection of a residence in Whitney avenue, Rosedale.

The lowest or any tender not necessarily accepted.

F. S. BAKER, Architect,
Traders Bank Building, Toronto.

30

Tenders

For Steel Bridges and Concrete Abutments

Tenders will be received by the undersigned up to twelve o'clock noon, WEDNESDAY, JULY 27TH, 1910, for the construction of a Steel Superstructure, 55 feet clear span, and Concrete Abutments for a Bridge over the Black River between the Counties of York and Ontario, Lot 31, East Gwillinbury.

Plans and specifications may be seen and all necessary information may be obtained at the offices of the undersigned, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

BARBER & YOUNG,
Engineers.

Toronto, July 18th, 1910.

29



Sheet Piling on the Diversion of the Don River

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on TUESDAY, JULY 26TH, 1910, for the construction of sheet piling on the west bank of the River Don from the south line of the Grand Trunk Railway bridge southerly for a distance of 283 feet across the present river.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties the bond of a guarantee company approved of as aforesaid.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.

City Hall, Toronto, July 12, 1910.

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Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 inch x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail.—WM. LESSLIE, Walkerville, Ont. TF

Positions Wanted

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra

ARCHITECT'S ASSISTANT (80) desires permanent engagement in Western Canada or B.C.; 14 years' sound English and Canadian experience. Excellent testimonials. Member Society of Architects. L. L. Pearson, 370 Aikins street, Winnipeg, Man. 29

**Power Plants, Electricity and
Telephones****Blyth, Ont.**

Tenders for line materials and erection of telephone lines for the Blyth Telephone System will be called shortly. Full information can be secured from the secretary, Mr. A. Elder, this place.

Calgary, Alta.

The new branch of the street railway, for which estimates have been passed by the commissioners, will cost over \$250,000.

The ratepayers will vote on a by-law on July 20th to raise \$125,000 for the purpose of constructing, erecting and equipping a municipal electric power plant.

Moose Jaw, Sask.

John Bocrae, consulting engineer, and Hector A. Dion, assistant engineer, Ottawa, Ont., will supervise the construction of the new electric street railway now being built. Noted previously.

Nanaimo, B.C.

The Dominion Stock & Bond Corporation, Vancouver, have offered to construct and operate a suburban street car line, the city guaranteeing the interest on the bonds. Invested capital about \$400,000. G. H. Salmon, manager.

Seaforth, Ont.

The ratepayers on August 8 will vote on Hydro-Electric by-law for \$25,000, to cover cost of power plant, and equipment for street and general lighting.

Stratford, Ont.

The Council of Waterloo Township has decided to submit to the ratepayers a by-law to take a \$10,000 block of stock in the People's Railway Company on August 8th.

Victoria, B.C.

The by-law calling for the expenditure of some \$75,000, to allow of the B. C. Electric Railway Company laying its wires underground, will shortly be submitted to the ratepayers.

Tenders for the cluster light standards and lights will be called for.

Winnipeg, Man.

Tenders addressed to the Chairman of Board of Control will be received until September 1st for the manufacture, delivery and installation of 46,000 feet of 13,000 volt, three-core cable. Copies of specifications obtained at the power engineer's office, this city, and also at offices of Messrs. Smith, Kerry & Chace, Toronto. M. Peterson, secretary.

AWARDED.**Brandon, Man.**

The Brandon Electric Light Company let the contract for the laying of the mains

for the big plant which is to furnish steam heating to the business portion of Brandon from the central station to A. E. Bullock.

London, Ont.

A contract was let for the laying of 90 miles of 12-inch gas pipes from Raleigh township near Rondeau to this city.

Toronto, Ont.

The contract for supply of aluminium wire per pound was awarded to Messrs. Parke & Leith, Toronto, at 22 cents per pound.

Vancouver, B.C.

The contract for installation of the ornamental lighting system on Granville street has been awarded to the Electrical Construction Company.

Miscellaneous**Montreal, Que.**

Recent building permits include:—A. Beaulieu, 607 Montana street, three houses containing eighteen dwellings, \$9,000; C. Desjardins, 163 Laurier avenue, one house containing three dwellings, \$3,000; Jos. Lauzon, 55 Duford street, one house containing six dwellings, \$3,200; V. Harnois, one house containing two dwellings, \$2,500; C. E. Lamoureux, 171 Marquette, one house containing six dwellings, \$5,000; S. H. Ewing, 100 Côte des Neiges street, two houses containing two dwellings, \$12,000; J. A. Grier, factory building, Papineau avenue, factory, \$15,000; A. Giguere, 427 Charlevoix, one house containing two dwellings and one store, \$3,000; J. Wolfe, 894 Nicolet, one house containing two dwellings, \$4,000; Mrs. Cousineaux, 217 Hotel de Ville, two houses containing six dwellings, \$3,500; F. Pare, one house containing three dwellings, \$3,000; H. Lacroix, 211 Nicolet, three houses containing eight dwellings, \$10,000.

Ottawa, Ont.

Tenders addressed to Board of Control will be received until July 26th for five fire alarm boxes of standard type, etc. J. Henderson, City Clerk.

Among the building permits issued during the past few days are: Victor Hall, warehouse, Wellington street, \$3,000; A. M. McDiarmid, Melgund avenue, dwelling, \$2,500; Mrs. C. Smith, dwelling on Center street, \$2,000; Taylor & Lackey, Powell avenue, dwelling, \$4,500; R. J. Devlin, store, Sparks street, \$2,000; T. C. Glendennen, dwelling, First avenue, Geo. Ear-now builder, \$5,000; William Coots, Sweetland avenue, dwelling, \$3,000; A. M. Mathe, cement dwelling, Church street, \$2,700; W. J. Mills, factory, Slater street, Geo. Crain and J. and C. Low builders, \$4,300; F. W. Forde, shops, Rideau street, Alex. Christie builder, \$5,000; Jos. A. Acton, Second avenue, dwelling, \$3,000; R. E. McKinstry, builder; Ottawa Electric Company, transformer station and stables, Slater street, J. A. Ewart, architect, T. C. James and Thos. Shore builders, \$18,000.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until July 26th for construction of sheet piling on the west bank of River Don, etc. Specifications at office of City Engineer.

Vancouver, B.C.

Permits granted recently are as follows: W. S. Hugo, 980 Dunsmuir street, \$12,750; D. McKenzie, 1154 Burnaby street, \$3,500; W. D. Ritchie, 2161 Sixth avenue west, \$2,850; H. P. Newman, 1943 Keefer street, \$3,000; H. O. Hatt & Company, 2737 St.

Catherine street, three houses, \$7,500; D. S. McDonald, 2225 Second avenue west, \$6,000; A. F. McKinnon, 116 Fourteenth avenue west, two houses, \$5,000.

AWARDED.**Welland, Ont.**

J. W. Russell, of Toronto, has been awarded the contract for slightly widening the Welland canal at Welland, at \$12,000.

New Companies

Canada Machinery Corporation, Toronto, Ont., Limited, capital of \$3,000,000. The incorporators are: Harry Riley, law clerk; Joseph Edward Riley, accountant; Edward Gordon McMillan, law student; William Hamilton Walter, bookkeeper, and Thomas Wallace Lawson, solicitor, all of Toronto. The company proposes to make machinery, tools, etc.

Chillas, Black, Limited, Toronto, Ont., capital, \$40,000, incorporated to deal in building supplies and fittings, etc. Incorporators: H. R. Chillas, S. W. Black, both of Toronto.

The Mechanical Equipment Company of Canada, Limited, Montreal, Que., capital \$50,000, incorporated to carry on the business of mechanical engineers, boiler makers, etc. Incorporators, Stephen Davis, M.D., and Jos. Presner, civil engineer, both of Montreal, Que.

Business Notes

Buffalo Wire Goods Company, St. Paul, Que., J. McD. Hains, curator.

Dunbar Lumber Company, Limited, Elk Lake, Ontario, are stated to have assigned.

Strong and Murphy, Lumber merchants, Belle River, Ont., have sustained loss by fire.

F. J. Snider, saw mill proprietors, Bruce Mines, Ont., are stated to have assigned to A. Grigg.

La Compagnie de Telephone de Ste. Philomene de Fortierville, Que., have registered.

Frigon and Brien, painters, Montreal, Que., Joseph Frigon and Adrien Brien, registered.

In the Canada Gazette appears a notice of the incorporation at Montreal of the Canadian Development Company, with a capital of a million dollars. It is incorporated through Arnold Wainwright, advocate, to acquire and operate timber limits, mines, waterpowers, and real estate.

The British Columbia Gazette gives notice of the incorporation of the following companies: Princeton Waterworks Company, Limited, capital \$25,000; The Bull River Electric Power Company, Limited, capital \$2,000,000; Barkley Sound Power Company, Limited, capital \$10,000; Prince Rupert Sheet Metal Works, Limited, capital \$10,000; Bruce and Sweatman, Limited, incorporated to conduct and carry on a general engineering, contracting and construction business, etc., capital \$20,000; The Pacific Coast Construction Company, Limited, capital \$100,000; Imperial Power Company, Limited, capital \$10,000; Newport Timber Company, Limited, capital \$400,000; British Columbia Log Brokerage Company, capital \$100,000; Cranbrook Sash and Door Factory, capital \$100,000; Moose Jaw Electric Railway Company, Limited, capital \$400,000; The Tulameen Power Company, Limited, capital \$10,000; Portland Canal Lumber Company, Limited, capital \$50,000; Western Construction Company, Limited, capital \$25,000.

The Patching of Macadamized Roads with a Special Type of Roller

The author has pleasure in submitting to the conference a few remarks on the system he has adopted for the repair of macadamized roads. He has long been of opinion that the systematic repair of roads by patching does not receive the attention its importance demands, and simple as the operation is, and notwithstanding its economy, it is not generally carried out in a scientific manner. It will probably not be denied that the patching of a road is desirable, although there may be a difference of opinion as to the extent to which the practice should be carried out. Some authorities appear to be satisfied with repairing holes, which become a source of danger, while others attempt patching by filling up the inequalities with loose material, leaving the traffic to either consolidate it or scatter it about, according to the state of the weather and the condition of the roads. The author's contention is that the patching of a road should commence immediately it begins to show any appreciable signs of wear, and that it should be regularly and systematically continued up to about the time when it becomes necessary to remacadamize the surface. The result of such a practice is, undoubtedly, not only to maintain a better surface, but to lengthen the periods for re-coating, and consequently, to reduce the cost of maintenance.

Adds 20 per cent. to Life of Road

The author's experience is that systematic patching generally adds something like 20 per cent. additional life to a road. For instance, a road on which patching is not properly carried out, and which usually requires re-coating once in five years, will, under the same conditions of traffic and with systematic patching, last at least six years.

The author believes that the main reason why the patching of roads is neglected is, that it is generally found impracticable with the plant available. It was certainly so in his case. He had charge of about 60 miles of macadamized town roads, for which two ordinary 10-ton steam rollers were provided. These rollers were usually employed on re-surfacing, and occasionally upon patching. But proper patching was found to be impracticable, especially during the summer months. Frequently, when it was most needed, the rollers were urgently required for other work; and when they could be spared they were found too unwieldy to properly carry out the repairs. Moreover, it was necessary that a roller should be accompanied by a water van and a horse and cart, and this was costly and inconvenient.

The author came to the conclusion that what was required was a special roller to be used almost entirely for patching purposes. Such a roller, it was thought, should be as capable of rolling in a patch and leaving it quite uniform with the adjoining surface. It should be small and compact in order to be as little conspicuous in the streets as possible. It should be capable of being quickly and easily reversed, in order that small patches could be consolidated quickly. It should be heavy enough to carry out any work which could be generally done by a 10-ton roller, and at the same time should be capable of being lightened for working on roads, where a heavy roller would be a disadvantage. It should carry at least 200 gallons of water in order to avoid the necessity of a water cart.

A Satisfactory Type of Roller

All these conditions are embodied in the roller which the author now uses for patching purposes. It is about 12 feet long and 5 feet 6 inches wide over all. The rolling wheel is 3 feet wide, and can be weighted from about 5 tons to 9 tons, according to the work it is required to do. The driver and two men are employed with the roller, and they are kept

almost exclusively engaged on patching. They leave the depot each morning with about three tons of road metal and binding material, and when this is exhausted the roller travels back for a further quantity. It is surprising to find how small a quantity of stone is required to maintain an even surface to a road if the repairs are not neglected. The best time for patching is after a fall of rain, but if the work is to be successful it must be carried out continuously, except, of course, in frosty weather. When a road about to be patched is in a dry condition, water is sprayed on to the surface from the tank carried by the roller, and the smallest of holes are then detected. Each hole is picked over in order to loosen the old crust. The patching and binding material are then applied, and the patch watered from the roller tank, and well rolled until thoroughly consolidated. The system has proved most economical and is satisfactory from every point of view.

Constructing a Fireproof Dwelling

A builder described as follows his method of constructing a fireproof dwelling:

"The first floor was constructed of ferro-lithic plate, plastered underneath, and concreted on top to a depth of two and one-half inches. These floor plates rest on concrete girders having a special reinforcement which also took the place of false work for the beams. The girders, in turn, are supported by concrete piers. In the second floor construction specially designed I-joists, five inches deep, were employed. These joists rest on an angle wall-ribbon, which was rivetted to the exterior studs at the second floor line. The attic joists were formed of 6-inch channels and extend two feet over the outer line of the building. Six-inch metal rafters are supported upon a ridge resting on the ceiling joists. Upon the rafters were placed ferro-lithic plates, which were plastered underneath and concreted above and covered by asbestos waterproofing material. The necessary ground for concreting and plastering was afforded by expanded metal lath, applied and fastened by means of prongs punched on the structural members. The lath on the exterior was covered first with a coat of cement mortar, then with a scratch coat, then with a finished coat, left very rough. The inside of exterior lath was plastered with a heavy coat of cement plaster, thus wholly embedding the lath and producing a concrete slab two inches thick. The interior partitions were plastered with patent hard plaster on expanded metal lath."

A report of more than ordinary interest to all users of steam boilers, is that credited to the Cunard Company of an intention to build a liner for the Atlantic service, on the lines of the Lusitania, to be equipped with oil burning boilers. It is claimed that oil fuel will save an immense amount of money on a single trip, being cheaper fuel, requiring fewer firemen, and permitting a larger cargo because of the coal bunkers being largely available for merchandise, as well as there being more room for passengers. If it proves to be practicable to use oil fuel on steamships, railroads will take oil fuel up more extensively, and stationary plants of all kinds will also take up the oil fuel plan. This has been suggested time and again, and is something of an old story, but it certainly seems that there must be something to it when a corporation like the Cunard company seriously considers the matter.

To the Toronto city architect's request for an automobile for the work of his department, the Board of Control replied by granting permission for that official to hire a car when necessary. Either Mr. Macallum has got an awful snap or else the controllers have poor ideas of economy. We think the latter.

* Paper by J. S. Pickering, Borough Engineer, Chatham, Eng., read before the Irish Road Congress, held at Dublin, Ireland, April 20-22, 1910.

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Supply Market, Situation and Outlook

In view of the fact that considerable space is devoted in this issue to building figures and reports, and that we are now advancing into the second half of 1910, it may perhaps be interesting to consider briefly the situation and outlook.

In the first place, it is only natural that we should begin to experience some decline in the volume of work planned. Every year the more important work is planned well in advance. As the summer advances, there is less and less inclination to take up the larger schemes. In building, especially, a very small percentage of the larger sized structures of any kind are started as late as midsummer, as such a tardy commencement would defer their completion into the late fall or winter. Hence the work offering at this time of the year is confined generally to smaller structures, aside, of course, from public buildings, which may be started whenever the appropriations are available or the preliminaries completed.

A strong demand is reported from nearly every department of the supply markets in eastern Canada. Brick has been a scarce commodity all the season and contractors are still experiencing a difficulty in getting their orders filled. At Toronto, common brick ranges \$9, \$9.50 and \$10, according to delivery. Pressed brick are quoted at \$17 at works and \$18 delivered.

The present season has been a good one for cement, the various dealers in which report numerous sales and a well sustained demand. Prices have been advanced at times but there have been very few changes during the past month or so. At Montreal the quotations are \$1.40 a barrel of 350 pounds; at Toronto, \$1.75 a barrel, or \$1.60 for 1,000-barrel lots; at Winnipeg, \$2.20, and at Calgary \$2.60.

One of the features of the market is the demand for building lumber. At Toronto, pine is quoted at \$32 to \$35 per thousand; common stock boards at \$28 to \$33;

cull stocks at \$20 and cull sidings at \$17.50. Southern pine dimension timber ranges from \$30 to \$45 and hemlock, \$17.50. Spruce flooring in car lots is worth \$22 to \$24.

1910 as a building year is looming large in the building circles of western Canada, and with a prospect of a good average crop there is every justification for expecting even greater things in 1911. An enormous number of buildings are now being erected in the West. The country school district and the smaller towns seem to be doing quite as well, in proportion to their population and available funds, as the larger cities. School buildings of good design and construction are going up at all points and in this connection it is not certain but what the small towns are beating out the cities, for there are many complaints of overcrowding in the latter. The character of the structures is improving steadily. While much of this is due to the supervision of the authorities it is apparent that there is an increasing appreciation of the necessity for advanced construction and equipment. The demand for building materials is well sustained. Prices are firm without any material advances. There is the usual shortage in some lines. Labor is none too plentiful but wages are practically unchanged. Reports received at this office from Winnipeg indicate that plans for new work are hardly as steady as they have been this season and occasional lulls are occurring in the reports of architects. This is the usual experience during the hottest part of the season. The volume of smaller structures, such as dwellings, apartment houses, stores, and so on, is well maintained and it seems probable that the totals for the season will depend largely upon this source.

Good Average Crop Assured

The crop reports from at least one reliable source, the Molsons Bank, are quite cheering in view of the pessimistic things that have been going the rounds during the last month or so. Owing to the excessive heat some districts in Manitoba will doubtless have light crops, but taking the whole province the outlook is reassuring. The sections that have suffered are southern Manitoba and southern Alberta. In the northern portion of the latter province there has been a large increase in the acreage under cultivation, particularly wheat, and there is every prospect of a good average crop.

In Ontario and Quebec the harvest promises to be better than the average. Winter wheat is generally good and some districts report that it will be the best in years. Oats and barley are not quite as good but they are above the average. And reverting to Western Canada: the west is a booming country and the fact must not be overlooked that there never has been a season in which every district has been immune from failure. There may be some truth in the assertion that the area of poor crop is somewhat larger than usual this year but it is also true that this will be amply compensated for by the increased acreage in the three western provinces.

City Engineer Angus Smith, of Victoria, recommends the construction of a civic asphalt plant at an approximate cost of \$10,000. He believes that the city will effect a considerable saving by making its own paving material. Mr. Smith considers that Victoria is situated close to the source of what is probably the best asphalt in the world and that with a civic plant a good asphalt pavement can be laid at a cost of about \$1.75 a yard.

Canada's Great Building Development

Returns for the First Six Months of 1910 Show Gain of 41 per cent. — Facts and Figures from Many Points

Computed from the returns of Canada's leading cities is shown an average gain of 41 per cent. for the first six months of 1910 over the corresponding period of 1909. Twenty-three cities expended over forty-seven millions, compared with thirty-three and a half millions during the first half of last year. June, 1910, leads June, 1909, by a million and a half dollars.

At present there seems to be no limit to Canadian expansion. The records established this year and viewed with wonderment by even those who are studying the

of the year, falls into third place, with Montreal, a keen competitor, one behind. The records made by the three western cities, Calgary, Saskatoon and Regina, are particularly noteworthy, the increases being respectively 152, 236 and 264 per cent.

A gain of 63 per cent. for Victoria, B.C., is very satisfactory. Hamilton, with an increase of 90 per cent., remains in the limelight.

Toronto, Ont.—The city's position at the head of the list is a significant sign to those interested in building and de-

Town or City	June 1909	June 1910	1st six months 1909	1st six months 1910	Approx. increase for six months
Toronto, Ont.	\$2,001,545	\$2,302,550	\$8,829,375	\$9,840,648	11
Winnipeg, Man.	2,042,850	2,406,600	5,468,850	9,835,500	80
Vancouver, B.C.	657,020	1,162,940	3,493,185	6,885,880	97
Montreal, Que.	1,172,788	1,585,254	4,285,910	6,216,880	45
Calgary, Alta.	202,710	573,846	949,110	2,394,942	152
Ottawa, Ont.	1,400,775	302,250	2,623,415	1,668,275	36*
Saskatoon, Sask.	153,085	194,400	493,260	1,657,131	236
Regina, Sask.	121,650	255,318	368,310	1,342,053	264
Victoria, B.C.	90,120	312,600	789,200	1,287,835	63
Hamilton, Ont.	144,945	301,885	650,420	1,232,725	90
Edmonton, Alta.	201,290	233,670	1,054,476	1,092,220	4
Fort William, Ont.	307,125	256,225	1,979,445	939,280	53*
Lethbridge, Alta.	82,170	92,005	659,775	748,000	13
London, Ont.	127,639	38,586	557,789	452,466	19*
Peterboro, Ont.	44,322	145,470	177,358	408,993	130
Port Arthur, Ont.	17,600	65,375	155,200	310,310	100
Strathcona, Alta.	18,800	13,350	91,100	270,100	200
Brantford, Ont.	25,805	109,145	131,600	241,430	83
Sydney, N.S.	22,360	69,789	65,725	204,652	211
Halifax, N.S.	66,830	21,630	373,760	176,450	53*
Stratford, Ont.	16,150	16,500	78,650	112,118	43
Windsor, Ont.	48,550	31,075	201,010	109,480	45*
Kingston, Ont.	40,975	11,545	174,860	100,143	43*
Total	\$9,007,104	\$ 10,502,008	\$33,651,783	\$47,527,511	
Average increase, 41 per cent.					*Decrease.

field closely, are broken down next year and find a place only in the history of building development. This increase of 41 per cent. for the first half of the year is even more significant than the 54 per cent. gain made during the first three months of 1910, for it furnishes convincing evidence that the strides which are being made in all departments of the Canadian building field are due to natural development and not to any inflated conditions or temporary boom.

Several decreases will be noted in the accompanying table, but in nearly every case a substantial reason for the decline is given in the building reports. Ottawa, which is 36 per cent. to the bad, is a notable example, the building permits for the first half of last year having been swelled up by the total for the G.T.R. work. Fort William is another, this city having been badly handicapped by a carpenters' strike.

The small margin between Toronto and Winnipeg, the remarkably close finish in which the former city obtains the leading honors, is suggestive of a 100 yards' dash. Vancouver, which led for the first three months

development work throughout Canada. It is a clear indication of prosperity and seems to show that Toronto is destined to become the commercial metropolis of the Dominion. In addition to the figures given in the above table the following may be of interest. From January 1st to June 30th, 1909, the number of permits issued was 2,427, against 3,032 in the corresponding period of the current year. Last month 1,200 permits were issued, compared with 860 in June, 1909. The number of buildings erected during the first half of last year was 3,540, compared with 4,290 this year. It is noteworthy that a number of good sized permits for factories have been issued to United States firms who are building Canadian branches in Toronto. We look for increased revenues from this source on the ground that American firms are finding it more profitable to manufacture their goods at the scene of activity than to ship them from the other side.

Winnipeg, Man.—(Correspondence of the "Contract Record): Building figures for the first six months of 1910 show an increase of \$2,777,350 over the highest previous record for the same period of any other year. The former record was established during 1906, and while this year eclipses it in

total valuation, 1906 still holds first place in the number of permits issued and in the number of buildings erected. The detailed comparative statement of building operations for several years appended substantiates the belief that the permits for the year will total more than fifteen millions.

COMPARATIVE FIGURES

Period	Permits.	Buildings.	Cost.
June, 1906	416	501	\$1,436,450
June, 1907	337	412	1,110,600
June, 1908	196	229	802,200
June, 1909	418	490	2,042,850
June, 1910	373	461	2,406,600
Six months—			
1906	1,835	2,251	7,058,150
1907	1,606	1,907	4,443,850
1908	714	807	2,238,250
1909	1,305	1,545	5,468,850
1910	1,789	2,201	9,835,500

During the fiscal year of 1910-11, the city of Winnipeg will spend \$2,431,896.01 in conducting the business of the corporation. Two-thirds of this amount will be spent by the various departments on improvements which are open to tender, and a big slice will go to the contractors of Canada.

By the new assessment roll which has been issued by the city the total valuation of properties is \$185,870,140. Of this amount, \$28,261,920 is exempted from taxation. The value of assessable buildings at the two-thirds rate of assessment is \$48,934,150, or a total value of buildings aggregating more than \$72,000,000. Assessable land is valued at \$108,674,070.

Vancouver, B.C.—S. H. Jarrett, Building Inspector: "The outlook here for 1910 is that the year will show an increase of 75 per cent. or over. There is great activity at the offices of the leading architects of this city. The demand for dwelling houses is a feature of the situation. I am confident that we shall leave the previous banner year far behind."

North Vancouver, B.C.—Thos. Shepherd, City Clerk: "There is greater activity here than ever before. Among the buildings planned may be mentioned the Bank of Hamilton and Keith Block, to cost \$80,000; the Balfour Ker Block, to cost \$30,000, and the Pythian Castle Hall, to cost \$22,000. Among the residential work completed this season may be mentioned five first class residences on Grand Boulevard which cost \$40,000. The Provincial Board of Health has approved plans of a new sewerage system and the installation of this will commence immediately. The permits issued during the last month amounted to something over \$50,000. We have no previous records so are unable to supply you with the necessary figures for the table."

Montreal, Que.—(Correspondence of the "Contract Record")—June building statistics show a gratifying increase in amount of permits issued during that month as compared with June of the previous year, and in consequence the total results for the first six months of this year are agreeably higher than those during the same period in 1909.

July gave indications of setting a high level mark, when in one day alone permits aggregating more than \$2,000,000 were issued.

Just what effect the present troubles between the master builders and brick and mason contractors will have towards restricting activity along this line is hard to estimate, but according to Inspector Chausse the influence of the strike is being seriously felt in his department and there is a very noticeable dropping off in the applications for building permits. Even at that, July is bound to be a great building month and the year should wind up with a new record.

Calgary, Alta.—W. D. Spence, city clerk: "Considerable difficulty is experienced in this city in regard to obtaining

materials and labor, and this is retarding the progress of buildings now under way. Prices of materials have naturally advanced. Prospects are bright, however, for the immediate future, and extensive building and development work is anticipated."

Ottawa, Ont.—"The comparatively poor showing made by the first half of 1910 is accountable for by the fact that during the first half of 1909 the permit was issued for the erection of the new G.T.R. hotel, a structure which in itself involves an expenditure of more than a million dollars. As a matter of fact the building conditions and prospects in the Federal capital are excellent and it is quite possible that 1910 will set a new high record."

Saskatoon, Sask.—J. E. Harrison, C.E., Building Inspector: "Building conditions and prospects are excellent. The construction entering into the erection of business blocks in this city is of the very best, the buildings now going up being of brick, brick and stone, and reinforced concrete. The residences that are being built this year show great improvement both in regard to design and finish."

Regina, Sask.—Building permits for this city issued this year amount to practically four times the total of last year. For the first ten days of July the building permits were \$88,555, which exceed last year's figures for the whole month by some \$38,000. There are some 325 buildings of all descriptions now under construction. These, with the large contract for the trunk sewer and disposal works, now being constructed by the city at an estimated cost of \$300,000, have made a considerable stir in contracting and building records. 1910 will undoubtedly exceed all former years in the history of the city.

Among the notable undertakings under construction at the present time are: Parliament Buildings, approximate cost, \$2,000,000; Albert street subway, \$125,000; new trunk sewer, \$190,000; R. H. Williams' departmental store, \$100,000; new General Hospital, cost of building, \$105,000; new General Hospital, furnishings, \$15,000; new Exhibition Buildings, \$75,000; Grey Nuns' Hospital, \$105,000.

City municipal work contemplated for this year now totals approximately \$600,000, not including the cost of the new municipal street railway which is to be installed shortly.

Hamilton, Ont.—J. M. Anderson: "The building conditions at present in Hamilton are very good. The amount of new factory buildings and additions to the older concerns is greater, and will be greater than any year in the history of the city. The present outlook is very bright, with lots of building material and with no possible chance of strikes or labor troubles. There is no doubt that the building industry for 1910 in this city will be the best in its history."

Edmonton, Alta.—E. H. Cotterell, C.E., Building Inspector: "The prospects for the remainder of the year are very good indeed. Several large buildings are contemplated, these including new opera house, General Hospital, fire hall, theatre, Union Bank buildings and several apartment and business blocks. The crops in this district are in first class condition, rain having fallen in abundance at the right time, thus ensuring confidence. As an indication of the progress of this city, I may mention that there are now six large banks in course of construction within a stone's throw of each other in the centre of the city. The buildings are of excellent design and are constructed in brick, reinforced concrete and stone fronts."

Fort William, Ont.—S. Macnamara, Building Inspector: "There has been a considerable set back to the building trade in this city during the past month or so, caused by the carpenters' strike, which lasted for the best part of June, otherwise building operations and prospects never looked better than they do this year. Although the figures show a con-

siderable falling off compared with last year's returns, the development of the city is very much greater. A great deal of work not classified under building is being done, this including docks, railway and street railway construction. Much more money is being spent in wages now than in any previous year."

Lethbridge, Alta.—H. W. Meech, Building Inspector: "Lethbridge continues to make steady progress. As far as can be seen at present I am of the opinion that the value of building permits will go on increasing from month to month and that by the end of the year we shall have a new record to work upon."

London, Ont.—Arthur E. Nutter, City Architect: "The present year started well, but during the last three months there has been a considerable falling off from the 1909 totals. The number of large works undertaken this year is rather smaller than usual although a great deal of improvement work is being made generally. There are prospects of several large works starting up in this city. If these materialize the year's business will be greatly improved."

Strathcona, Alta.—A. J. McLean, city engineer: "A large number of buildings are in course of construction although the total for June this year shows a decrease compared with the corresponding month of 1909. There is a substantial increase for the six months of 1910, as will be seen by the table. The construction of the C.P.R. bridge over the Saskatchewan river will be commenced not later than September 1st. Altogether the prospects for the balance of the year and for 1911 are excellent."

Brantford, Ont.—T. Harry Jones, City Engineer: "Building is being carried on extensively in residential, business and factory areas of this city and many promising schemes are under consideration, the whole pointing to a record season for Brantford."

Sydney, N.S.—D. McD. Campbell, City Clerk: "Building operations in this city are much more active this year than last. The figures given in the table do not include the improvement work now being carried out by the Steel Corporation. In addition to a number of good residences the new Sydney Academy, the St. Andrew's Church and a new fire station are under construction. Prospects are exceedingly bright."

Kingston, Ont.—H. B. R. Craig, City Engineer: "The poor showing made by this city in the above table is attributable largely to the strike of the carpenters and masons which was in force for over a month and which practically suspended building operations. It does not indicate that Kingston is on the downward grade. Indeed, prospects here look very good."

Prince Albert, Alta.—1910 will probably see more actual development in this city than any two or three previous years. The most important work under way is that on the Dominion Penitentiary. This structure when completed will be one of the largest of the kind in the Dominion and will accommodate prisoners from the whole of the province. The power station for the institution is now being built, also a building which will serve eventually as a work shop, but temporarily as cells. The present work will probably cost \$100,000. It will be quite a number of years before the main building, which will probably be built by convict labor, is finally completed. The next most important works to be started at Prince Albert are the wharf and river bank protection which will cost about \$75,000. Probably \$100,000 will be spent on paving work this year. Of the larger buildings, work is well advanced on the Masonic Temple on Tenth street, costing \$60,000, and a start has been made on the Grey Nuns' Hotel, which will cost approximately \$100,000. The Imperial Bank are putting up an attractive building on

Tenth street. A number of business and apartment blocks are under discussion, also additional accommodation for schools. The four brickyards in and around the city report an enormous demand for their output. The lumber mills are enjoying an excellent demand from the prairie. It is expected that the city will receive quite an impetus with the advent of the G.T.P. during the coming winter and the C.P.R. next summer.

Portage la Prairie, Man.—The season of 1910 promises to be a busy one with the building trades of Portage, and one contractor states that he cannot remember when so many buildings were being erected or going to be built at one time as at the present. The brick buildings which are in course of construction, or on which work will begin shortly, are the new home for the Urban Mutual Fire Insurance Company, the new north ward school, the Old Folks' Home, which is an addition to the Home for Incurables, and the new block for Burk & Andrich. In addition to these, a number of private residences are under way.

Brandon, Man.—At the present time building is exceedingly active in this city. There are now under construction several fine hotels, among which may be mentioned the Cecil, the Royal and the Canadian Northern Railway Hotel. The Codville Company are erecting a large warehouse on Ninth street, and immediately adjoining, Clement & Company are putting up a fine office and apartment block on Tenth street. In the same block a new theatre is being built by Hughes & Company. If the building operations of to-day are a fair criterion of Brandon's growth and prosperity, the city is entering upon an era of development which will be the greatest in its history. In the business portions of the city many of the streets are almost impassable by reason of the fences which have been erected around new buildings in course of construction and nearly every day finds some addition of this kind. There is the same activity in the residential sections of the city.

Yorkton, Sask.—Yorkton's building operations for 1910 will reach \$300,000. This is not the result of any boom but is caused solely by the demand for public buildings, mercantile houses, manufacturing establishments and residences to meet the demands in eastern Saskatchewan's rapidly growing metropolis. Features of the buildings just completed, now being erected or planned, are their substantial character, architectural beauty and modern appointments throughout, proving that Yorkton has long passed the western "shack" stage and is fast merging into the more permanent and lasting building era which characterizes the growth of cities.

Fort Saskatchewan, Alta.—The Secretary, Board of Trade, writes: "Tenders are being called for by this town for the construction of a water power plant for the generation of electric power, the cost to be \$30,000. The building permits issued since May 1st are inconsiderable. Some large buildings were completed on permits issued previous to that date. As regards the labor situation, the local supply will not meet that required for the municipal work projected. The town has a population of 1,100 and is situated in one of the richest parts of Alberta. It is one of the oldest settlements in the west, and, with the offer of free power, is in a position to attract industries of all kinds."

The proposal has been made at Ottawa to institute a test of the European system of ozone purification and it is possible that Dr. Karl Frank, representing Siemen & Halike, the New York agency of the German firm of Siemen & Schuckotwerke, will be invited to Ottawa. It is claimed that the ozone system has been employed successfully at St. Petersburg, Paris and other European cities.

Methods of Repairing Brick Sewer

The following method of repairing a brick sewer was employed at Worcester, Mass., by Matthew Gault, Superintendent of Sewers. The sewer was built in 1870 and the bricks were soft, the cement poor and sparingly used and the grade steep. The result was that many of the brick in the bottom of the invert were loose and badly worn and the sewer in a dangerous condition. The sewer is a 24x36-inch oval and, as it was necessary to lay hose inside of the sewer to provide for the large flow of sewerage from the district above, the space available for working was very much contracted. The work was done in sections. At the upper end of each a sand bag dam was placed. Two and sometimes three lines of 3-inch pump hose, 60 feet long, extended through the dam, thus taking the flow and keeping the invert dry. When a connection was encountered an extra line of hose was laid to accommodate it. The hose were supported on short strips of boards laid across the sewer about 6 inches above the invert. From three to four inches of cement mortar placed in the invert and carefully trowelled completed the work. After the cement had hardened sufficiently to withstand the flow of sewerage, the dam and hose were moved ahead.

Concrete Floor Tested for Fire

A test of a reinforced concrete floor was made recently under very unusual conditions, says "The Engineer," including a fire test with the floor under load, the fire test apparently being required under the city's building ordinances. The structure was a ten-storey office building, with floor panels 22 feet by 20 feet centre to centre of columns. The floors were designed for a working load of 100 pounds per square foot, and were required to stand a test load of 200 pounds per square foot with a deflection not exceeding $\frac{3}{4}$ -inch. The deflection with this latter load on a test panel of the floor was only $\frac{1}{8}$ -inch. The building inspector then had a fire test made of the loaded panel, and with a hot fire beneath the deflection increased by $1\frac{1}{8}$ -inch. Water from a fire hose was then thrown up the bottom of the heated slab, and the recovery was $\frac{7}{8}$ -inch, leaving $\frac{1}{4}$ -inch deflection. A small amount of concrete spalled off under the action of the stream of water. The building inspector considered the result unsatisfactory in leaving $\frac{1}{4}$ -inch deflection, and the approval of the structure on behalf of the city is now in dispute. It is pointed out that the heated bars in the lower part of the slab may have taken a slight permanent set as the effect of the sudden cooling. While many fire tests on concrete slabs have been made in special test chambers, it is very unusual to require such a test in a completed building.

The Need of Standardizing Bricks

Dealing with the great variety in quality of bricks, brought about by the fact that architects and builders seem at present to be satisfied with very low grades, Mr. A. B. Searle, a recognized authority of London, Eng., said recently that whilst public authorities failed to recognize the difference between bricks and rubbish, a large amount of pioneer work would be necessary before a minimum standard for brick would be obtained and recognized. Concrete, which is one of the largest competitors, has been subject to standardization from its inception, and it would be a good day for brick-makers and architects when similar standards were imposed upon bricks of all kinds. The present system of unlimited competition is rapidly resulting in the average brick be-

ing of an unnecessarily low quality, imperfect in texture and badly fired, and the reduction in cost of manufacture is being carried to an extreme. Whilst the chief characteristic of a good brickmaking material should be its plasticity, the tendency of modern brickmakers is to avoid the property of plasticity, because it introduced certain processes in manufacture, the cost of which it was necessary to eliminate owing to low prices due to the excessive competition; the quality of the bricks is of secondary importance.

This condition of affairs had led to a movement having for its object the suppression of all plasticity in clay, viz., the dry process, the earth being shaped in presses, the compression being such that the bricks have sufficient cohesion to enable them to be taken to the kilns whilst hot and to result in the production of a brick which meets the public demand. Microscopic examination, however, shows that bricks made of the more plastic materials are undoubtedly far superior. On the other hand, if cheap prices are to prevail, this "dry" process must be continued. It is a process which has become extremely popular, but brickmakers are slowly and surely returning to bricks made of partially plastic material, as the limitations of the "dry" process are coming to be recognized. He objected to the terms "semi-plastic," "semi-dry," and "stiff plastic" processes. They are unsatisfactory and misleading terms, representing stages between the wet and the dry processes, and intended to convey the impression that the bricks so obtained have some of the qualities of the older methods.

Forest fires recently exploded two powder magazines owned by Contractor McEwen, who is working on the N.T.R., north of Lake Nepigon. The magazines contained 100 cases of explosives, and were valued at \$15,000. They were on an island, and the fire jumped across from the mainland. No one was injured.

When Paint Spots

In two-coat work poor lumber and thin painting often cause spots on paint. The oil penetrates into the wood more freely on crossed grained and other porous surfaces, and the result is flat places in the paint which fade more quickly than a glossy paint. This makes the work look spotted.

Spotting due to poor lumber and porous surfaces can be guarded against if more care is taken in applying the priming coat. Make it a point to thoroughly fill all extra porous places with the priming coat, or go over such places twice before the second coat is applied to the entire building.

The practice of applying a coarse dark priming coat is another cause of spotting. This dark under coat is likely to show through in spots where the paint is put on too thin.

The use of too much Japan, fatty or poor quality oil, which makes the paint dry, tacky and soft, often results in mildew, which causes spotting and degeneration of the paint film.

Another cause of spotting is insufficient and improper brushing out of the paint, particularly on the priming coat. A great many painters still fail to realize that the priming coat requires as much care in applying as the second or finishing coats. Many jobs show "laps," and when the second coat goes over a priming coat which shows "laps," trouble usually results.

The surface has at least one more coat where the "laps" show than the balance of the job, therefore the paint is very likely to show spots when it fades out.

Winnipeg's New Union Passenger Depot

A Detailed Explanation of the Most Interesting Points of Design and Construction — Progress Views from Start to Completion

The story of progress in the erection of the new union passenger station for the C.N.R. and G.T.P. at Winnipeg, Man., as told in the accompanying views will doubtless be of interest to many of our readers. The building has a frontage on Main street of 352 feet and a depth of 140 feet, and covers a ground area of approximately 50,000 square feet. It comprises basement and four storeys, surmounted by a dome 90 feet in diameter and 100 feet above street level. The new depot, known as the Fort Garry station, forms part of an extensive project involving a system of trackage and railway buildings which will provide one of the best equipped terminals in the world.

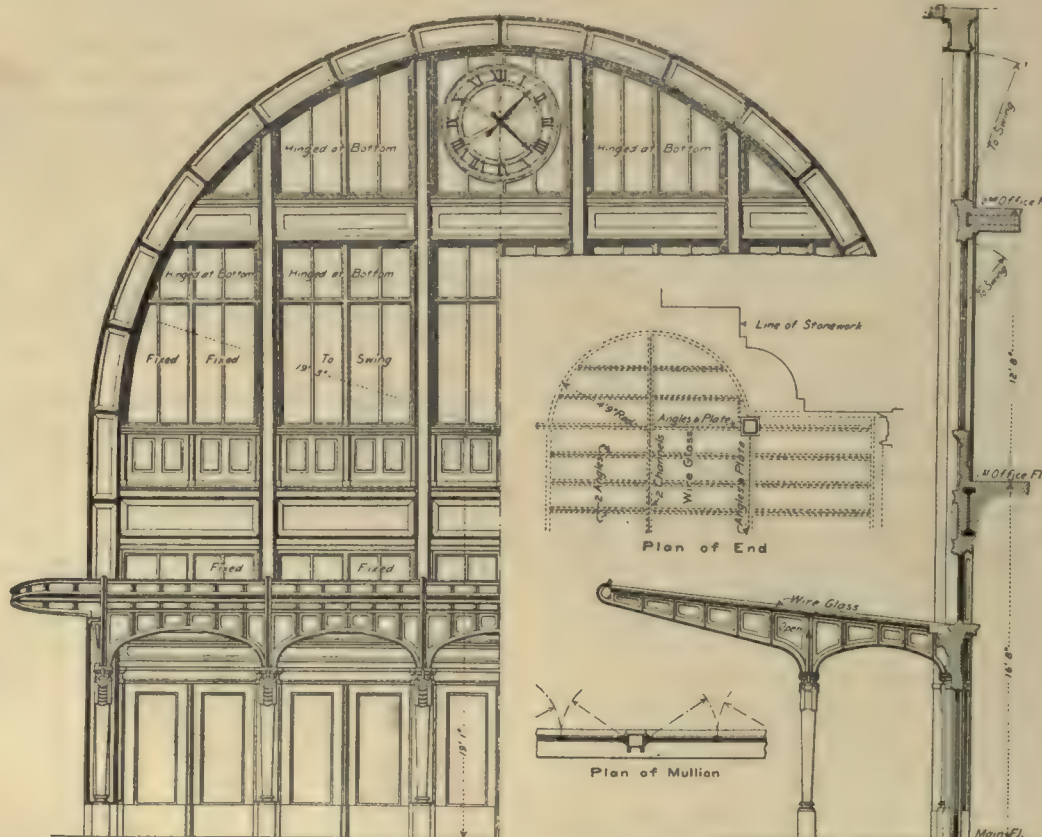
The main floor of the building has a large circular lobby in the centre under the dome, with waiting rooms, restaurant and lunch room on one side, and ticket offices and baggage rooms on the opposite side. It communicates through the rear of lobby, via the subway and stairways, to wide platforms between the eight through tracks which have a capacity for 200 cars at a level of 10 feet above the main floor. The main lobby is entirely unobstructed by columns or seats of any kind and is exceptionally well lighted on all four sides by large arch windows. In the basement there is a waiting room with an area of 10,000 square feet, besides excellent accommodation for immigrants. The second, third and fourth floors will be devoted to office purposes. Ultimately, it

is planned to add four more storeys to provide a total of 200,000 square feet of office room. The building is designed so as to obviate the necessity for artificial lighting through the day. Indirect steam heating is installed with mechanical ventilation. The columns are supported at the foundations by wooden piles driven to rock bottom, this being necessary on account of the heavy column loads and the character of the clay underlying the site.

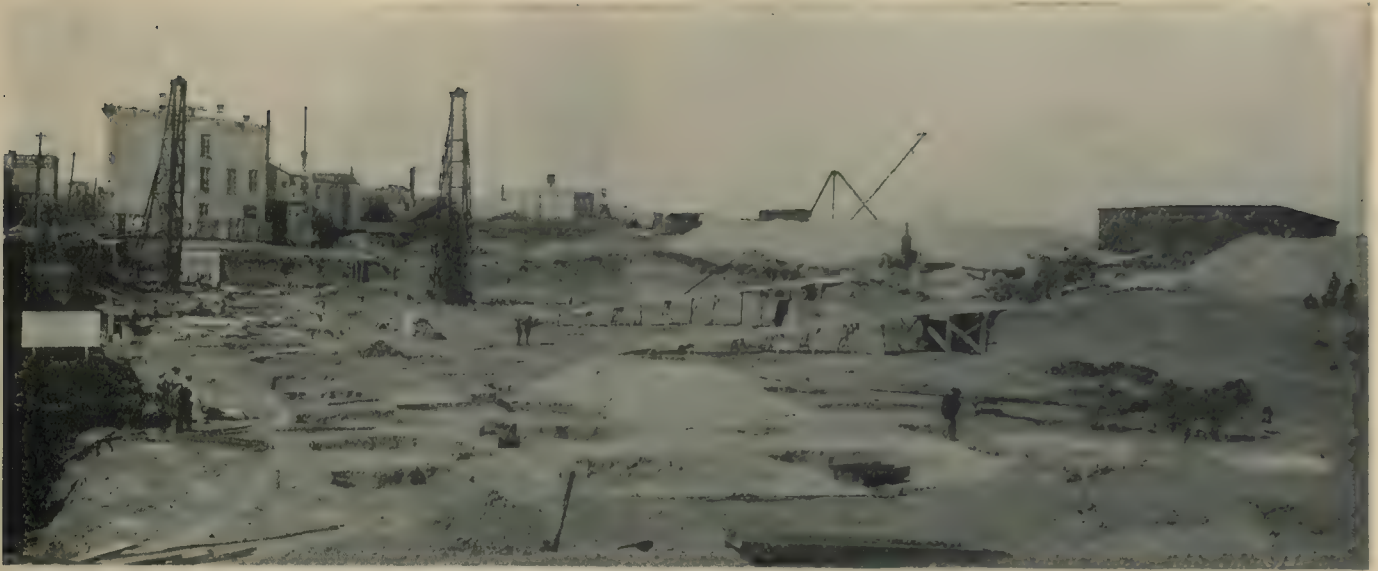
The columns all have I-shape cross sections, made with a solid web plate and four flange angles reinforced with cover plates when necessary.

The maximum column load is 1,292,000 pounds and the corresponding cross sectional area is built up with four 6 x 4 x 11/16-inch flange angles, one 12 x 1/2-inch web plate and eight 14 x 11/16-inch flange cover plates. The lower sections of the columns, about 37 feet long, extend through the basement and first storey, and the second sections, which extend through the second, third and fourth storeys, each of them 12 feet 8 inches high, are about 38 feet long, excepting under the dome, where some of them are about 50 feet long. The third, or fourth storey sections are 12 feet 8 inches long.

Columns with heavy loads have extended bases, distributing them across the full width of I-beam grillages, seated on concrete footings with pile foundations. The base plates, 1-inch thick, project considerably beyond



Main Entrance to New Union Depot, Winnipeg.



1.—September 4th, 1908. Pile Drivers, driving wooden piles in foundation for piers and walls.

the column flanges and are reinforced by extended wing plates riveted to the column flanges and by stiffener angles on the wing plates. The grillage beams are entirely enclosed in concrete, which is extended up to cover the base plates of the columns.

The grillages for the heaviest loads are made with four 36-inch I-beams, and those for smaller loads are made with three 24-inch I-beams. The grillages are set on rectangular concrete footings, reinforced by horizontal old rails just above the tops of their foundation piles. The heaviest column loads have 16 piles for their foundations, those with the 24-inch grillage beams have nine piles, and the lightest column loads have only two piles, and the columns there are seated directly on the concrete footings without the interposition of grillage beams. About 3,000 wooden piles, 35 feet long and 14-inch in diameter at the top, were driven to bed rock for the foundations.

With the exception of a few of the wall columns, which are especially grouped for architectural considerations, and a few of those in the dome construction, all columns are located at the intersection of longitudinal

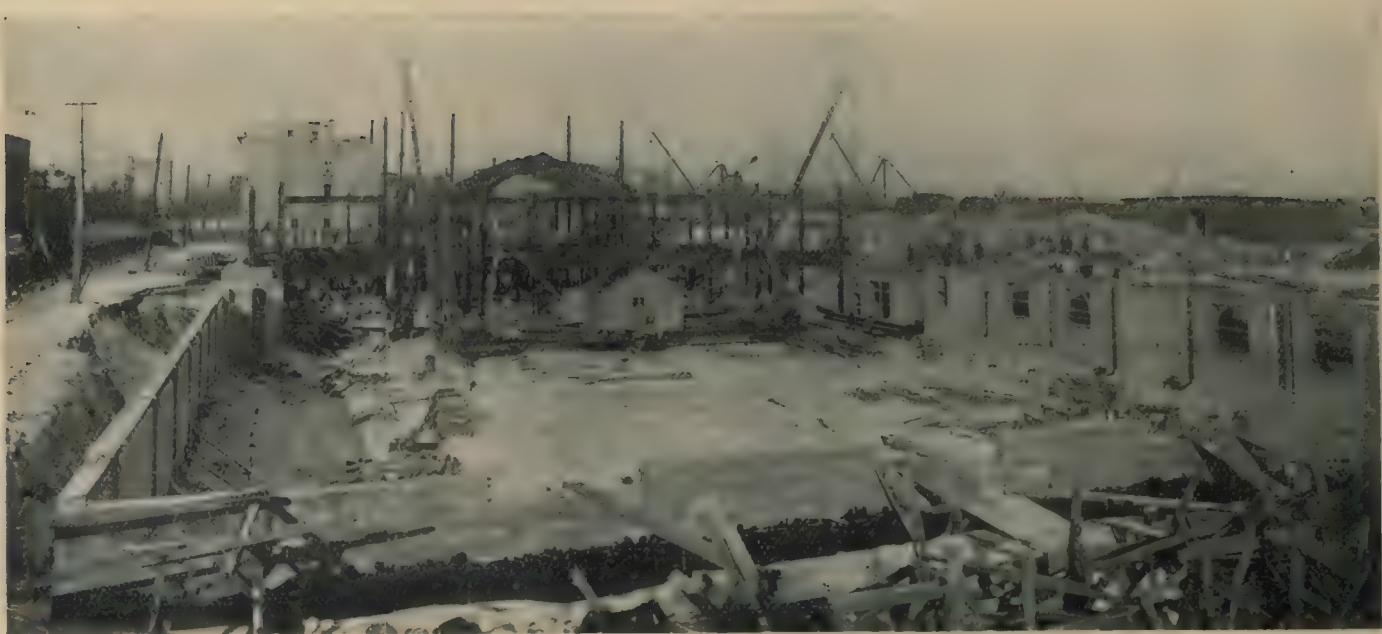
and transverse lines from 18 feet 7 inches to 23 feet apart, thus affording advantageous lengths of floor panels and making very regular beam and girder construction. Excepting some box and plate girders in the second floor, which are introduced to carry offset upper storey sections of the columns and to span extra long distances between columns, all of the girders are made with single or double I-beams 18 or 20 inches deep, and all of the floor beams are single I-beams, most of them 12 inches deep.

At the second floor level the office rooms on both sides of the rotunda are connected by a balcony 5 feet wide and octagonal in plan, enclosing the dome above the rotunda. In the corners the balcony floor is carried on diagonal I-beams framed to the regular floor girders and on the long side it is supported from angle iron brackets rivetted to the main columns and carrying fascia angles to support transverse beams made with pairs of angles rivetted together back to back and connected at their inner ends to corresponding channels supported directly by the columns.

The second floor beam plan is nearly symmetrical



2.—Nov. 3rd, 1908. Showing forms for concreting exterior basement walls of building.



3.—December 9th, 1908. Showing progress of steel erection, north end of building.

about the centre transverse line, except that one side of it is one panel longer than the other side. The skylight roofs over the first storey rooms on both sides of the rotunda are supported at the second floor level by trusses. These so-called trusses are more properly arch ribs with solid webs and curved bottom flange angles. Straight inclined top flange angles act as rafters carrying the curb girders and purlins for the skylight framing.

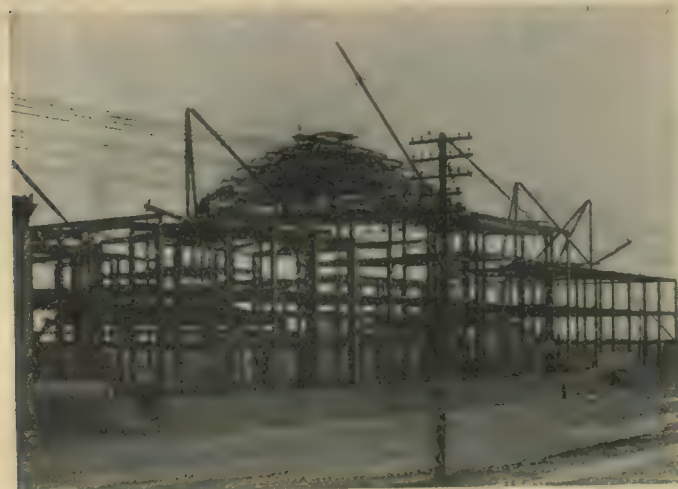
The second floor box girders are proportioned for a maximum column load of 632,000 pounds 2 feet 10 inches from the end, and have two $25 \times \frac{3}{8}$ -inch web plates in the planes of the flanges of the supporting columns. There are also eight $6 \times 6 \times \frac{7}{8}$ -inch flange angles and two $26 \times 15/16$ -inch cover plates, besides four $7/16$ -inch web reinforcement plates under the second storey columns.

The third floor plan resembles the second floor plan, except in the framing around the rotunda, in the absence of box girders and the open spaces caused by the light court. It is typical of the framing of all office floors, and with the exception of plate girders is made almost wholly with 12-inch, 18-inch and 20-inch I-beams.

In all storeys the lintels for the exterior stone walls are made of one 12-inch I-beam for every 8-inch thickness of the wall for spans of 8 feet and under. For

more than 8 feet, 8-inch 18-pound I-beams are used. For the interior brick walls one 4-inch $7\frac{1}{2}$ -pound I-beam is used for every 6 inches in thickness of wall for spans up to 10 feet. For 3 and 4-inch terra cotta walls one 4-inch $7\frac{1}{2}$ -pound I-beam is used for spans up to 4 feet, and one $6 \times 4 \times \frac{3}{8}$ -inch angle is used for spans between 4 feet and 10 feet.

The roof over the wings correspond with the floor, except that it is made lighter with single instead of double I-beam, long span girders, and that they are slightly pitched from the interior to the exterior columns and will eventually support a raised skylight. The building has already been modified from the original plans by the construction of the fourth storey with the lower storeys, instead of adding it at some future time as was at first intended. This has been accomplished by modifying the steel connections at the tops of the third storey columns, so that they would receive the floor beams instead of the roof beams, and the latter have been shifted to the tops of the single-storey column sections, added above the fourth floor, and are connected to the latter in such a manner that they can hereafter be removed and be replaced by permanent horizontal



4.—April 1st, 1909. Completion of steel work.



5.—June 22nd, 1909. Stonework, front facade of building.



6.—June 22nd, 1909. Erection of stonework at south end of building.

floor beams, the inclined beams being transferred to the new roof level.

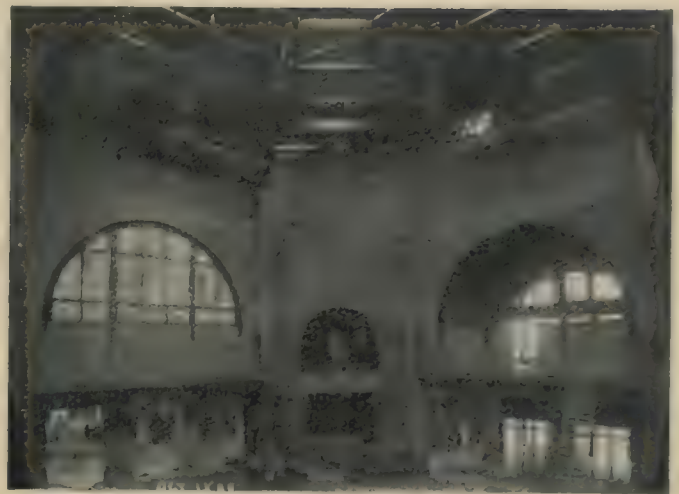
The columns are fitted with connections for both sets of beams, but as the latter are at the same elevation at the lower end, the suspended ceiling will have to be removed, when future additional storeys are added to the present building.

The dome framing is made with 12 radial trusses, which are supported on columns at the lower ends, and at their upper ends are connected to an octagonal framework of vertical trusses, which transmit the balanced reactions across the 30-foot open central space. Intermediate trusses are similar to the main trusses except that they are somewhat shorter and of lighter construction, and are supported at their lower ends on horizontal trusses, which connect the dome columns. The radial trusses both have skeleton framework extensions above their top chords to carry the rafters and curved purlins of the convex dome roof. These extensions cantilever beyond the inner ends of the trusses to carry the octagonal framework 19 feet in diameter for the centre monitor. I-beam purlins in the dome are spaced about 6 feet apart and support a continuous reinforcement concrete roof slab 3 inches thick, which is waterproofed and covered with flat tiles.

In the front wall of the station there is an arched window with a rivetted box girder casing, which forms a full-centered arch rib, 88½ feet in diameter and 15 inches deep. This is divided into five panels by four intermediate rivetted columns connected by rivetted transverse girders forming window heads and sills, differing notably from the ordinary mullions and cast iron construction.



8.—December 20th, 1909. Front facade of completed building.



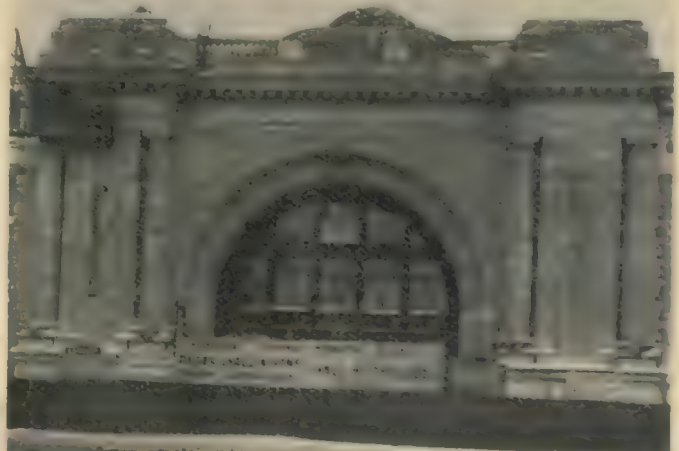
7. October 15th, 1909. Central portion of dome interior in course of construction.

Below the window over the main entrance there is a large and wide marquise, with semi-circular ends supported on rivetted cantilever girders, which are anchored to the main wall columns and fulcrumed on six ornamental cast iron columns about 7 feet clear of the walls.

Our contracting friends will be particularly interested in a close observance of the progress of this work. The first photograph, taken Sept. 4th, 1908, shows the pile drivers, driving wooden piles in foundation for piers and walls. Wooden piles, 35 feet in length, were used, these being driven to refusal. As the character of the soil beneath the footings for the space of 35 feet down to hardpan was of a very wet nature, and as the piles are practically sealed from sun and air, the life of these wooden piles should be as long as any concrete pile. At the left of this photo is shown an interesting test made upon a single wooden pile, a test load of 70 tons being balanced on the butt of this one pile, which had been driven to refusal, bringing up on hardpan a distance of 35 feet below the level of column footing. This load was carried by the pile for a period of two weeks without any settlement whatever.

In the second illustration, taken Nov. 3rd, 1908, will be seen the forms for concreting the exterior basement walls of the building. At this time the concreting for these walls was just about ready to commence.

Illustration No. 3, taken Dec. 9th, 1908, shows the



9.—December 20th, 1909. Stonework main entrance.

erection of steel at the north end of the building well under way. In another, taken April 1st, 1909, the steel work is shown completed. The fifth picture, taken June 22nd of last year, shows the erection of stone work on the front facade of the building. No. 6, taken on the same date as the preceding picture, depicts the erection of stone work on the south end of the building and of the wall at the rear of the building. This wall, it is interesting to note, is built of sand lime brick manufactured near Winnipeg.

The seventh picture, taken Oct. 15th, 1909, shows the interior construction work on the central portion of the dome.

No. 8, taken on Dec. 20th last, shows the front facade of the completed building. Another view, taken on the same date, conveys an idea of the excellent stone work on the main entrance. The last illustration, taken on May 1st, 1910, is an interesting view affording a glimpse of the construction of steel viaducts for elevated passenger tracks and platforms at rear of building.

Trains are to be run in at this level and reached by subway beneath this viaduct. All baggage, express and material will be located in warehouses beneath this viaduct and taken up from the warehouses below to the



10.—May 1st, 1910. Construction of steel viaducts for elevated passenger tracks.

tracks above by means of electric elevators. The building shown by this photo in the distance is the new stable building, completed on Jan. 1st, for the C.N.R. Cartage Company. This building has a capacity of 150 stalls.

The Fort Garry depot was designed in accordance with the requirements of Mr. William Mackenzie, president, and Mr. D. D. Mann, vice-president, of the Canadian Northern Railway, and Mr. Charles M. Hayes, president of the Grand Trunk Pacific Railway. The architects are Warren & Wetmore, of New York City; Mr. J. D. Matheson, engineer in charge. The steel work was designed by Balcom & Darrow, under the direction of the architects. The general contractors were Peter Lyall & Sons, of Montreal and Winnipeg, and the 1,800 tons of structural steel were fabricated and erected by the Dominion Bridge Company, of Montreal.

Other contracts included: Ornamental iron work, Canada Foundry Company, Limited; Kahn system of reinforced concrete, Trussed Concrete Steel Company of Canada, Limited; roofing and sheet metal work, A. B. Ormsby, Limited, Toronto and Winnipeg; interior woodwork, G. W. Murray Company, Limited, Winnipeg; lighting fixtures, Robert Mitchell Company, Limited, Montreal, Toronto and Winnipeg; plumbing and heating, Jas. Ballantyne & Company, Montreal and Winni-

peg; marble and tiling work, the Great Marble & Tiling Company, St. Paul, Minn.; electrical work, Mitchell Electrical Company, Winnipeg; painting, Talbot & Crawford, Winnipeg; decoration, Hector Chalmers, Winnipeg.

In the compilation of this article we are indebted to the "Engineering Record," New York, for information pertaining to the features of design, and to Mr. J. D. Matheson, of Winnipeg, the engineer in charge, for interesting particulars concerning the progress of the work and also for the views published herewith.

An Interesting Discovery at Ottawa

Workmen engaged on the excavation for the new Rosenthal Building, Ottawa (illustrated and described in a recent issue of this journal), unearthed an old well about 15 feet below the street level. The well, which had evidently not been used for many years, was probably dug by some early resident of old Bytown. It was situated directly under the east wall of the buildings that have been torn down to make way for the Rosenthal structure and must have been in disuse for at least 60 years, as that is the reputed age of the buildings just razed. An old fashioned suction pump, still in good repair, and the head of an axe were found in the bottom by the workmen. The well was evidently the work of a skilled well-maker, for despite the years since it was dug the wall of rubble stone around the sides is still in fine repair. Some six feet through solid rock was bored by the early resident before he struck water, and to-day it is gushing up with probably as much energy as it did when first bored. One of the workmen sunk his crowbar down this depth before he struck bottom.

Handling concrete in narrow gauge cars has been adopted for the floor of the Pedro Miguel lock of the Panama Canal. The plant is a temporary one, put up for use until the large handling equipment described in the "Engineering Record" of September 25, 1909, is in service. The concrete is mixed in a plant on the side of cut for the lock and discharged into large buckets. These are picked up by a locomotive crane running on a track along the side of the cut. The buckets are dumped into hoppers elevated on a platform and provided with chutes discharging into cars on two parallel lines of track running across the site of the lock. These tracks are laid near the edges of the trenches in which the lock culverts are located and the concrete is dumped directly into place from the cars. Blaw collapsible centres are employed for these culverts, and are held down by wire anchors while the culvert is being constructed, for otherwise the soft concrete would force them out of place. A part of the equipment has been rigged up from French plant found in the jungle.

Construction work on the main line of the Canadian Northern Railway from Edmonton to the Yellowhead Pass will be commenced at once. The contract for the first section from Edmonton to the Pembina river, a distance of 70 miles, has been awarded to McMillan Bros., who are now on the scene preparing to start work. The whole 70 miles will be graded as rapidly as possible and the company hope to have the rails laid before Christmas. The contract for the line from near Stettler to the Brazlau coal fields will be let shortly.

The Canadian Northern Railway will make extensive improvements on the main line between Winnipeg and Edmonton this summer. The road will be thoroughly ballasted and relaid with 80-pound steel in place of the 60-pound rails now in use.

G. T. P. Construction in New Brunswick

Important Railway Work now in hand will mean much for this Maritime Province—Systematic Development of Resources Assured

Within a year the province of New Brunswick will have had 256 miles added to its railway mileage, which, in proportion to the population, is already very large, intersecting the province in all directions.

The construction of the Grand Trunk Pacific in New Brunswick has probably been easier than in almost any other part of New Brunswick or Nova Scotia, but naturally to get the grade required, some very heavy work was necessary. There is one great viaduct, near the falls of Upper Salmon river. While the stream is only 100 feet wide, it is necessary to construct a viaduct across the valley for a length of almost 4,000 feet. It is 200 feet high at the river, and 180 feet high for two-thirds of its entire length, and requires 7,000 tons of steel in construction. The mere statement of these figures indicates the vastness of the structure. There is one tunnel on the line in New Brunswick. It is at the summit of the watershed between the St. John and the Tobique, and is 500 feet long.

Nine Millions Expended up to June 1st

It is estimated that up to June 1st about \$9,000,000 had been expended on the line in New Brunswick, not including the steel work. When completed the whole road through the province will have cost in the neighborhood of \$60,000 per mile.

With the exception of thirteen miles near Chipman, the first 180 miles of the road from Moncton is through a wilderness region. For the first 100 miles it is through one which has very little growing timber, or from which most of the timber has been cut. It is a sandstone country and the soil is regarded as rather poor. A hundred miles from what is called the Campbellton road, the great highway through that section, the character of the country changes. For 20 miles there is a slate formation, and for the next 20 granite, with very little growth. Then comes slate again, and a slate, plaster and limestone country right through to the Quebec boundary, with good farming land. East of Grand Falls for about 70 miles, the line runs through a settled farming country and it is stated, that for some 30 miles, through French settlements with narrow farms, it was necessary to provide a railway crossing about every 100 miles. There is still a good deal to be done here and there along the line before it will be ready for operation. The great Salmon river viaduct is the most tedious piece of work. When completed the road will be first-class in every particular as to grade, roadbed and equipment. President Hays says it will be operated as soon as finished, and thus opportunity will very soon be afforded to enterprising settlers, lumbermen and manufacturers to begin the systematic development of the natural resources along its route.

International Nearing Completion

In connection with railway construction in New Brunswick it is worthy of note that the International Railway, across the province in the north, from the Maine border to Campbellton, making connections with a line to Gaspe, is about completed. It has been under construction for quite a number of years, and opens up a very rich timber country. There are rumors that this line with its Gaspe connection may have something to do with through

business to a winter port at Gaspe, but no authoritative announcement of such intention has ever been made.

Then there is the St. John Valley Railway, the route of which is now being surveyed by provincial government engineers. There has been much talk for many years about a line of railway from Grand Falls down the rich valley of the St. John river to the city of St. John, and it has had its place in many political campaigns. Even now there is not complete harmony between the provincial and federal governments concerning it, though subsidies have been voted and everybody professes a desire to see the work completed. It may be said, however, that the project has been so far advanced that it cannot be long before some plan is adopted to provide the valley people with railroad accommodation.

When the Valley Railway is built, and the Grand Trunk Pacific in operation, along with the Intercolonial and its branches, the C.P.R. and branches, the Intercolonial and the New Brunswick Southern, the province of New Brunswick will be fairly gridironed with railways, making it about the best served in that respect of any province in Canada. Nowhere will the settler be far removed from the railway and the conveniences it brings, while the wide-reaching service should give a decided impetus to the development of provincial resources.

Controller Ainey, of Montreal, has a unique proposition to lay before the Board of Control of that city. The proposal is for the city to build workingmen's tenements or cottages and to rent them at a moderate figure. Mr. Ainey states that the venture has proved a success in England and other countries.

Mr. A. R. Dufresne has been appointed to the position of Assistant Chief Engineer at the Department of Public Works, Ottawa. For some time Mr. Dufresne has been District Engineer of Public Works at Winnipeg. In this capacity he will be succeeded by Mr. W. Z. Earl, formerly of St. John, N.B.

Even the convicts are to be accorded the privilege of taking part in the good roads movement. In conformity with a recent enactment of the Ontario Legislature, a number of prisoners, chained in two's, left North Bay last week for Matheson, Ont., where they will commence work on the highway to the Porcupine gold fields.

Water tank collapses seem to be quite the fashion in the building world now. We read that a water tank on a factory in a Pennsylvania town dropped through the roof and wrecked the building, injuring 16 men more or less seriously. This is the fourth disaster of the kind since the "Herald" fatality in Montreal. This is remarkable in view of the fact that until a short time ago there had been so little trouble from this source. Building accidents, like diseases—appendicitis, tuberculosis, and so on—seem to have their cycles, their periods of ascendancy and decline.

Heading and Bench Methods in Tunnel Work

An interesting example of what can be accomplished by the judicious use of powder and gelatine is to be found in the Southwest Lake & Land Tunnel, at present under construction for the city of Chicago, says "The Contractor." The work in connection is being done by George W. Jackson, Incorporated. At the present time this tunnel extends one mile and a half under Lake Michigan, the entire bore being through tough limestone. When completed the tunnel will extend 11,000 feet under the waters of the lake and 1,265 feet under the land side, making a total of 12,265 feet. The estimated cost for the entire piece of work is \$1,581,090. The work is being done by means of blasting, the tunnel section in the rough being about 16 feet, and the customary heading and bench methods are being employed. The heading and bench are about equally divided, and four Ingersoll-Rand air drills mounted on columns are used in the heading, equipped with cross bits. From April 1 to May 1, 1909, in 27 working days there were driven in the heading 468 feet, establishing a daily record of $17\frac{1}{2}$ feet, which is considered the world's record. There are eight centre cut holes, with four helpers on either side, while to force the remnant twelve rim holes are drilled around the outside. The bench is removed with eight vertical holes, no lifters being used. In order to break



Location of holes Southwest Land & Lake Tunnel for heading

this it requires an average of 225 pounds of 60 per cent. Du Pont gelatine. It takes an average of $1\frac{1}{2}$ hours to blow out and load the holes, which are filled about three-quarters. The men work in two shifts, shooting each shift. Each driller has a helper who arranges steel and makes himself useful in a general way, though generally manipulating the feed screw. The charge is set off electrically, the current from the 110-volt light circuit being used for that purpose. When the blast has been made, a blower is turned on which quickly sucks out the gases remaining in the bore. A feature in connection with this work is the fact that few noxious gases are generated by this type of gelatine. The drillers do their own mucking back for the set up and in turn are assisted by the mucking in tearing down. Very complete reports are kept of this work, a record being turned into the office every hour showing the distribution of all forces and covering every portion of the work. This system was introduced to catch the least leakage in the matter of cost. One blacksmith is sufficient to keep both shifts supplied with the necessary steel.

The State Highway Commissioner of New Jersey in his annual report says that the application of oil upon roads for laying the dust has had a marked effect in driving away mosquitoes.

Town Planning Conference

The Exhibition Committee of the Town Planning Conference of the Royal Institute of British Architects would be glad if architects and others possessing drawings or models illustrating town planning design, which they would be willing to lend for exhibition, would send particulars thereof to Mr. John W. Simpson, Secretary-General of the Conference, 9 Conduit street, Regent street, London, W., at as early a date as possible. The space at the disposal of the committee being limited, they are unable to accept illustrations of buildings other than such as have a definite connection with the subject of town planning.

Technical Education Commission's Exhaustive Tour

The itinerary of the Technical Education Commission has been completed. The first sittings will be held at Halifax, N.S., on July 18, 19 and 20, and others in the Maritime Provinces as follows: Lunenburg, July 22; Liverpool and Yarmouth, 23; Digby, 25; Middleton, 26; Kentville and Wolfville, 27; Windsor, 28; Truro, 29; Sydney and district, August 1, 2 and 3; New Glasgow, 5; Pictou, 6; Charlottetown, 7 and 8; Summerside, 10; Amherst, 12; Shediac, 14; Moncton, 15 and 16; Sussex and Hampton, 17; St. John, 18 and 19; Fredericton, 22; Woodstock, 24.

The commission will then go to the Toronto Exhibition.

The Quebec and Ontario dates are: Quebec, Sept. 13 to 15; Three Rivers, 16; Sorel, 17; St. Hyacinthe, 18; Sherbrooke, 20; Montreal and Valleyfield, 21 to 28; Ottawa and Hull, Sept. 29 to Oct. 3; Lachute, 4; Smith's Falls, 5; Cornwall, 6; Brockville, 7; Kingston, 11; Belleville, 12; Peterboro, 13 and 14; Toronto, 17 to 20; Barrie and Orillia, 21; Hamilton, 24 to 26; St. Catharines, 27; Niagara Falls, 28; Brantford and Paris, Oct. 31 and Nov. 1; Galt, Nov. 2; Berlin and Waterloo, 3 and 4; Guelph, 5 and 7; Stratford, 8; Woodstock, 9; London, 10 and 11; St. Thomas, 14; Chatham, 15; Windsor and Walkerville, 16.

The commission will then go west and stay there till the end of January. On the way back St. Louis, Chicago and Milwaukee will be visited. The commission early in February will go to the Eastern States and then sail for Europe.

The bricklayers' strike at Montreal remains unsettled. While a number of the smaller contractors have agreed to the closed shop principle all the larger firms are standing firm. These declare that if necessary they will bring men from England, although they have a fair supply of men now. The contractors who have signed the demands of the men are mostly in a small way of business.

The Civic Power Committee at Winnipeg are thinking of securing a business manager for the power plant. It is not proposed to have an electrician, but a thoroughly practical man who can arrange rates for the sale of power. First class salary will be paid to the right man. If the recommendation passes the city council, applications will be invited for September 1st, duties to commence October 1st.

The sewage disposal works at Leeds, England, for which the city has recently acquired 600 acres of land, will cost about \$6,214,000, according to a recent Consular Report. The process will include sedimentation, chemical precipitation and treatment on percolating filters. From the works the effluent will flow into the River Aire through a channel $\frac{1}{4}$ -mile long. About 200 acres of the site, it is said, will be utilized for the sludge beds and pressing plant.

From the Federal Capital

Labor Matters Being Adjusted—Ottawa Architects want Government to Standardize Brick—Shortage in this Line

Correspondence of the "Contract Record,"

Ottawa, July 18th, 1910.

There was a tendency in the building trades this year to settle the differences between contractor and employee on July 1st instead of May 1st. While there were no actual changes of wages in these trades on May 1st, July 1st saw two important changes and one pending.

The most important was the change with the plumbers. The journeymen plumbers asked for an eight-hour day the year round, instead of nine, and four hours on Saturday. They also demanded a minimum wage of 43 cents an hour, instead of 36 cents. However, the two parties got together and effected a compromise. An agreement was signed giving the journeymen plumbers a minimum wage of 39 cents an hour. Eight hours is to make up the day from Nov. 1st until May 1st each year, with four hours on Saturday. The remainder of the year (the summer months) they will work nine hours and five hours on Saturday. The agreement is to last for 18 months, and unless a three months' notice is given, will continue from year to year afterwards.

The sheet metal workers also asked for a raise. It was decided, however, to allow 30 cents an hour minimum wage to remain in force until Jan. 1st, 1911, when it will be moved up to 35 cents an hour. The hours were not fixed but will work out much the same as the plumbers are.

The plasterers are asking for a raise of five cents an hour on their present minimum rate, which is about 40 cents an hour. A compromise, however, is expected.

Ottawa Also Short of Brick

All the season there has been an appreciable shortage in the brick supply in this city. One architect had nine jobs held up for some months owing to inability to get brick, and still has two of them inactive on this account. However, the different firms, both in the city and in the surrounding towns, are making a strenuous effort to catch up, and it is believed that by the end of the month there will be little trouble from this source.

Some of the builders and architects are complaining of the variations in the size of brick. Especially was this noticed when contractors had to pick up a lot here and a lot there to keep things going until their regular orders were filled. Not only do the brick vary in the depth of the frog, but often neighboring brick manufacturers are making brick of different dimensions. Some of the architects are in favor of the Government fixing a standard size. There is no scarcity in any other building supplies.

Work on the new museum is nearing completion. Mr. George Godwin is the contractor. The main tower section of the building settled somewhat more than the remainder of the building, which caused cracks to extend from the main floor to the top on each side of the junction of the tower wall to the main wall. However, as this only affects the inside it is not expected that it will injure the building. Mr. Ewart, Chief Government Architect, states that all the settling is stopped now so that there is no danger of trouble. He says that he anticipated this settling, and there is no blame attachable.

At a recent meeting of the executive of the Vancouver Tourists' Association, initial steps were taken to formulate a plan for the development of the city along the modern lines of utility, healthfulness and art. It was considered by the members of the executive that such a plan should be adopted

as early in the history of the city as possible, in order to assure its growing and developing along modern lines and with a view to its future greatness. At the present time there is not any plan set down that could be followed, nor does there seem any great desire to follow a plan that would add to the general attractiveness and healthfulness of the city. The secretary, Dr. Elliott S. Rowe, was instructed to prepare all the information obtainable as to what is being done in other cities in this direction, and to submit this to the executive of the association. It is likely that a league as a department of the Tourists' Association or as a separate body will be organized to promote the adoption of the measure described.

Banner Year at Winnipeg

Some Shortage of Labor, but no Material Delay Thereby — Supplies Available at Right Prices

Office of the "Contract Record,"

Winnipeg, July 16th, 1910.

With the building season little more than half gone, there are in Winnipeg now more than \$7,000,000 worth of uncompleted buildings. This volume of building has naturally drained the labor supply to the last laborer and has resulted in the opening of a number of new building supply houses in the city. Despite the unprecedented pressure of the demand on every branch of the trades, there has been little delay in the schedule of contracts. Individual contractors have on hand at present as much as \$2,000,000 worth of work but report progress favorable and prospects good for finishing inside the time limits.

Materials, while not plentiful, are to be had in quantities sufficient to meet the requirements of the trade from week to week and prices have dropped from the inflated figures asked during spring to the regular mark which makes profit possible.

The condition of the city at present presents a spectacle unrivalled even by the banner year of 1906. Vacant properties in every section of the limits are giving birth to substantial structures and even the heart of the city, which previously seemed well built up, is dotted with innumerable evidences of the building prosperity which has grasped the city this year.

Scarcely any of the ten and a quarter millions of dollars' worth of work commenced this year is yet completed, and from this fact the demands on the building trades can be readily estimated. The city has been singularly free from labor disputes, as the scales of wages paid are up to the demands of artisans, and contractors are generally willing to pay equitable wages for competent men. The painters, whose strike is not yet officially settled, are practically all back at work with other employers, while non-union men have taken the places of the strikers in the old shops.

Apartment blocks, which have been the feature of the building season, are getting well toward completion in many sections of the city. This class of building is generally started early in order to cater to the fall return of tenants to the city. A few such structures were held up for a couple of weeks during the early season by the scarcity of brick, but overtime has brought the work up to schedule. On several of the larger works, overtime has featured progress. Where men could be obtained to do the work the contractors have attempted to get the contracts off their hands as rapidly as possible, hence the overtime.

The building situation is, generally speaking, the best yet experienced and the outlook for the Canadian record for the year, from this angle, at present appears almost certain.

The total building returns for the year to July 15th, are \$10,238,650; representing 2,355 buildings and 1,928 permits.

Trade News from Montreal

Present Strike an Injustice to Master Builders—Permanent Committee Appointed by Exchange—The Supply Market

Montreal Office of the "Contract Record,"
July 18th, 1910.

The strike of the Montreal mason and brick contractors, involving as it does such an important department of the building trade in this city, forms the feature of the local building situation at the present time.

This move on the part of the members of the local union, coming as it did in the midst of a prosperous building season, was most unfortunate and has already been detrimental, in general, to the building interests of this city.

The strike is the more unfortunate because of its apparent injustice to the master builders of Montreal, and their stand in refusing to bow to the demands made upon them is most admirable. In the first place, the strikers are not out because of a general dissatisfaction with the prices paid for their labor. In point of fact, contractors were paying their men according to their different abilities and we understand that it was possible for good men to earn as high as 60 cents per hour. Rather are they striking for the recognition of certain principles, a closed shop, etc., the salient features of which at the best are not quite clear.

In the meantime the master builders have taken a firm stand in respect to this question and have refused to recognize the demands made by the union. Construction work is, as a result, proceeding with a lack of the vim which should characterize it at this season of the year with such a large number of contracts on hand. Concrete work, however, is not affected and an extra activity is reported in this direction.

The local union is being backed up in their fight by the International Union, whose headquarters are located in the United States, and the money which is being distributed in support of the movement is largely forthcoming from this source.

J. H. Bernier, president of the strike committee, claims that 130 contractors have acceded to the demands made by the union and have signed a two years' agreement to that effect. This, while partially admitted by the master builders, means practically but little when it is considered that these contractors mentioned are the small men, a great number of whom do their own work, and who altogether do not employ as many of the strikers as would any one of the larger contractors holding out against the demands of the union.

The headquarters of the master builders is the Montreal Builders' Exchange, and during the past few weeks Secretary J. H. Lauer has been an exceedingly busy man. A permanent strike committee has been appointed to receive any overtures which the strikers may make and consists of the following members of the Exchange: Messrs. E. G. M. Cape, J. P. Anglin, James Murphy and H. R. Hutchison, all prominent members of the local contracting firms.

Just how long the present conditions will last is difficult to figure, but it is generally considered that the dwindling of the strike funds will find the masons' and bricklayers in a different frame of mind and more ready to consider propositions concerning a return to their neglected work.

News of Supply Market

In general, local supply markets have not been particularly active during the past fortnight, and this must be attributed to the unsettled conditions of the labor situation.

Cast iron water pipe continues in good demand with prices ranging as follows, f.o.b. Montreal, per net ton: 4-inch, \$32.50; 6-inch, \$32; 8-inch, \$31; 12-inch, \$30.

Cement has all through the season moved quite freely and from the headquarters of the Canada Cement Company, we

learn that the demand is excellent at present. According to Mr. W. H. Forde, sales manager of the Canada Cement Company, prices of local cement remain unchanged while during the past two months United States markets have made two strong advances. Prices are as follows, f.o.b. Canadian centres (exclusive of cost of package): Montreal, \$1.40; Toronto, \$1.60; Fort William, \$1.50; Winnipeg, \$2.20; Calgary, \$2.60; Ottawa, \$1.40; Halifax, \$1.50.

Montreal Park Commission

At a special meeting of the Provincial Cabinet held at Quebec recently the Metropolitan Parks Commission was appointed. This commission is to be composed of the following members: J. L. Perron, K.C., M.L.A. (chairman); Sir William Van Horne, Controller E. P. Lachapelle, W. D. Lighthall, K.C., Mayor Alexander Michaud, of Maisonneuve, J. A. David and J. C. Walsh, Montreal.

The appointment of this commission was sanctioned by a special Act passed by the Legislature last session and was appointed to study the question of the establishment of a system of parks and boulevards throughout the island. They will receive all suggestions and will collect information regarding the probable cost and other details of such plans. They are empowered to hear experts and to visit other places for the purpose of inspecting park systems, which have been established. They will make a report which will be considered by the Government and submitted to the Legislature next session, when a bill will probably be introduced authorizing the commission to go ahead with the work which they have mapped out.

The cost of the commission is to be divided between Montreal and the other municipalities of the island, the city, of course, paying the largest share. The commissioners will receive no salary, but the secretaries of the commission will be salaried officials and will devote their whole time to the work.

Several plans for boulevards and parks have been submitted already, including one by Mr. William Lyall for a boulevard through the city, which has met with popular favor and which will likely be one of the first plans considered by the commission. His scheme, which has already been described in these columns, provides for a wide boulevard from east to west through the city, following the present line of Ontario and Burnside Place, which may ultimately be extended throughout the length of the island.

New Land Surveying Office

Mr. Malcolm D. Barclay, who has been associated with Mr. Jos. Rielle for some years, has opened an office in the Lake of the Woods Building, where he will continue his profession as land surveyor and civil engineer. Mr. Barclay is a graduate of McGill University and a member of the Corporation of Quebec Land Surveyors.

Marriage of Mr. William S. Leslie

Mr. William S. Leslie, president of the firm of A. C. Leslie & Company, Limited, and Miss Margaret Wilson, daughter of the late James R. Wilson, of Sanquhar, Scotland, were married on June 15th. The ceremony was conducted in St. Helen's Church, Sanquhar, by the Rev. J. Richmond Wood, assisted by the Rev. J. Scott, of Toronto. Mr. and Mrs. Leslie are expected in Montreal about the end of August. The "Contract Record" extends heartiest congratulations.

Montreal Dry Dock Plans

An Ottawa dispatch of recent date says that the application of Vickers, Sons & Maxim for a dry dock subsidy at Montreal will probably not be finally dealt with by the Cabinet Council for some time yet, pending the examination of plans, etc., by the engineers for the Public Works Department and a report thereon.

Notes

According to an estimate recently prepared by the road department it will take seven years and cost \$20,000,000 to

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aylmer, Ont.

This municipality is calling for tenders until July 31st for the purchase of \$21,000 waterworks extension debentures, etc. Jas. Bradley, town clerk.

Beaurepaire, Que.

Tenders for making about one mile of roadway from the main highway to G.T.R. station, are called until July 28th by C. L. Shorey, 475 St. Catherine street east, Montreal.

Collingwood, Ont.

It is probable that a by-law will be submitted for authority to spend about \$5,000 on the increase of water supply. K. S. Macdonnell, town engineer.

Estevan, Sask.

Tenders addressed to L. A. Duncan, secretary-treasurer, will be received until August 24th for pipe-laying on storm sewers; power house; two return tubular boilers; high speed steam engine; electric lighting system; and sewer pipes. Plans, etc., at office of Chipman & Power, engineers, Winnipeg and Toronto, and at the town hall. For further particulars see advertisement in this issue.

Lethbridge, Alta.

The by-law for the expenditure of \$148,000 on waterworks and sewers was carried. \$35,000 will also be spent on streets and \$12,000 on steam shovels and other equipment.

London, Ont.

Tenders for sewers on Sydenham and Miles streets and Dufferin avenue will be received until July 28th. G. W. Wright, deputy city engineer.

Moose Jaw, Sask.

The \$375,000 by-law for sewer and waterworks extensions was carried; also that for \$20,000 for road improvements; also that for \$12,000 for concrete sidewalks; also that for \$20,000 for permanent improvement of roads.

Medicine Hat, Alta.

A by-law to expend \$45,000 on waterworks extension will be submitted to the ratepayers on August 15th.

New Westminster, B.C.

The ratepayers have passed a by-law to issue \$150,000 street improvement debentures.

Outremont, Que.

The following list of tenders for sewers has been sent in: R. T. Smith & Company, Montreal, \$1,928.50; W. G. McDonald, \$2,434.00; W. Duquette, Montreal, \$1,169.01; M. Lapointe, Montreal, \$1,183.

Outlook, Sask.

The ratepayers carried the \$25,000 waterworks by-law.

Orillia, Ont.

Tenders addressed to A. E. Cavana, O.

L. S., engineer for Township of Medonte, will be received until July 29th for the construction of drain No. 7. Plans, etc., with T. D. Robinson, clerk, or at the office of the engineer.

Prince Albert, Sask.

City Engineer Creighton has submitted plans for a trunk sewer to cost \$94,994. Construction will start as soon as the Provincial Health Department approves.

Peterboro, Ont.

Chipman & Power, consulting engineers of Toronto, are preparing plans for sewerage in the south end. Tenders to include sewer construction, pumping station, machinery, etc., will probably be called in a few weeks' time. T. S. Hay, city engineer.

Penetanguishene, Ont.

On August 2nd by-laws will be voted on to issue the following debentures: \$2,075, 20 years, for cement walks; \$2,078, 20 years for sewer construction; \$24,220, 30 years for payment of floating debt; \$3,280, 20 years for sewers, culverts and water meters. The above debentures all bear 5 per cent. interest. W. H. Howson, town clerk.

Sydney, N.S.

The pelbiscites on water extension and subway received favorable verdicts.

St. John, N.B.

The tenders for the permanent pavement in Germain street were considered, and it was resolved to call for new tenders. Under the new call the tenderers will be asked to submit samples of the asphalt they propose to lay, for analysis, on which the engineer will report.

Steeltown, Ont.

The plan submitted to the Provincial Board of Health for sewerage disposal was not approved.

St. Thomas, Ont.

Tenders will be received until July 27th for the clear water concrete reservoir at the waterworks. Jas. A. Bell, city engineer.

Swift Current, Sask.

By-laws for sewerage, sewage disposal and water supply were carried. J. Darlington Whitmore, of Regina, engineer.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until August 2nd for supply of water meters for the year. Specifications at office of city engineer.

The one tender for the 500-foot extension, etc., quoted \$35,000. Engineer Fellows' estimate, \$20,000. Referred to the engineer for report.

The Provincial Board of Health has approved plans for sewerage disposal at Alma, Oshawa, Tillsonburg and Trenton.

Tenders will be received until August 2nd for supply of floor tile for the filtration plant. G. R. Geary, Chairman, Board of Control.

Victoria, B.C.

The C. P. R. has decided to lay Hassan pavement on the roadway through the Empress hotel grounds. The estimated cost of the work is \$4,000.

Verdun, Que.

The town council have decided to replace the old board sidewalks with concrete. Work has already been started on the Lower Machine road. Five miles of sidewalk will be laid before the autumn.

Winnipeg, Man.

Pavements, walks and sewers, totalling \$224,506, were passed by council at last meeting and will be advertised for tenders.

AWARDED.

Brampton, Ont.

The contract for construction of 7,200 square yards of macadam roadway was given to John Conn, Windsor, at 88 cents per yard; that for grading to same at 39 cents per square yard.

Chatham, Ont.

The County Council have awarded the contract for paving the south approach of Kent bridge to the Fielder Paving Company.

Foam Lake, Sask.

C. H. Conery and C. Mattaini, of Guelph, Ont., were awarded a contract for construction of 13,000 square feet of concrete sidewalk, at 16 cents a square foot for walks, and 63 cents a lineal foot for curb.

Hamilton, Ont.

J. J. Armstrong was given the contract for sewers in the following streets: Barton, Bay to Park, at 47 cents a foot; Simcoe street, James to Hughson streets, 44 cents a foot, and Fife street, 60 cents a foot.

New Westminster, B.C.

The contract for the laying of the new Coquitlam pipe line has been let to the Municipal Construction Company for \$108,557.57.

Ottawa, Ont.

The Ottawa Construction Company has been awarded the contract for surfacing in asphaltic mixture the drives leading to and from the House of Commons at 65 cents per yard.

Prince Rupert, B.C.

The Westholme Lumber Company got the contract for a million feet of lumber for sidewalks at \$15,000.

Victoria, B.C.

The contract for the supply of 13,000 yards of sand for the filter beds at Elk lake will be awarded by the city to Messrs. Simons & Merryman, at \$1.10 per yard. Four hundred enamel street names will be purchased from the Thomas Davidson Manufacturing Company, Montreal, at a cost of 37 1/2 cents each. Tenders for these signs were called for some time ago, but only one bid was received of eighty five cents each.

Railroads, Bridges and Wharves

Dover, N.S.

Tenders for wharf here have been called until August 15th by the Public Works Department. Plans at offices of district engineers at Halifax and Antigonish, R. C. Desrochers, assistant secretary.

Elmira, Ont.

On the 1st of August a by-law will be submitted to the ratepayers to authorize the expenditure of \$25,000 for cement arch bridge on Arthur street.

Kenora, Ont.

Plans for the new subway under the C. P. R. track on Main street were received from Geo. A. Montain, chief engineer of the railway commission. It is understood the C. P. R. have already approved of the plans, and construction will be commenced within the next month.

New Westminster, B.C.

The ratepayers have passed a \$30,000 bridge by-law.

North Vancouver, B.C.

By-laws will be submitted to the ratepayers asking for authority to issue \$100,000 debentures for the purpose of subscribing for stock in the Second Narrows Bridge Company.

Ottawa, Ont.

The C. P. R. accepted options on property aggregating \$125,000 adjacent to their present freight yards on Sussex street. The company proposes to considerably increase their present train yard.

Port Arthur, Ont.

It is stated that tenders for extension of breakwater will be called shortly.

Port Felix, N.S.

Tenders are being called until August 15th by the Public Works Department for construction of wharf, etc., here. R. C. Desrochers, assistant secretary.

Richibucto Cape, N.B.

Tenders for extension to breakwater will Ottawa, until August 17th. Plans, etc., be received at Public Works Department, at offices of E. T. P. Shewen, district engineer, St. John; G. Stead, district engineer, Chatham, and on application to local postmaster.

Regina, Sask.

The C. N. R. has applied for permission for joint terminals with G. T. P. for the passenger traffic.

Sault Ste. Marie, Ont.

Tenders will be received until July 30th for the supply of 250,000 standard railway ties for the Algoma Central Railway, etc. For information apply General Superintendent, Sault Ste. Marie.

Toronto, Ont.

A conference was held on the 21st inst. between promoters of a terminal railway station in this city, and the Board of Control and representatives of the Board of Trade. The promoters comprise the following New York men: F. M. Andrews, architect; G. V. Hedden, contractor; A. P. Gillies, and F. E. Townsend. A scheme will be submitted later which, it is stated, will obviate the necessity of viaducts, etc. Messrs. Townsend and Eakins will open an office here.

Tenders are being called by the Board of Control for construction of reinforced concrete viaduct on Weston road, until August 9th. For particulars see advertise-

ment in "Tenders and For Sale Department," this issue.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until September 6th for construction of steel viaduct on Queen street over the Don river, etc. Plans, etc., at office of Bridge Department, City Hall. For further information, see advertisement in "Tenders and For Sale Department" of this issue.

The Board of Control authorized the city engineer to advertise for tenders for ties and rail for the proposed civic industrial railway to be laid on the east side of the Don.

Winnipeg, Man.

It is found that the contract price of the Brant and Brown street overhead bridge exceeds the amount voted for the purpose by several thousand dollars and the work may be held up until a supplementary by-law for the additional amount

AWARDED.

Cornwall, Ont.

The following list of tenders for concrete arch bridge over River de Lisle, 1½ miles north of Alexandria, has been sent in:—Morpaw & McDonald, St. Andrews West, \$2,066.25 (accepted); McDonald & McDonald, Alexandria, \$2,393.07; Chisholm & Quinn, St. Andrews West, \$2,511.45; G. R. Phillips, Cornwall, \$2,477.25; Helmer & Winstanley, Russell, \$2,527.31; D. G. McMillan, Finch, \$2,535; A. Cameron, Alexandria, \$2,196. W. H. Magwood, county engineer. Dimensions of bridge, 32-foot span and 18-foot roadway.

Orangeville, Ont.

The Hunter Bridge & Boiler Works, Kincardine, were awarded the contract for steel truss highway bridge in Township of Chinguacousy. C. R. Wheelock, engineer Peel County.

Public Buildings, Churches, Schools, etc.

Aylmer, Que.

Tenders are being called for a 2-room addition to the Academy at Aylmer, Que. The addition will be of stone, costing about \$5,000. M. C. Edey, architect, Ottawa.

Bellville, Ont.

A by-law is soon to be voted on to issue \$30,000 school debentures.

Brantford, Ont.

A building permit has been issued for the erection of the new St. Basil's school. Cost, \$19,900.

Chatham, Ont.

Wilson & Son, architects, are preparing plans for a ventilation system for the House of Refuge.

Chilliwack, B.C.

A site has been purchased from Mr. S. A. Cawley, M.P.P., upon which the new city hall will be at once erected.

Tenders were received until July 23rd for the erection of hospital. Plans, etc., at office of the Snelgrove-Waddington Company.

Darlington, Man.

A new public school to cost \$8,000 will be erected here shortly.

Edmonton, Alta.

Tenders will be received until August 6th for \$115,000 5 per cent. 30-year, and \$30,000 5 per cent. 10-year school debentures.

Fort William, Ont.

The site for the court house and police station has not yet been selected.

Fredericton, N.B.

A committee formed of Rev. J. H. MacDonald, Rev. Dean Schofield, Rev. Father Carney, Messrs. E. Moore and D. Fraser have been appointed to look into the matter of the enlargement of hospital here.

Grand Forks, B.C.

Government Architect Henderson has plans for the new post office. The new building will be a two-storey brick structure and will cost \$40,000.

Halifax, N.S.

Tenders addressed to R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa, will be received until August 3rd for fittings for savings bank. Plans, etc., on application to Mr. D. A. Hewitt, architect, custom house, this city, and at the above department.

Kingston, Ont.

The Board of Education decided to have plans and estimates prepared for one or more school buildings, and later to ask council for necessary funds for same.

Tenders were called until July 22nd for erection of synagogue. Power & Son, architects.

Mitchell, Ont.

Plans for the reconstruction of the town hall here are being prepared by Architect T. J. Hepburn, of Stratford.

Montreal, Que.

Plans have been prepared and tenders will be received until August 4th for the construction of Maisonneuve Town Hall. Mr. C. Dufort, architect.

It has been decided to have more extensive plans prepared for the new Montreal Art Gallery. Estimated cost now \$300,000. D'Archambault stone will be specified, and the building will be two storeys in height. Associate architects, Mr. Edmund Wheelwright and Messrs E. & W. S. Maxwell.

Plans and specifications have been prepared and tenders will be received until August 2nd for the erection of the Academy Garneau, on Visitation street. Marchand & Haskell, architects.

Building permit was issued to Chalmers Presbyterian Church, St. Lawrence Boulevard, \$90,000. Reid, McGregor & Reid, contractors.

Niagara Falls, Ont.

On August 1st by-laws will be voted on to issue \$2,500, 20-year, 5 per cent. Fire Hall debentures; \$15,000 30-year 5 per cent. Collegiate Institute.

New Westminster, B.C.

A \$12,000 church is to be built on Sixth avenue, between Eleventh and Twelfth streets, by the Sixth Avenue Methodists.

The \$60,000 school bylaw was defeated. It will likely be submitted again shortly in a different form.

Oriole, Ont.

J. R. Whittaker is receiving tenders until July 31st for erection of school, section 11, East York.

Orillia, Ont.

Tenders addressed to J. R. Robertson, architect, will be received until July 30th for the erection of Sunday school building for the Baptist church. Plans, etc., at office of the above.

Ottawa, Ont.

A party of architects from New York have been taking measurements of Bank

Street Presbyterian Church to ascertain its adaptability for a theatre. This church is for sale, the congregation having secured a site for a new building.

Tenders addressed to R. C. Desrochers, assistant secretary, Department of Public Works, will be received until August 3rd for post office fittings, this city. Plans, etc., at above department.

Prince Albert, Sask.

Plans have been prepared by Architect Ambrechtson for the theatre here. Noted in issue of July 13th.

Peterboro, Ont.

Hon. Senator Cox has offered the authorities of the Charlotte Street Methodist Church \$10,000 towards the erection of a new church on the present site, or a site at the head of Simcoe street, or \$25,000 and a site for the erection of a new church on Belmont avenue.

Quebec, Que.

Tenders are called until the 28th inst. for construction of fire hall at Limoilu. W. D. Baillairge, city engineer.

Tenders addressed to R. P. LeMay, architect, Quebec, will be received until August 4th for supply and installation of the following apparatus for the Technical School here: complete forced hot water system, etc.; plumbing system; clock and telephone system; wiring and lighting fixtures; motor generator set; 55 k.w. vertical engine and 25 k.w. horizontal engine; d.c. electric generators; storage battery and booster; electric motor equipment; switchboard installation. Plans, etc., at office of above mentioned or at office of Canadian Domestic Engineering Company, consulting engineers for the Commission, 5 Beaver Hall Square, Montreal. The tenders are requested from contractors in Quebec province. A. Galipeault, secretary, Commission Ecole Technique de Quebec.

Regina, Sask.

The library board will call for plans for fireproof building to cost not more than \$40,000, and be in the hands of the board by September 1st, 1910. The site has been acquired at the corner of Twelfth avenue and Lorne street.

Saskatoon, Sask.

Tenders were called until July 27th for erection of college barns and three houses for the University of Saskatchewan. Plans, etc., at office of University, or at office of architects, Brown & Vallance, Montreal.

St. Thomas, Ont.

The Roman Catholics of this city, it is stated, will either erect a new church or remodel the present one next year.

Stratford, Ont.

A by-law will be submitted to the rate-payers shortly to authorize the expenditure of \$5,000.

Smith's Falls, Ont.

The tenders received for the new hospital were too high. Plans are being revised and new tenders will be called.

The award of the arbitration on the site for the school has not been accepted by the school board.

Toronto, Ont.

The following permits were issued recently: Sisters of St. Joseph's Community House, Power street, \$50,000; Board of Education, alterations to the public school corner Richmond and York streets, \$24,000; Reformed Presbyterian Church's new edifice, Bloor street east, \$12,000, and St. Barnabas Church's new building at the cor-

ner of Danforth and Hampton avenue, \$12,000.

It is stated that 592 Sherbourne street, owned by H. Gooderham has been purchased as a site for Branksome Hall (Girls' School). Miss M. T. Scott is principal.

Tenders addressed to H. F. McNaughten, secretary Public Works Department, will be received until July 28th for construction of conservatory and green-houses at Normal School here. Plans, etc., at above department.

The congregation of Riverdale Presbyterian Church have decided to purchase 40 additional feet on Pape avenue, thus giving the new church a frontage of 160 feet. Rev. J. A. Miller, pastor.

A permit has been issued for the erection of a two-storey Sunday school building in connection with the Bathurst Street Methodist Church, corner Bathurst and Lennox street, \$30,000.

Plans for the new Masonic Temple on College street, south of Markham, have been prepared. When approved by city architect, tenders will be called.

Tenders were called until July 25th for masonry work in connection with the enlargement of Earlscourt School. Plans, etc., at office of the Board, City Hall.

Victoria, B.C.

Tenders were called until the 20th for erection of a 4-storey club building on Rae street for the Alexandria Club. D. C. Frame, architect. Noted previously.

Vancouver, B.C.

The Cedar Cottage Orangemen will build a hall on the Flett road. The directors consist of the following: President, Rev. J. C. Madill; secretary, W. T. Broderick, etc. As soon as plans are finished, construction will begin.

Windsor, Ont.

Essex County Council have decided to accept the offer of A. L. Irion to erect a modern office building at the corner of Ouellette avenue and London street, to be used for county offices. Ald. Banwell is interested.

Winnipeg, Man.

The new Children's Hospital, for which \$25,000 has been collected, will be modelled after the Hospital for Sick Children in Toronto. Noted previously.

Tenders are being called until August 1st for the construction of a new home for the Westminster church congregation. J. H. G. Russell, architect.

AWARDED.

Edmonton, Alta.

The contract for erection of school for Order of Oblates of Mary Immaculate has been awarded to McSporran Company. Barnes & Gibbs prepared the plans.

Montreal, Que.

The contract for rebuilding the Catholic church at Cote St. Paul, destroyed by fire in 1907, has been awarded to Contractor Martineau. Estimated cost, \$40,000.

Moose Jaw, Sask.

We are informed that the contract for erection of Isolation Hospital has been awarded to Ellis Bros., at \$11,350. Higgins & Moir got the contract for heating and plumbing at \$2,600. W. Zimmerman, architect; also that Willoughby & Hay were awarded contract for sub-fire station at \$4,595. All three local contractors. Architect for fire-station, J. M. Wilson.

Ottawa, Ont.

Eastwood Public School Board has awarded contracts for a new four-roomed

school. The aggregate of the tenders awarded was \$10,545. C. J. Burritt is architect. W. G. Adamson gets the contract for masonry, bricklaying, etc., and carpentering, for \$6,785. Others receiving contracts were Frank Hunt, plastering; J. R. McLennan, plumbing and heating; Modern Machine Company, galvanized iron work; George Higman & Sons, painting and glazing; T. E. Hobson, electric wiring.

Strathcona, Alta.

The contract for the new school has been awarded to Wm. Deitz, the lowest, at \$12,900. The tenders ran as high as \$17,000. Wilson & Herrald, architects.

Saskatoon, Sask.

Blum & Delbridge, of Cleveland, O., it is reported, have secured the contract for the cut stone required in the five buildings at the University of Saskatchewan at \$87,000.

St. Catharines, Ont.

Mr. S. P. Gourlay has secured the contract for the plumbing at the Nurses' Home, and Mr. John Peart has obtained the contract on the new addition to the hospital.

Taber, Alta.

The following tenders were received for the erection of new school: E. R. Wildman, \$52,975 (accepted); Hotsen & Leader, Lethbridge, \$59,980; J. E. Lusier Construction Company, Lethbridge, \$55,000; R. A. VanOrman, B. A. Stringum, Taber, \$52,975.

Toronto, Ont.

W. J. Maguire & Company will instal the steam heating plant in the Allan Gardens palm house at \$3,970.

Waterford, N.S.

The following tenders for jail were received: Rhodes, Curry & Company, Sydney, \$2,475; F. L. Dixon, Sydney, \$2,034.90; J. R. Martin, Sydney, \$1,825; Daniel Gilha, Waterford, \$1,650; Angus McEachren, Langan, \$1,549 (accepted).

Residences

Fort William, Ont.

Tenders are called until July 27th by Hood & Scott, architects, for erection of two residences.

Mansonville, Que.

The following residences were destroyed by fire recently: Mayor Perkin's brick residence, \$5,000; Mrs. Burhardt's residence, \$5,000.

Montreal, Que.

Plans and specifications have been prepared and tenders will be received up to August 2nd for the erection of residence on Elm avenue, Westmount, for Mr. F. Berling. Mr. C. Dufort, architect.

Plans are being prepared for the erection of a residence on Western avenue, Westmount, for Mr. J. P. Vanier. C. Dufort, architect.

A residence is being erected at Isle Cadieux, Que., for Mr. R. P. Cowen, by Jas. Williams, contractor. Plans prepared by Mr. T. B. Daniel, architect, Beaver Hall Square.

The Advance Realty Company, Sherbrooke street, through their construction department, are erecting an apartment house on Bishop street to cost \$40,000.

Ottawa, Ont.

C. J. Burritt, architect, is preparing plans for a residence for Hugh Flemming on Beeser street.

George L. Orme is preparing to erect a country home near the golf links. W. E.

Noffke, architect, is calling for tenders. Estimated cost, \$10,000.

W. E. Noffke, architect, is calling for tenders for a residence on the Driveway west of Bank street. Estimated cost, \$13,000.

Toronto, Ont.

Mr. Hume Blake has been granted a permit to erect a two-storey addition to his residence in Clarendon avenue. Cost, \$25,000.

Victoria, B.C.

A contract will shortly be let for the construction of a two storey residence for W. S. Drewry, Chief Water Commissioner. Cost, about \$6,000. P. Leonard James, A. R. A. I. C., is the architect.

Building permits for residences were issued to J. C. Pendray, Belleville street, \$5,500; to Alexander Peden, Richardson street, \$4,500.

Vancouver, B.C.

Messrs. Thornton & Jones, architects, have prepared plans for a 4-storey apartment house on Hastings street for Mr. C. Tweedale; also of a two-store and apartment blocks on Broadway for Mr. C. R. Gilbert; also for apartment house on Westminster east.

AWARDED.

Montreal, Que.

Contracts have been awarded as follows in connection with the erection of two residences on Cedar avenue for Mr. G. A. Campbell: Masonry and brickwork, Messrs. Ward & Baldock; carpentering, W. Evely; roofing, Sibley & Muot; steel work, Dominion Bridge Company; plastering, D. A. Bethune; hardware, Jas. Walker & Company; plastering, Clarke & Sons; painting, R. E. Jones. Messrs. McVicar & Heriot, architects.

Mrs. H. S. Phillips is erecting an apartment house on Dorchester street west, to cost \$22,000. Contract for the erection of same has been awarded to Alex. Brosseau, contractor, 561 Maisonneuve street. Architect, Theo. Daoust, 90 St. James street.

The contract for the erection of two houses for Mr. S. H. Ewing, 100 Cote des neiges road, has been awarded to Francis Villeneuve, contractor, 1785 St. Lawrence Boulevard. Mr. Graham White, architect.

Oshawa, Ont.

Contract for brickwork of a new residence for Geo. MacLaughlin, Esq., Simcoe street, was awarded to Robt. Bennett, Euclid avenue, Toronto.

Ottawa, Ont.

James Mather has been chosen architect for an apartment house and stores to be erected on the corner of Dalhousie and Murray streets; M. Drazin, owner. The general contract has been awarded to John Robertson & Son. The building will cost over \$18,000.

Jas. MacLaughlin has been awarded the plastering contract for the apartment house which Patrick LaBelle is erecting corner Metcalfe and Gilmour streets, \$4,000.

Business Buildings and Industrial Plants

Brandon, Man.

Pratt & Ross, architects, Winnipeg, for the C. N. R., will receive tenders until July 30th for construction of hotel and depot.

Blairmore, B.C.

The large mill and lumber yard, the property of Peter McLaren, located near here, were destroyed by fire recently with a loss of \$50,000.

Brandon, Man.

The fifth and sixth storeys of the Empire Hotel were damaged by fire to the extent of about \$24,000 on the 24th inst.

Brantford, Ont.

The Brantford Brewery, owned by Westbrook & Hacker, was completely destroyed by fire on the 23rd inst. Loss about \$50,000. Proprietors will rebuild.

Calgary, Alta.

The C. N. R. announces that it will build in Calgary a combined depot and hotel, on the corner of Tenth avenue and Tenth street, to be designed after the Royal Alexandra in Winnipeg.

Chatham, Ont.

It is stated that the International Harvester Company, of Chicago, has secured the control of the Chatham Wagon Company, of this city, and that they will eventually extend the plant. Present Board of Directors of latter company include President, Manson Campbell; vice-president, H. Malcolmson, etc. Plans also include a \$75,000 addition to International Harvester Company in London.

Highgate, Ont.

The Dobson block was destroyed by fire on the 21st inst. Estimated total loss, \$17,000.

Hamilton, Ont.

Lindsay A. Wardell, brick addition to hotel building, Mulberry and James streets, for Mrs. G. Case, \$4,500.

London, Ont.

The Bell Telephone Company have secured a lot next to the local exchange. No additions will be made this year.

Mansonville, Que.

The properties destroyed by fire in the recent fire are as follows: Commercial House, loss about \$6,000; George Holmes' store, loss about \$6,000.

Montreal, Que.

Tenders will be received up to July 28 for the erection of a four-storey business building on St. Lawrence Boulevard, for the City House Furnishing Company. Mr. C. Dufort, architect.

Plans and specifications have been prepared and tenders are now being received for the erection of a factory building at Cote St. Paul for the Marx-Rawolle Company, of Canada, Limited. Messrs. Saxe & Archibald, architects.

Tenders were received up to Wednesday July 27th for the erection of a five-storey reinforced concrete, cold storage building on Dorchester street for Mr. Gatehouse. Mr. A. Piche, architect.

The Carsley property on St. James street will be converted into a hotel and restaurant. The group of men who acquired the building have sub-let the property to Freemans, Limited, who are planning to spend \$350,000, it is said, in fitting up a first-class restaurant and hotel, remodelling the entire building to suit their requirements. The present building will be remodelled and there will be constructed in the centre of the building a rotunda, which will lead into the restaurant and the connecting stores. The Carsley property now taken over consists of about 12,800 square feet

of land and the five-storey building thereon. In addition, the company have leased the adjoining premises on Notre Dame street from the Caverhill estate. This has an area of about 18,000 square feet.

Owen Sound, Ont.

In the fire here on the 22nd inst. some of the losses are reported as follows: Davis, Smith & Malone, \$22,000; MacLaughlin, Son & Company, \$7,000; Godfrey & Sibbald, \$7,000; Dominion Transportation, Northern Navigation Company and George Herbain, together, \$5,000.

Ottawa, Ont.

J. Freedman is having plans prepared for four stores on Rideau street. W. E. Noffke, architect.

M. C. Edey, architect, is calling for tenders for shop and dwelling at corner of Bronson avenue and James street. Cost, about \$8,000.

Prince Rupert, B.C.

The Prince Rupert Wholesale & Liquor Supply Company propose erecting suitable premises for their business here.

Preston, Ont.

The Ballantine by-law which was to have been voted upon on August 1st has been withdrawn at the request of the company.

Peterborough, Ont.

Tenders are called until July 30th for erection of brick foundry. W. Blackwell, architect.

Port Arthur, Ont.

The Riley-Ramsey Company, Lincoln street, will erect a four-storey and basement warehouse on Water and Cameron streets. Work will not commence until the spring. W. P. Riley, president.

Prince Rupert, B.C.

J. Hamblin's bakery and Peterson & Olsen's hotel were destroyed by fire on the 19th inst.

Regina, Sask.

Tenders were called until July 25th for erection of warehouse for National Drug & Chemical Company. Storey & Van Egmond, architects.

Ruskin, B.C.

The E. H. Heap Company's lumber mill here was burned last night. The loss is estimated at \$50,000.

St. Stephen, N.B.

The Maritime Edge Tool Company purpose enlarging their buildings, in consideration of which exemption is asked.

Seaforth, Ont.

On August 8th the ratepayers will vote on a bylaw to guarantee the Bell Engine & Threshing Company to the amount of \$50,000 in return for which the company will enlarge their plant.

St. Andrews, N.B.

It is announced that the C. P. R. will add another large concrete wing to the Algonquin Hotel here this fall.

Sydney, N.S.

The plebiscite taken here on the 20th re bonus for shipbuilding plant mentioned in issue of July 13th was favorable to the grant.

Saskatoon, Sask.

The Hill Manufacturing Company (sash and door factory) state that they will not rebuild at once their plant recently destroyed by fire.

Tupperville, Ont.

The grain elevators of R. F. Stover were destroyed by fire on the 19th inst. Loss is estimated at about \$20,000.

Three Rivers, Que.

The foundry and machine shop of Bellefeuille & Frere were destroyed by fire on the 21st inst. The loss will be about \$10,000.

Torrance, Ont.

The hotel here on Lake Muskoka was destroyed by fire recently. Loss, about \$10,000.

Toronto, Ont.

The following permits were issued recently: Wm. Neilson's Company's factory, Gladstone avenue, \$35,000; Otto Higel's addition to factory, King and Bathurst, \$15,000.

The storage sheds and eastern dock of the Niagara Navigation Company are reported damaged by fire on the 24th inst. Estimated loss, about \$20,000.

Tenders addressed to Darling & Pearson, architects, will be received until July 30th for trades required in the erection of branch building for Imperial Bank on the corner of Queen and Roncesvalles.

Victoria, B.C.

Damage to the extent of about \$3,000 was done to the B. C. Fur Manufacturing Company, Government street, on the 11th inst.

A building permit was issued to George Carter for a two-storey brick building on the south side of Courtney street between Douglas and Blanchard streets, to cost \$4,500.

Vancouver, B.C.

The stock exchange have secured a central site for a new building.

The Maple Leaf Milling Company will establish warehouses here. Hedley Shaw, president, is at present at the Coast.

The British Columbia Piano Company, Limited, will locate a factory, it is stated, at 1670 Cordova street. President, J. Auld; secretary, F. H. Lewis.

Building permit was issued to the Vancouver Trust Company for a bank block on Pender street between Granville and Seymour. Estimated cost, about \$50,000.

A building permit was granted to Mr. F. Morgan covering a brick business block at 242 Hastings street east. The building will be three storeys in height and cost \$25,000.

Mr. O. Kahlert, Chicago, Ill., has been in communication with the civic market and industries committee here in regard to the establishment of a wire window screen factory. He purposes making a tour of Canadian cities after July 25th with a view to selecting Canadian headquarters.

Tenders were taken until July 18th for excavation for the World Building, corner of Pender and Beatty streets. W. T. Whiteway, architect.

Messrs. Thornton & Jones, architects, have plans for a large warehouse to cost about \$100,000.

Welland, Ont.

Contract for the Peters factory will be let shortly. H. S. Peter, Dover, N.J.

Winnipeg, Man.

Tenders will be received up to August 1st for the construction of a three-storey warehouse for D. R. Dingwall, on Albert street. J. H. G. Russell, architect.

Tenders will be received by J. H. G. Russell,

sell until August 1st for the construction of a four-storey factory for Stobart and Sons, corner of Lydia street and McDermott avenue. The factory is to be of mill construction.

E. L. Drewry is having plans perfected for the construction of a 54-horse stable in connection with his big manufacturing plant, the Redwood Breweries.

J. D. McArthur has secured a permit for a warehouse on the south side of McDermott avenue.

The Manitoba Elevator Commission, 279 Garry street, will receive tenders for supply of gasoline and drums to be despatched to points within the province of Manitoba for operation of grain elevators.

Yorkton, Sask.

Bulk tenders were called until July 23rd for erection of bank building for the Bank of Toronto. J. D. Atchison, architect, Bank of Toronto Building, Winnipeg.

AWARDED.**Montreal, Que.**

The Foundation Company, Limited, Montreal, has been awarded the contract for the construction of several oil tanks for the Queen City Oil Company. The structures will be about 110 by 50 feet.

The general contract for alterations to Kastell's restaurant has been awarded to D. M. Long. Messrs. Finley & Spence, architects.

The general contract for the erection of a factory building for the Berliner Gramophone Company, St. Antoine and Le Noir streets, has been awarded to D. L. Loomes & Company, general contractors. Messrs. McVicar & Heriot, architects.

Contracts for erection of milling plant for the St. Lawrence Flour Mills Company, Canal bank, have been awarded to the Barnett-McQueen Company, Limited, Winnipeg and Minneapolis. The mill is to be built of reinforced concrete. It will be fireproof throughout. The grain elevator will also be of reinforced concrete, with marine elevators and all modern handling machinery. The contract for the mill machinery has been secured by the Allis-Chalmers Company.

General contract for the alterations to property at 132 Mansfield street, for Madame Marie, has been awarded to Sparrow & McNeil, general contractors, Coristine Building. Architect, James E. Adamson.

Messrs. E. & W. S. Maxwell, architects, 6 Beaver Hall Square, have awarded the general contract for alterations to property on McGill College avenue, for E. M. Renouf, to Sparrow & McNeil, general contractors, Coristine Building.

Sub-contract for the glazed terra cotta for the new Blumenthal Building on St. Catherine street west, has been awarded to Messrs. G. W. Ooliscroft & Son, Limited, Hanley-Stoke-on-Trent, England. Architects, Agilvy & Mitchell, associated, 127 Stanley street. General contractors, D. G. Loomis & Sons, Cote St. Paul.

Sub-contract for the plumbing and heating for the Holland Varnish Company's factory, has been awarded to John A. Gordon, 301 St. Antoine street. Architects, T. Pringle & Son, Limited, Coristine Building. General contractors, Geo. W. T. Nicholson, E. T. Bank Building.

Oshawa, Ont.

The contract for erection of three-storey factory building, 280 by 185 feet on Duke and Colborne streets, for the MacLaughlin Carriage & Automobile Company, have been awarded to Robert Bennet, Euclid avenue, Toronto.

Winnipeg, Man.

J. H. G. Russell has awarded the contract for the construction of a seven-storey warehouse for J. D. McArthur on McDermott avenue, to A. Simmons. The price of the building is \$65,000.

The contracts for the building of a five-storey, reinforced concrete and brick warehouse, for Joseph Brown on Princess street, have been let by J. H. G. Russell, architect, as follows: W. J. Davidson, masonry and concrete; Gray & Company, carpentry work; and A. B. Ormsby Company, sheet metal and fireproof door and window contracts.

**Power Plants, Electricity and
Telephones****Brockville, Ont.**

The Brockville Light & Power Department asked tenders for the erection of a new power house adjoining the waterworks pumping station for the purpose of combining the plants, but the figures were so high that it was deemed wise to do the work by day labor.

Blyth, Ont.

Tenders are being called until July 27th for erection of municipal telephone system for Blyth Telephone Company. Plans, etc., at office of the engineer, G. J. Beattie, 109 Victoria street, Toronto, and at office of A. Elder, secretary, this place. L. Mill, president.

Chicoutimi, Que.

The ratepayers voted down the negotiations for loan of \$70,000 to be used in making payment to the Saguenay Hydraulic Company, upon part of its property desired for municipal lighting system.

Camrose, Alta.

The by-law authorizing the issue of \$30,000 debentures for an electric light plant was carried. The installation will be begun at once and hurried to completion. Mr. Maxwell, B.S.C., has charge of the work.

Edmonton, Alta.

City Engineer Latourneau submitted the detailed plans for the east end extension of the street railways. Tenders will be called for immediately and construction begun as soon as possible.

London, Ont.

The time for opening tenders for electrical pumping equipment at Springbank has been extended until August 8th. H. J. Glaubitz, C.E., consulting engineer, Toronto.

New Hamburg, Ont.

The following list of tenders for electrical apparatus for this municipality have been sent in: Potholombe Estate, \$7,500; C. H. Burgess & Company, \$7,464; W. A. McKenzie & Company, \$7,450; Brentt Norman & Company, \$7,344. None of these were accepted. W. Millar, clerk.

Ottawa, Ont.

A building permit for a solid brick transforming station to cost \$18,000, on south side of Slater street, has been taken out by the Ottawa Electric Company.

Stratford, Ont.

This municipality will purchase 900 75-watt tungsten street lamps from the John Forman Company, of Montreal. Lamps will be about 60 c.p.

Victoria, B.C.

Tenders will be received until August 1

(Continued on page 28)

Tenders and For Sale Department

FOR SALE

Kelly Steam Pump Horizontal Cross Compound, in good condition, capacity 2,000,000 imperial gallons, must be removed to make room for electric equipment. Inquire the Water Commissioners, London, Ontario. 31

TO CONTRACTORS

Sealed bids will be received by the undersigned up to noon, FRIDAY, JULY 29TH, for all trades required in the erection of a residence in Whitney avenue, Rosedale.

The lowest or any tender not necessarily accepted.

F. S. BAKER, Architect,
Traders Bank Building, Toronto. 30

Town of Estevan Province of Saskatchewan

Electric Lighting and Sewerage

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on WEDNESDAY, AUGUST 24TH, 1910, for the following works:

- Contract "A"—Pipe-laying on Storm Sewers.
- Contract "B"—Power House.
- Contract "H"—Two Return Tubular Boilers.
- Contract "J"—High Speed Steam Engine.
- Contract "K"—Electric Lighting System.
- Contract "S"—Sewer Pipe.

Plans and specifications may be seen at the office of the engineers, Winnipeg, and Toronto, and at the Town Hall, Estevan.

J. G. HASTINGS, ESQ., L. A. DUNCAN, ESQ.,
Mayor, Estevan, Sask. Secretary-treasurer,
Estevan, Sask.

CHIPMAN & POWER, Engineers,
Winnipeg and Toronto. 30

City of Winnipeg Electrical Distribution System

Tenders for

Underground Cable

Sealed tenders on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope "City of Winnipeg Electrical Distribution System, Tender for Cable," will be received at the office of the undersigned up to noon on THURSDAY, SEPTEMBER 1ST, 1910, for the manufacture, delivery and installation, 46,000 feet of thirteen thousand volt, three-core cable.

Copies of the specifications and form of tender may be obtained at the Power Engineer's Office, Carnegie Library Building, Winnipeg.

These specifications may also be examined at the offices of Messrs. Smith, Kerry and Chace, Confederation Life Building, Toronto, Ontario.

Each tender must be accompanied by a certified cheque for one thousand dollars, which cheque will become forfeit to the corporation in the event of the successful tenderer refusing or neglecting to sign a satisfactory contract when called upon so to do.

The city reserves the right to reject any or all tenders or to accept any bid which shall appear advantageous.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, July 15th, 1910. 31

Tenders for

Pumping Engine

Tenders will be received by the undersigned up to AUGUST 1ST, NEXT, for a Compound Duplex Pumping Engine, capable of pumping two million imperial gallons per day, against a head of 125 pounds per square inch. A second-hand pump will also be considered.

For further information apply to

H. HYMMEN,
Superintendent Berlin Waterworks.

Berlin, Ont., July 18th, 1910. 30

Tenders for Electrical Pumping Equipment

London, Ontario

The time of opening tenders for Electrical Pumping Equipment at the Springbank Pumping Station, London, Ontario, has been postponed from July 29th to AUGUST 8TH. All tenderers are requested to have their quotations reach Secretary Ellwood of the Board of Water Commissioners before noon of that day.

H. J. GLAUBITZ, C.E.,
Consulting Engineer, Toronto, Ont. 30

Steel Viaduct on Queen Street East

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon, on TUESDAY, SEPTEMBER 6TH, 1910, for the construction of a steel viaduct on Queen street in the City of Toronto, crossing over the River Don, and the roadways on each side, and over the tracks of the Canadian Pacific, Canadian Northern and Grand Trunk Railways, including the following approximate quantities:

- Excavation (ordinary)—5,400 yards.
- Excavation (trenches)—2,300 yards.
- Filling—24,000 yards.
- Concrete reinforced walls and footings—1,570 yards.
- Concrete reinforced floor slab—880 yards.
- Piling concrete—10,400 lineal feet.
- Steel reinforcing rods—113 tons.
- Reinforcing fabric—20,000 square feet.
- Structural Steel—752 tons.
- Paving (wood block)—3,010 square yards.
- Paving (macadam)—9,000 square yards.
- Also Railing, Waterproofing, etc.

Plans and specifications may be seen, and forms of tender obtained at the office of Bridge Department, City Hall, Toronto, and office of "Contract Record, B. 34, Board of Trade Building, Montreal, Que.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer) not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties, the bond of a guarantee company approved of, as aforesaid.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto, July 22nd, 1910. 32

Township of Mersea

Tenders for Dredging

Sealed tenders, addressed to Mr. Alfred Hair-sine, Township Clerk, Mersea, Leamington P.O., Ont., and endorsed "Tenders for Dredging," will be received for the Dredging required in the Eastern and Western Divisions of the Point Pelee Dredging System, up to 6 o'clock p.m., AUGUST 5TH, A.D. 1910.

Plans, specifications, etc., for the Eastern System may be seen at the office of Owen McKay, Civil Engineer, Walkerville; and plans for the Western System at the office of Alexander Baird, Civil Engineer, Leamington, Ont.

The lowest or any tender not necessarily accepted. 30

Reinforced Concrete Viaduct

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on TUESDAY, AUGUST 9TH, 1910, for the construction of a reinforced concrete viaduct of beam and slab construction on the Weston Road, in the City of Toronto, containing the following approximate quantities:

- Excavation—1,068 cubic yards.
- Concrete (retaining walls)—472 cubic yards.
- Concrete (viaduct)—577 cubic yards.
- Reinforcing steel—126,000 pounds.
- Also Pipe Railing, Waterproofing, etc.

Plans and specifications may be seen and forms of tender obtained at the office of the Bridge Department, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties, the bond of a Guarantee Company approved of as aforesaid.

The usual conditions relating to tendering as prescribed by the city by-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman of Board of Control.

City Hall, Toronto, July 22, 1910. 31

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 inch x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail. —WM. LESSLIE, Walkerville, Ont. TF

CONTRACTOR'S OUTFIT FOR SALE.—Six Wheeler, No. 8, concrete line plant, nearly new. Owner going into another line of business. Joseph Patterson, Box 114, St. Marys, Ontario. 35

The B. C. Gazette gives notice of the incorporation of the following companies:—Canadian Doorhanger Manufacturing Company, Limited, capital, \$50,000; Quain Electrical Supply Company, Limited, capital, \$50,000; Great West Light Company, Limited, incorporated to install lighting systems within the Province of British Columbia, etc., capital \$10,000; Producers Rock & Gravel Company, Limited, capital, \$350,000; Anvil Island Brick Company, Limited, capital, \$100,000; British Columbia Electrical Supply Company, Limited, capital, \$25,000.

Power Plants, Electricity and Telephones

(Continued from page 27)

for installation of system of cluster lights. Plans at office of W. W. Northcott, purchasing agent, City Hall.

Winnipeg, Man.

Tenders addressed to P. E. Ryan, secretary, commissioners Transcontinental Railway, were received at Ottawa, until July 26th for wiring system, switch board and transformers in connection with the locomotive shops of the Transcontinental Railway.

AWARDED.

Fleming, Sask.

Tenders for telephone construction were received as follows: Wm. Bobier, Fleming, \$385 (accepted); Berwick & Laster, Minnola, \$418; Somerville & Taylor, Regina, \$540.

Winnipeg, Man.

We are informed that the contract for supply of two sets of line disconnecting switches for the transmission line system, has been awarded to the Western Iron Works, Limited, Winnipeg, for the sum of \$2,258.

The city council has accepted the tender of the Northern Electric Company for the supply of 9,000 pounds, No. 2, B & S, DB weatherproof solid copper wire, required for power line to No. 7 well, at \$16.45 per hundred pounds.

Miscellaneous

Montreal, Que.

Recent building permits include; Mrs. G. A. Campbell, 223 Milton, residence, \$7,000; Mrs. Wm. Clelland, 51 Durocher, residence, \$7,000; J. B. Julien, 125 Church street, two houses containing three dwellings and two stores, \$12,000; W. Langlois, 1138 Simard street, house containing two dwellings, \$2,900; Congregation of Jerusalem, 2487 Papi-neau avenue, church building, \$3,000; H. De-bellefeuille, 70 Laconte street, house containing three dwellings, \$3,700; J. L. Gravel, 1359 St. Catherine east, house containing five dwellings, \$5,500; Jos. Pepin, 1279 Ontario east, two houses containing two dwellings, \$8,000; Napoleon Paquin, 580 Carieux, house containing two dwellings, \$3,000; Alex. Shields, 162 Grand Trunk, house containing two dwellings, \$6,100; H. Jacobs, 29 Hermine, residence, \$3,500; M. Ledue, 318B Dufferin street, house containing three dwellings, \$3,000; E. Bradbury, 160 Forsyth, residence, \$3,000; E. Masse, 1221 des Erables, two houses containing six dwellings, \$5,000; Thompson & Ticehurst, 1795 Christopher Colomb street, house containing three dwellings, \$3,000; D. L. Dupre & Company, 567 Delormiere, three houses containing nine dwellings, \$9,000; H. S. Phillips, 500 Guy, two houses containing six dwellings, \$22,000; Advance Realty Company, 4160 Sherbrooke street, two houses containing twelve dwellings, \$40,000; P. Chapleau, 2443a Waverley, two houses containing five dwellings, \$5,000; J. A. Stevenson, 716 Dorchester west, alterations to residence, \$3,500.

Ottawa, Ont.

A preliminary notice has been issued by the Naval Service branch regarding the construction of ships of the Canadian Navy. Under the conditions imposed tenderers must have a ship yard capable of building a ship of the Bristol type, or be prepared to construct such a yard within a year. Under the Rush-Bagot Treaty no

ships of war are to be built on the Great Lakes.

Tenders addressed to P. G. Keyes, secretary, Department of the Interior, will be received until September 1st for furnishing of iron posts for use on survey of Dominion lands, to be delivered at Winnipeg, Prince Albert, and at Edmonton.

Recent building permits include: F. Diamond, brick dwelling, Archibald street, W. Gibson, builder, \$8,000; Water Street Hospital, alterations, W. E. Noffke, architect, T. J. Fautany & Company, builders, \$12,600; H. A. Caplin, storehouse, Queen street, G. Stewart, builder, \$3,600; A. Monette, dwelling, Holland avenue, \$2,500; Isabel Whyte, alterations to dwelling, Cartier street, C. J. Burritt, architect, J. Robertson and A. G. Marshall, builders, \$4,000; Mary Graham, dwelling, Daly avenue, A. Tomlinson, builder, \$2,800; W. Shenkman, dwelling, Rideau street, \$3,500; R. B. Stet-hem, dwelling, Kent street, \$2,500; J. G. Elliott, shop and apartment, Bronson avenue, \$8,000.

AWARDED.

Victoria Harbor, Ont.

Messrs. Edge & Gutteridge, Seaforth, have been awarded the contract by the C. P. R. for the erection of four residences, station, coaling plant, turn table, ash pit, boarding house, store and oil house, machine shop and engine house, ship stores, ice house, offices, laundry and boiler house here, the terminus of the Victoria Harbor & Peterborough line. Construction has been commenced.

Vancouver, B.C.

The contract has been let to W. Finney for the two-storey brick apartment building on Denman street for Mr. W. S. Hugo. Messrs. Thornton & Jones, Hastings street, architects.

WATERPROOFING CONCRETE.

According to Prof. Ira L. Baker, when alum and soap are used as waterproofing for concrete, the alum in powdered form may be mixed with the dry cement or the sand, and the soap may be dissolved in the water employed in mixing the concrete; or both the alum and the soap may be dissolved in the water. The former is probably the safer method in practice, since with the latter method the water must be thoroughly stirred while the two are being mixed or the precipitate may form in large masses which it is practically impossible to break up; and, further, the water must be kept stirred to prevent the compound from accumulating on the surface. However, the alum is more easily dissolved than the soap; and hence the alum may be dissolved in, say, one-fifth of the water, and the soap in the remaining four-fifths, and then the two portions may be mixed together. The alum and the soap combine and form a finely divided, flocculent, insoluble, water-repelling compound which fills the pores of the concrete and decreases its permeability. The best proportions are: Alum one part and hard soap two parts, both by weight. Soap varies in its chemical composition, and hence a single proportion cannot be stated which will be chemically exact for all cases. The above proportion is in round numbers the relative combining weights of alum and average hard soap. Any reasonably pure soap will do. It is difficult to dissolve more than about 3 per cent. of hard soap in cold water; and hence this practically limits the amount of alum to 1.5 per cent., and of the soap 3 per cent. These amounts will give a precipitate equal to about 3 per cent.

of the weight of the total water. The amount of precipitate formed in the pores of the mortar or concrete will depend upon the amount of water used in the mixing.

The bridge recently completed across a deep gorge, with vertical sides some 170 ft. high, on the Bellegarde-Chizery Railway in France, justly ranks among the greatest works of the kind in the world. The main arch of 262 ft. 9 1/2 in. span springs from the solid rock on either side of the gorge, the thickness of the rib being 4 ft. 11 in. at the crown and 8 ft. 2 in. at the springings. Eleven spandrel arches with semi-circular openings surmount the main span, and serve the purpose of carrying the roadway above. As the crown is at the height of more than 215 ft. above the level of the stream running along the ravine, some particularly interesting falseworks were necessary before construction could be commenced in earnest. These comprised three lofty timber towers 133 ft. high, and an elaborate arrangement of braced centring, the whole including nearly 22,000 cubic feet of timber and about 30 tons of steel. To obviate any inconvenience from settlement of the falseworks, the arch was built in eight sections, finally connected by closing voussoirs. This remarkable bridge, designed by M. Picard, Chief Engineer to the Bridge Department of the railway company, was commenced in August, 1908, and the masonry finished in August last year, although the centring was not struck until early in November. It is stated that no settlement was noticed, and that the total cost of the work was less than \$90,000.

SANDBLASTING BRICK FRONTS.

An expert in the sandblasting trade who has operated on many buildings, on being asked as to the efficiency of the sandblast upon soiled brickwork, said that he could not advise it except when the bricks were extremely hard. When used against stone the blast does not remove the original face, he said, "only the grime." That is the aim of the skilful operator. But in the case of brick not extremely hard the result might be different.

The great force with which sharp sand can be driven through a fine nozzle is very great. If permitted it would actually cut a stone in two in time. In the case of granite, marble, and cut stone, the skilful operator preserves the original face of the block, but he cannot guarantee to do so with respect to all sorts of front brick. He would advise cleaning front brick with acid instead of sandblasting. The same opinion seems to be held abroad. The cleaning of brick fronts was the interesting subject of a paper recently read before the German Association of Brick and Terra Cotta Manufacturers. The author protested against the use of sandblast or any other method by which the original face of the brick would be taken away or be likely to be disturbed, saying:

"When the blast is used, and the face of the brick taken off, the cleared front will show a good appearance only for a short time, as the brick with the original face removed will be very much more porous than before, and absorb dirt more readily. The use of steel brushes is also very bad and will not give a first-class job. The best method is cleaning the brick fronts with a solution of muriatic acid. The strength of the solution can be made to 1 in 12. When this solution is too strong for the brick acetic acid should be used. A good soap solution will, as a rule, take off all thick dirt, and the cleaning with acid solution can then be done easily."—"The Building Age."

Interesting Injunction Suit

Evidence in the injunction proceedings instituted by Messrs. Hyde & Webster, supply dealers, to restrain the city of Montreal from contracting for a supply of scoria blocks to meet their requirements for the ensuing year, has all been received and it is expected that Mr. Justice Guerin will shortly render his decision in the case.

The chief point of contention on the part of Messrs. Hyde & Webster in instituting injunction proceedings was that on a certain day the city authorities, namely the Road Department, had called for tenders for supply of three million artificial paving blocks, while on the same date they had asked tenders for the laying of four million scoria or artificial paving blocks. This company also claimed that the tender form received by them asked for a quotation on one hundred and eighty thousand artificial blocks, whereas other supply men had been asked to figure on three million.

The city's defence on this point was that they did not mean to specify scoria particularly, yet notwithstanding, the evidence went to show that in the tender forms the words "tenders on paving blocks" had been struck out, leaving the word "scoria" standing alone.

Mr. J. B. Fellows, city engineer of Westmount, testified that he had used artificial and natural blocks for years. He put scoria on heavy traffic streets and the Metropolitan in other streets where the traffic was lighter. In short, he thought the scoria were less breakable than Metropolitan, the latter being liable to be attacked by varying temperatures.

Mr. C. A. Jaques, of the Jaques Steamboat Line, said that he had had the contracts to carry the Metropolitan blocks from Toledo, Ohio, to Montreal, and he thought he was safe in stating that not more than five blocks per thousand broke in handling them.

Dr. Milton Hersey, city analyst, testified to having made analyses at various times. Tests, made a short time ago by means of the brick rattler, recognized as the standard by the United States Government, showed the following losses in weight by abrasion: Metropolitan, 16.03 per cent.; Massillon, 11.28 per cent., and Scoria, 9 per cent. Referring to a report he had made in 1908, for Messrs. Hyde & Webster, Dr. Hersey stated that on this occasion the Metropolitan blocks lost 17.75 per cent. by weight and the scoria 30 per cent., which would point to the belief that the former were more uniform in manufacture. In concluding his report in 1908, Dr. Hersey stated that there was no doubt whatever in his mind but that Metropolitan blocks were infinitely superior to scoria blocks.

Major H. C. Lordy, civil engineer in charge of construction of the Lachine Canal, said that in 1908 he had used both Metropolitan and scoria blocks in paving work on the wharf at the foot of McGill street. In the handling of these two kinds of blocks he had found that the breakage on 40,000 scoria blocks was as heavy as that on 280,000 Metropolitan blocks. Since then he had made examinations of both blocks, in actual paving in different parts of the city, and had come to the conclusion that the Metropolitan block was superior to the scoria, both in initial handling and in use.

Mr. J. N. Nelson, 35 years civil engineer for the Harbor Commissioners, said they had used thousands of scoria blocks between 1902 to 1908, and that they had stood well in exposed places, the principal reason being that they were carefully made. In 1908 when tenders were called for paving blocks he took the samples submitted, and in a rumblor in Parker's foundry, found the percentage of loss was less for Metropolitan than scoria, being six per cent., while the other ran eight to nine per cent.

Mr. W. H. Walker, paving block expert, stated that the scoria block is a casting and has all the weaknesses that castings have—blow holes, bubbles, etc. He had found scoria porous and spongy.

Mr. Ernest Marceau, engineer in chief of Government railways in the Province of Quebec, said homogeneity was a great factor and there were holes in the depth of scoria while none existed in the Metropolitan.

Mr. Emile Vanier, formerly engineer for St. Louis, testified to having superintended the laying of both scoria and Metropolitan. He thought that scoria was the superior block. The texture of Metropolitan, in his opinion, was less uniform than that of scoria. He had found that a quantity of Metropolitan were very friable and were broken easily. This, he had

noticed when some of the Metropolitan were being unloaded.

Messrs. Hyde & Webster claimed that the Metropolitan blocks in St. Louis had been laid under most disadvantageous circumstances, a great number having been placed in position during the winter month of December.

J. Anderson, of the Standard Construction Company stated before witness that one of the chief clerks in the Road Department had remarked that there was no use tendering on any material other than scoria.

Money Flowing Into Montreal

Record breaking development in the establishment of new manufacturing concerns in Montreal has been going on during the last three months. In fact capital reaching a total of \$42,128,900 has been invested in 54 new manufacturing concerns incorporated under Ottawa or Quebec charters since April, all of which will make their headquarters in Montreal or in its immediate vicinity.

Several of the new incorporations represent English firms which are establishing branch industries in Montreal but a greater number are American concerns which had apparently been waiting until the settlement of the tariff negotiations had inspired more confidence in them to cross the border and establish plants there.

Among the new industries are two pulp mills, one with a capital of \$1,000,000 and the other with \$100,000 invested, these being among the first direct moves to follow the pulp wood policy prohibiting the export of pulpwood cut on Crown lands in Quebec. There is also a new lumber company with half a million capital.

The Montreal Herald Disaster

Editor, "Contract Record":—

Dear Sir,—In the July 13th issue of the "Contract Record" on page 50, under the heading of "The Montreal Herald Disaster," I read the following: "Building Inspector Chausse stated that in 1905 a permit has been granted, etc." This is not correct, as in my testimony before the coroner I stated that since the Herald had bought the building in 1905 no permit had been applied for and consequently had not been granted. All work of alterations and repairs done to the Herald building since 1905 were done without any civic authority or permission.

Yours very truly,

Alcide Chausse,

Architect, Inspector of Buildings.

"A Foine Country!"

Mike—"Sure, Pat, this do be a foine town to wurruk in."

Pat—"How's that?"

Mike—"Be jabers, Oi was wurrukin' in this same spot lasht wake putting the strate down for the city engineer; to-day Oi'm tearin' it up for the waterwurruks; an' nixt wake Oi'll be in the same place for the gas wurruks. 'Tis a foine country, bedad."—Victoria Times.

Appropriations provided for Winnipeg's civic improvement works are almost exhausted and less than two-thirds of the work projected has been started. This condition means that very little more work will be ordered this season.

The city of Winnipeg is about to advertise in every large city of the continent for a manager for the civic power plant.

Contract Record

ESTABLISHED 1886

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Municipal Progress, Advance Information

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No. 30

Government's Consideration for Railroad Development

The Dominion Government is at last easing the immigration regulations in regard to laborers on railway construction. The following memorandum has been issued:

"Owing to the great scarcity of railway laborers it has been decided to admit from all countries except Asia, railway construction laborers who are mentally, morally and physically fit, willing to work, and who are guaranteed employment by railway contractors or railway companies irrespective of money qualifications or direct journey."

This means that for the time being railway construction men are placed in practically the same position in so far as immigration regulations are concerned, as farm laborers have been in the past. It also means that contractors in the prairie provinces and on the Pacific coast will be able to secure large numbers of Scandinavians and other first class construction men who, under the strict interpretation of the immigration regulations, might be debarred either for the lack of the required \$25 or for not coming from the country of birth or naturalization. This alteration in the regulations is of especial importance to railway contractors in view of the fact that operations have been considerably curtailed across the border, and first class men are therefore easily available.

The Government is to be congratulated upon this step—tardy though it may be. It is as essential to the trade of the country to have good transportation facilities as it is to have a good crop, and it was dull-witted indeed

to tie up with red tape the brawn and muscle needed so badly by western railroad contractors. If a man be "mentally, morally and physically fit" and, in addition, "willing to work," he represents about the highest ideal ever fulfilled by a railroad laborer. Let us have immigration regulations—and let us enforce them—but for Heaven's sake let those regulations be of a *defensive* and not of an *offensive* character. If we take in criminals and such like we have ourselves to blame. If we shut out the very men we most need, we go down to posterity as imbeciles.

The following paragraphs, culled from a Winnipeg despatch of July 15th, show the gravity of the situation brought about by the old enactment:

"An acute labor problem is confronting the construction contractors for the mountain section of the National Transcontinental Railway.

"Messrs. Chamberlain & Stewart, contractors for the mountain section, have intimated that it is impossible to complete the section in reasonable time unless they can get more labor.

"Existing immigration regulations provide that no foreigner can come into Canada except directly from his native country. It is understood the regulation was designed to deal with drifting Asiatics.

"United States railways are shutting down in construction to a certain extent, and many foreigners accustomed to railway work are out of jobs. Under the regulations they can not be hired in Canada. Contractors report that they cannot get labor although they are offering \$2.25 to \$3 per day with board. They have 1,600 men at work and ought to have over 5,000.

"Chief Government Engineer Collingwood Schreiber, in charge of the western division of the Grand Trunk Pacific, reports to the Minister that he cannot complete the work in time unless labor is immediately secured. The contractors engaged hundreds of men from the United States, but they were turned back at the border by officials of the Department of the Interior under existing regulations."

British Columbia's New Regulation

The impression is pretty general that British Columbia's new regulation, causing incorporated companies wishing to do business in that province to obtain a license, is an imposition. Especially is it a cause of loss and inconvenience to Ontario concerns. Inconvenience of this kind, however, we venture to think, will ultimately militate ten-fold against the interests of British Columbia. An instance of this in a small way is provided by the case of the Ontario Wind Engine & Pump Company, which had arranged to open a branch in British Columbia this summer, but which has given up the idea since the new provisions have come into effect. The principle underlying regulations of this kind is a very narrow one and it is to be hoped, in the interests of Western Canada generally, that the example of British Columbia will not commend itself to the neighboring provinces.



Technical High School, Winnipeg, Man.

**Appropriateness of Design, Excellent Interior Arrangement, and Modern Equipment
—Progressive Manitoba Metropolis Alive to Importance of Industrial Training**

For some years the Winnipeg Public School Board has realized the growing importance of technical training, and the desirability of having suitably designed buildings, properly equipped, in order that the pupils attending the Winnipeg schools may have the opportunity of better fitting themselves for the ever-increasing competition in the industrial world of to-day.

It was accordingly decided to erect two buildings, one at either extremity of the city, to form centres toward which all the pupils from the graded schools would gravitate. The present policy of the board is to place in the central portion of the residential section of the city another technical high school, with possibly several new features, which will be the arch stone of the educational system of Winnipeg.

The two buildings, for which contracts were awarded on the 14th ult., will cost \$300,000 each, exclusive of plumbing, heating and ventilating plant. They will be built of Tyndall cut stone and Estevan red pressed brick on concrete foundations, and will be equipped with every modern improvement. The buildings will have a frontage of 220 feet and a depth of 180 feet.

A comprehensive idea of the plans of the buildings may be obtained from the following description of the interior:

The basement will be occupied by the boiler room, heating and ventilating plant, and a machine shop, forge shop and woodworking room, each 40 by 80 feet; a mechanical drawing room, 34 by 28 feet; a plumbing shop, 28 by 30 feet; locker rooms in connection with each of these, 14 by 26 feet; electrical shop, 40 by 60 feet; and boys' and girls' shower baths which are situated immediately under the gymnasium.

The ground floor comprises main auditorium, 50 by 80 feet; household science room, 40 by 44 and 28 by 34 feet; six classrooms and boys' and girls' retiring rooms.

The second floor contains principal's office, 20 by 24 feet; running track and gallery of gymnasium, seven classrooms and a library, 28 by 40 feet.

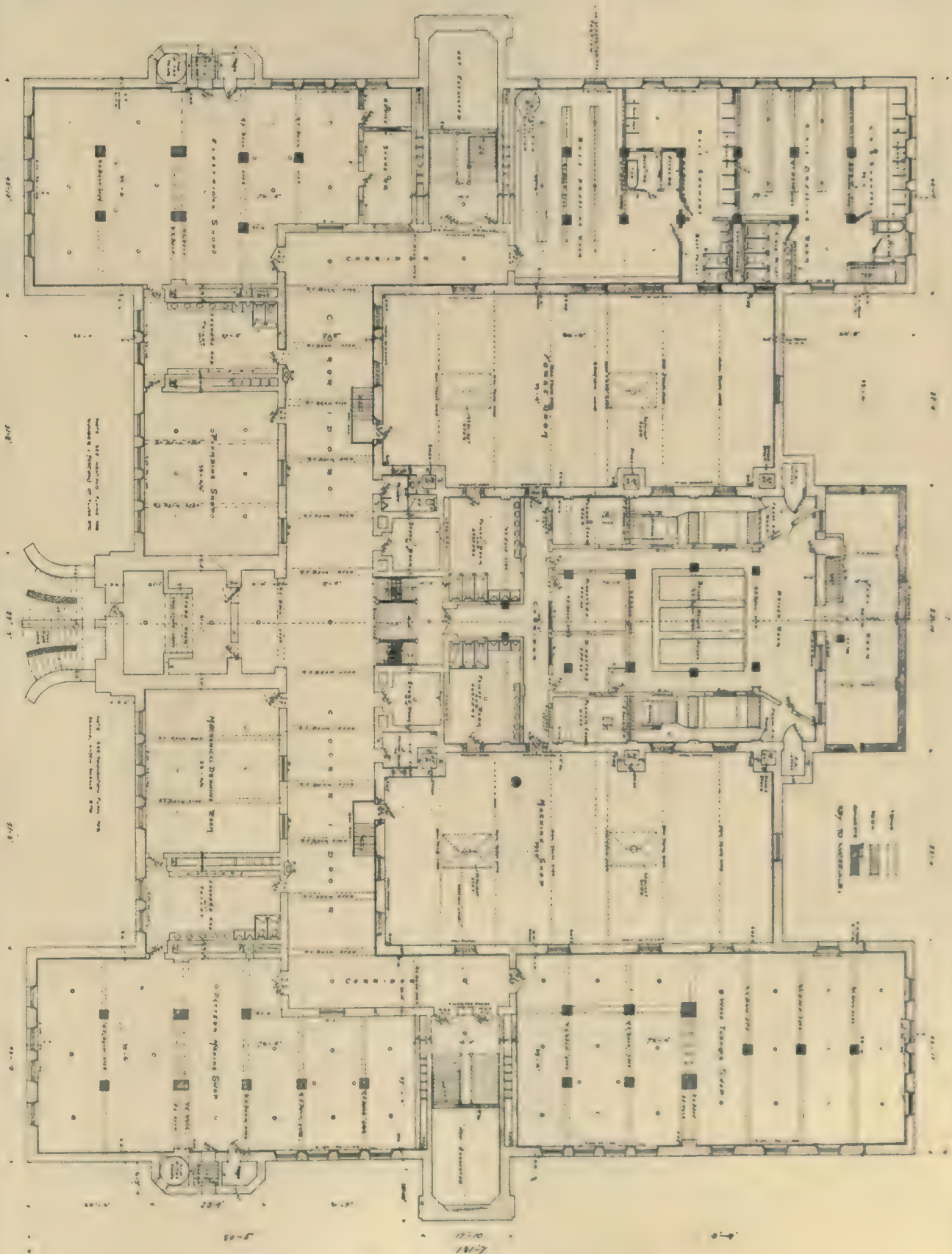
On the third floor are a museum, 20 by 24 feet; physics laboratory, 40 by 42 feet; chemical laboratory, 28 by 34 feet; household art room, 50 by 50 feet; plant room, 24 by 34 feet, and seven classrooms. The interior finish throughout will be in keeping with the character of the building.

There will be one entrance at the front of each building and two at the ends, giving three separate flights of stairs. All stairs and floors will be fireproof in construction. In addition to the staircases there will be two spiral fire escapes encased in brick walls. The central tower extends upwards of 100 feet from the street line and gives an effect of stability and finish to the structures.

The buildings were designed by Mr. J. B. Mitchell, Commissioner of School Buildings, Winnipeg, and are being erected under his personal supervision. The general contractors for the work are Mr. John Saul and Messrs. J. H. Tremblay & Company, Limited, contracts being awarded in both instances at slightly under \$300,000.

Victoria, B.C., aldermen are discussing the relative merits of a cement concrete base and an asphalt concrete base for their road construction work. By means of the latter method the contractor claims that the city will save \$7,000.

M. P. Cotton, Vancouver, B.C., as previously noted, has the contract for constructing the Burnby line of the British Columbia Electric Railway from Vancouver to New Westminster, B.C. The contract includes 100,000 cubic yards of earth excavation and six small trestles.



Basement Plan, Winnipeg Technical Schools

The Planning of Undeveloped City Areas

Logical Routes for Transportation Lines—Existing Roads in their Relation to Future Development—Desirability of Municipal Blocks*

By N. P. LEWIS

In most American cities whose growth is conspicuous additions are made from time to time, and frequently these additions have already been exploited by the suburban developer. They are often so limited in area that it is difficult to do anything but extend the already established city plan over them or accept the street lines which may have been adopted by the local authorities or fixed by the real estate developer. It occasionally happens that an extension of the city limits will include large areas where there are a number of centres of population, and that these centres are disconnected and can be absorbed in a larger city plan without serious detriment to the latter. Areas of this kind contiguous to a large city are almost invariably traversed by highways which have been established for many years and which follow natural lines of traffic. These old roads are the logical routes for transportation lines such as electric railroads, and they can be made the controlling features of the city plan.

The first thing to do is to determine the relative position of the different parts of the new territory and the different existing highways with respect to the remaining portions. This can only be done by a triangulation, which will establish points whose precise relative positions will be known, these points being, say, not less than 2,000 feet or more than 5,000 feet apart. It will then be possible to proceed with the mapping and planning in widely separated sections of the new territory with a positive knowledge of the relation of the street lines which will be established in one section to those in another.

Existing Roads Skeleton of Future System

The next thing to demand attention is the system of existing roads. These should form the skeleton of the future street system. In many cases it will be necessary to straighten them, and in all cases to widen them, but wherever possible the new lines should be parallel with the old ones, so that the old roads may become a part of the new street with as little disturbance as possible and without sacrificing the trees. They should, in most cases, be not less than 100 feet in width, and in some instances even wider. It is unnecessary at this time to discuss the subdivision of the streets which are to exceed 100 feet in width, but if the old road was fortunate enough to have good shade trees, the original highway can probably be preserved for pleasure driving while another section can be reserved for railroad tracks, and, perhaps, still another for automobiles, with adequate sidewalk spaces. Such an arrangement for the separation of different kinds of traffic will require a total width of about 150 feet or even more.

These old roads which are the basis of the city plan may have been nearly parallel with each other or they may have been approximately radial, while the cross connections may have been infrequent or unimproved, but these cross connections will be a necessary feature of the final city plan and must therefore be carefully considered. They should be straight between the parallel or radial highways wherever possible and should join

them at points where there are deflections. At these intersections there can well be an enlargement of the street area, creating plazas or some decorative space.

As soon as this system can be determined, the property required for the new streets or boulevards should be acquired. The cost could properly be assessed upon the entire territory which will be developed by it, as the benefit will not be merely local, but their establishment will be the first step toward the development of the entire suburban area. If the whole system of arterial streets could be acquired under a single condemnation proceeding, it would be advantageous.

When these controlling streets shall have been definitely determined the city plan is fairly safe. Whether it would be advantageous to have the intervening spaces treated in a uniform or conventional manner is questionable. The interest of the average citizen is not in the map; it is in the street system itself, and it might be preferable to allow these various subdivisions to develop along lines of least resistance, without exercising too much control over them. In fact, if the treatment of these different sections varies, a more pleasing result may be attained.

Reservation for Parks

Parks are a necessary part of any city plan, and they should be given a conspicuous place in designing a city street system. If there is a particular bit of woodland, an elevation with a commanding outlook, or even a piece of lowlying land traversed by a stream, which has not yet been cut up into building lots, it can be most advantageously set aside at this time as a future park. These reservations should be scattered over the entire area so that there will ultimately be some open space within convenient walking distance of every resident of the city. These parks should be connected by adequate roadways, not necessarily straight or even of uniform width, but contracted where the topography would involve expensive construction and again expanded to include a small area which might ultimately become a most attractive feature of our park and parkway system.

As we are dealing with a territory which is at the present time suburban and where detached houses are likely to be always a characteristic feature, it will not be necessary to provide large park areas, and yet parks of considerable size may be exceedingly desirable as playgrounds and places of recreation for those living in the more congested areas in the older parts of the city, especially if they are so located as to be easily reached by existing or prospective transportation lines. It may be deemed unwise to assume that parks will be ultimately needed in the particular localities selected. The city may not grow in the direction and along the lines assumed, but, while it must be admitted that the manner in which any city will expand cannot be predicted with any degree of accuracy, it is not unlikely that this expansion will follow the lines of least resistance, and if encouragement is given by a judicious selection of park areas connected by adequate roadways, and if the controlling features of the street system are laid out along the lines already indicated, the future development is almost certain to follow these lines, and the result

* Abstract of paper read at the Rochester City Planning Conference.

will be a city plan which will appear logical and reasonable, rather than a mere accident.

Municipal Blocks

In such a territory it may be useless to speak of the grouping of public buildings, for the important municipal centres will have already been established and will not be moved. There are, however, minor public buildings, such as schools, libraries, public baths and comfort stations, police stations and fire houses, for which provision must be made, and it would be most desirable to set aside here and there what might be termed municipal blocks, upon which buildings of this kind could be grouped in a very effective manner. The park areas and municipal blocks should be acquired at as early a date as possible. It is often very difficult to justify a public expenditure in advance of actual needs when so many demands are being made for urgent municipal improvements in the older portions of the city, but a little foresight in this respect would undoubtedly save many times the sums which will inevitably be required to correct mistakes owing to lack of foresight in providing for what is sure to be required some day.

Caisson of the Quebec Bridge

The following particulars of the above work are contained in a late Quebec despatch, which runs:

The caisson of the Quebec bridge recently built by Messrs. M. P. & J. T. Davis and launched at Sillery Cove, which weighs 1,700 tons, is 180 feet long and 54 feet wide, and when completed will have a height of 68 feet. It is built of southern pitch pine (12-inch x 12-inch) and its cutting edge, which sinks into the floor of the river, is shaped like an equilateral triangle with a 30-inch side.

The working chambers are 8 feet high with walls 2 feet 6 inches thick, which is also the thickness of the roof. There is one tier 12 x 12, and two tiers of 3-inch planks, tongued and grooved. On top of that there is another tier of 12 x 12.

The men work under water until they get down to solid rock. In order to force the water out compressed air must be pumped into the chamber and great pressure is needed. The men who work in the chambers enter by a circular shaft, which has two trap doors. When the first of these is opened the latter shuts, and when the man has entered and closed the top door, a valve is then opened releasing the air in the lower part of the shaft, which is holding the second door up. This release has the effect of closing the top door and opening the second to allow the man to pass below.

Two pipes are used for working the bed of the river. One is a water pipe with a nozzle, which is used by two men to loosen sand and stones, etc. There is another pipe with a foot valve, which establishes a draught and carries up this material by suction up to the top above the caisson. When the solid rock is reached the chambers will be filled with concrete. Then the masonry will be built on top.

There is a good deal of activity going on up at the yard and bridge. Staging is being built at the latter place, where there will be soon six derricks, ten boilers and four air compressors. There will be also four double tracks. There is boarding accommodation on the spot for some two hundred men. Several hundred men are now employed, the majority of whom are Canadians, though there are various other nationalities, including Austrians, Italians and Poles.

The caisson will probably be brought up to the bridge in a few days, and the "sand hogs" will then get to

work. These will number 80 to the shift, and at the beginning they will work eight hours. The deeper they go, the shorter will be their shift, since they will not be able to work so long under water under the higher pressure.

A number of interesting features marked the second annual convention of the Master Painters' and Decorators' Association of Western Canada held recently in Winnipeg. Among those who read papers were W. S. Fallis, manager of the Sherwin-Williams Company, Winnipeg, and P. W. Nelson, professor at the Royal Industrial High School, New York. The sessions were held in the fine new quarters of the Winnipeg Builders' Exchange. An interesting event on the programme was a visit to the new St. Andrew's locks. The president of the association is Mr. J. W. Morley, who, it will be remembered, is also vice-president of the Canadian National Association of Builders.

Victoria, B.C., denies the report of a shortage of building materials in that city. It is stated that orders for brick and cement are being filled with the usual promptitude. A short time ago the Vancouver Portland Cement Company had to shut down for repairs, but in spite of this they were able to meet the demand. At present they are working to their full capacity. On the other hand, however, the lumber mills are said to have great difficulties in keeping pace with the market.

Construction work on the Canadian Northern Railway in British Columbia has already commenced, and the entire line from east to west will be completed by 1914.

Oak Bay, B.C., is going to experiment in permanent road making. In order to do this successfully, the engineer has been asked to recommend suitable machinery, etc., for the work.

It is probable that Jacobs & Davies, consulting engineers, New York City, will hand in their report to the city council of Toronto, Ont., on a system of subway railways for the city early next month.

An exchange tells of a man who answered an advertisement headed "How to Save Your Gas Bills." He sent the required amount and in return received a letter instructing him to "paste them in a scrap book."

Forest fires along the Transcontinental Railway in Ontario have destroyed much property owned by the contractors engaged in constructing the line. From Nipigon it is reported that the Pembroke Contracting Company lost camps, powder house and storehouses and supplies to a total amount of \$30,000. Anderson & Mann lost two camps and a large amount of supplies; Bonfield & Harvey lost one powder house and Morris & MacKie one complete camp.

In all probability there is no maxim of common law more generally recognized than that of responsibility for one's acts. Particularly must responsibility be accepted when an assumption of special knowledge concerning a given subject leads to employment and the payment of a fee. Even a physician or lawyer, who through neglect, whether by reason of carelessness or incapacity, allows his patient or client to suffer, is liable for damages. An architect's responsibility is not less clear. If he assumes and leads the owner to believe he possesses the requisite knowledge and ability to perform certain services, and in pursuance of such representation undertakes or pretends to render such services, he can scarcely escape responsibility for the results following his acts.—American Architect.

Sewage Disposal Ideas

The ideal site for sewage works is one which is sufficiently far removed from dwellings to prevent any possibility of nuisance arising, and it should be at such a level that the sewage can reach it by gravitation. Where this is not possible, only that portion of the sewage should be pumped which will not gravitate. The subsoil of the site should be suitable for the final process after treatment in tanks and filters.

In selecting the system of treatment, the chief factors to be considered are the character of the sewage to be treated, the extent to which it must be purified, and the fall available at the works. The ideal grit chamber is one that will arrest all the mineral matters in the sewage but none of the organic matter, and it should have special facilities for the removal of the deposit. Screens, if used, must be designed in such a way that they will arrest the matters they are required to intercept but allow all others to pass, and not readily become choked.

There are so many types of tanks that it is extremely difficult to choose the most suitable type. The question is raised as to whether it is essential to have septic action as a preliminary process in all cases. The ideal method is such that it is adapted to the particular character of the sewage to be dealt with, and will produce the most suitable effluent for the filters, while at the same time reducing the quantity of sludge to the minimum, and preventing the possibility of nuisance from smell. In the construction of tanks, attention must be given to the rate of flow through them, and special care must be devoted to the provision of every facility for the removal of sludge.

In the design of contact beds the ideals to be attained are to make them absolutely water tight, to provide a self-cleansing gradient on the floors, and a false bottom over the whole area, and also to select the best material and see that it is properly graded. Another important point is to arrange them so that they can be operated in the proper manner.

With regard to the percolating filters, the ideals as to floors, false bottoms, and material laid down for contact beds, apply with equal force. The question of distribution is of prime importance, and the author considers that continuous distribution, where possible, is more efficient than intermittent. Humus settling tanks or fine grain filters are necessary in order to produce the ideal final effluent.

From the general constructional point of view the ideal works should be executed in such a manner that while they are constructed throughout in a substantial manner and of materials which are the best of their kind, they should contain nothing which has not a direct bearing upon their efficiency in the production of a satisfactory effluent, and their maintenance in a good condition at the least possible outlay for repairs.—C. W. Easdale before the Society of Engineers.

Road Treatment of Terminology

Knowledge of how to do a thing is, of course, more important than the ability to describe it. Nevertheless when, as in the case of the application of road binders, experimenters throughout the country are endeavoring to obtain as quickly as possible the maximum amount of information not only by their own experiments, but by knowledge of what others are doing, it greatly simplifies matters and conduces to much more clear and certain information if an agreement can be reached as to the meaning of terms. The absence of such agreement is being realized as a serious difficulty by officials and others who are now endeavoring to describe the road

treatment work which they are doing. Tars and oils are being applied to broken stone roads by sprinkling, by pouring and by injecting in jets having considerable velocity; and this is done to old roads, which have received no preparatory treatment in some cases, while in others they have been relieved of all loose dirt, and in still others they have been brushed or otherwise treated so vigorously as to remove all the dirt above and much of that which is between the surface stones. In new construction, bituminous material is applied in a cold, semi-liquid form, or a material heavy in bitumen is heated before use. This may then be applied by miring it with the stone before this is laid upon the street, or the stone may be rolled and the material poured in afterwards.

Each of these methods of treatment is variously designated by officials in describing their experiments and work. Many of them, in order to make clear their explanation of such work, have described more or less at length the process adopted each time it is referred to, and this is probably desirable until there be a general agreement as to the meaning of terms which can be applied to at least the more common methods. Several societies have appointed committees to struggle with this question, and there is every probability that some definite conclusions will be reached before the end of this year.

Meantime there has been a more or less general acceptance of certain terms, and we hope that, unless some good reason be advanced for changing them, they be generally adopted. The term tar macadam, asphalt macadam or bituminous macadam has been applied to the mixture of bituminous substances with broken stone, whether added before or after the latter has been placed upon the road. To avoid the ambiguity thus occasioned there has been a partial adoption of two terms; the application of the bitumen to stone newly placed upon the road being called bituminous macadam, and construction by mixing the bitumen with the stone before laying being called bituminous concrete. These terms are believed to be suggested by analogy, since the bitumen as a binder takes the place of the binder of water and screenings, and in ordinary macadam the binder is placed upon the stone after it has been put upon the road and rolled, never mixed with the stone before application. It is self-evident that the mixing of binder and stone (with or without sand) before application to the road is the same treatment as is given to concrete.—Municipal Journal and Engineer.

In many large cities civic improvement leagues are evolving plans for the improvement of their municipalities along architectural lines. There is room for great improvement in the majority of cities. We are just beginning to realize that while we have progressed commercially we have stood still architecturally speaking. Few of our big cities have anything to commend them from the standpoint of beauty. Their public buildings as well as private structures have been built with the single purpose of making them useful. Group plans have seldom been considered in the past. The country is young and there is ample time for these improvements to be made. As time goes on these changes will cost more. There is no reason why our cities cannot be made as beautiful as those of older countries. We have the wealth and the brains and the materials. All we need is the impetus.

Contracts have been made for the construction of about 7,000 miles of railways in British Columbia within the next three years.

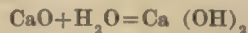
The Properties and Uses of Hydrated Lime

Classification and Most Satisfactory Methods of Manufacture—The Particular Advantages of this Material in Various Kinds of Construction Work

Specially Contributed by A. G. Larsson, C. E., of the Grey and Bruce Portland Cement Company.

By hydrated lime is generally meant, now-a-days, the dry powder obtained by slaking quick lime. In Europe, this product, owing to its many good qualities, has been a commodity of commerce for a long time, and it is therefore astonishing that it was not until a few years ago that it was introduced into this continent. Thinking that it may be of increasing interest to readers of the "Contract Record," I shall, in the following lines, discuss briefly its properties, manufacture and use.

The hydrated lime is, as was said above, obtained from quick lime by slaking. This is the chemical process that takes place when quick lime, acted upon by water, is transformed into calcium hydrate. The following formula expresses the reaction:



One hundred pounds of lime are, according to the above equation, hydrated with 32.1 pounds of water. A large quantity of heat is thereby generated, and the volume is increased about three and one half times. The formula is a true expression of the reaction only for chemically pure lime. Such a product, however, is seldom, if ever, obtained in the practice, where 98.25 per cent. CaO may be considered the maximum. The other matters found in lime are: magnesia (MgO), silica (SiO_2), oxides of iron (Fe_2O_3) and alumina (Al_2O_3) and underburnt lime (CaCO_3). The increasing percentage of the first four (MgO , SiO_2 , Fe_2O_3 , Al_2O_3) changes the character of the product considerably. On that account we must distinguish between two classes: the "white lime" and the "grey" or "lean" lime. The former contains less than 10 per cent. of the said matters and the latter more than 10 per cent.

The results obtained when slaking white lime will correspond fairly well with the above formula. The process is rapid, and the generated heat and the increase in volume are considerable. The resulting product has a pure white color and is very fine.

The grey limes may be divided into two classes: the "non-magnesian" and the "magnesian." The former has less than 5 per cent. magnesia, and the latter more than 5 per cent.

The dominating foreign matters in the non-magnesian limes are silica, and the oxides of iron and alumina. The group has also been called "hydraulic lime" or "waterlime," as mortars made therefrom will harden more or less in water. Le Chatelier claims that a good waterlime must hold four molecules of lime for each molecule of silica. We generally find that the best kinds hold about $3\frac{1}{2}$ times more lime than clay-matter, ($\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$).

As for the second class or the magnesian limes, these should include, theoretically, all the varieties containing from 5 per cent. to 47.7 per cent. magnesia. We find, however, in the practice that the magnesia content is either comparatively low or high, i.e., either close to 5 per cent. or above 30 per cent. From investigations I have found that for Ontario the limits are between 36.87 per cent. and 40 per cent.

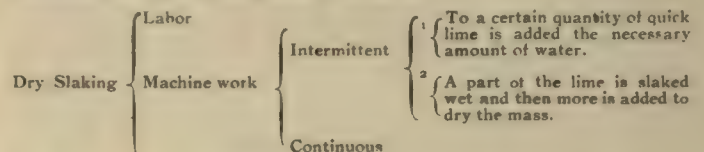
The slaking of the grey limes differs from that of the white in several ways. The water required for the hydration is less, the quantity depending on the percentage of magnesia, silica and the oxides of iron and alumina. The reason for this is that the said matters do not take any part in the reaction. Suppose, for instance, 15 per cent. of

them are present, then 26.45 pounds of water instead of 32.14 are theoretically enough to slake 100 pounds of lime. The process takes place more slowly than is the case with white lime, and the time is increasing with the greater percentage of magnesia and clay matter ($\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$). The point is finally reached when slaking does not take place at all. This occurs when the silica and the oxides of iron and alumina are 30 per cent. or over. It is evident that to secure a thoroughly hydrated product, the slaking must be done very carefully. The slower the process the better the results. The increase in volume is less for the grey than for the white lime.

Two different methods of slaking are in use: the "wet" and the "dry." In the former a great excess of water is used and the resulting product is a slurry, when in the latter only enough is added to hydrate the lime, and a dry powder is obtained.

Before proceeding any further, I would point out the necessity of having the lime well slaked. Suppose, for instance, a part remains as quicklime when the mortar is put into the wall. It will finally slake there under expansion, which in its turn will cause cracks, thus injuring the work. Now, many people claim that the only sure way to get the lime thoroughly hydrated is to use an excess of water. This seems at first thought to be a strong argument in favor of the "wet" process. It should not be forgotten, however, that no matter how carefully the quicklime is prepared it will always contain some overburnt lime. This product hydrates very slowly and will therefore remain intact when the rest is slaked in the mortar box. If there is not enough of it present, the mortar thus prepared will undoubtedly cause trouble. Contrary to what we might think at first, the possibility of this is minimized by the dry process, i.e., by preparing hydrated lime. The reason for this is that those parts, not acted upon by the water, remain almost entirely as lumps, or as a fairly coarse powder which can easily be separated from the fine flour, constituting the slaked material.

The dry slaking is done in several ways. The different methods may be grouped as follows:



There are various methods of slaking by labor. One, for instance, is to dip the pieces in water as long as air-bubbles appear on the surface and then to take them out to slake. The author has found that this way does not give the best results for white limes, but that it works very satisfactorily on magnesian limes, such as are found in Ontario. The reason for less success in the former case is that owing to the comparatively large quantity of water needed the pieces can not absorb enough of it.

Another hand-method used to some extent in Europe is to make a small pile of quicklime about 4 or 5 feet in diameter and 1 foot high, and then pour water on the same. When the most active part of the slaking is over, the mass is shovelled in a steeper pile. More water is now added, if it be needed, or some fine quicklime, if it be too wet. A

new batch is then started, and, after being treated the same way, the slaked product is shovelled on top of the other and so on. The resulting large pile is finally left undisturbed, for some days, to temper, i.e., to finish the slaking. The coarse particles are then sieved off and the product is ready for the market as hydrated lime. The author has seen first class products prepared in this way in Europe.

When hydrated lime is produced for the market in large quantities, it is undoubtedly more satisfactory in this country to use machinery than labor. The reasons are those common to any industry and need not be repeated.

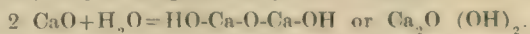
Three different stages may be distinguished in the manufacture of hydrated lime:

1. The quicklime is reduced to a fairly small uniform size.
2. The ground quicklime is mixed with water; the slaking proper.
3. The larger grains in the slaked lime are separated.

The first stage, or the crushing, is done somewhat differently in different plants. Some use only fine crushers and reduce the lime to $\frac{1}{2}$ or 1-inch size, and others grind the crushed material so as to leave 15 or 20 per cent. residue on No. 50. The latter method is the best as far as the grey limes are concerned.

We come now to the hydrating proper. The apparatus used for this purpose is either intermittent or continuous. When the former kind is employed, two ways may be followed. One method is to load the hydrating mill with from 1,000 to 2,000 pounds of lime (crushed or ground). To this add the necessary amount of water and then start it working; or we may slake about two-fifths of the quicklime in the total quantity of water and dry the slurry thus obtained by slaking the remaining three-fifths in the same. The hydrator is often a stationary horizontal cylinder, having inside a revolving shaft with pedals for working the mass; or else it consists of a rotating pan with several stationary plows for the mixing.

In every industry efforts are made to develop continuous systems of manufacture. Considerable saving in time and money is thus made possible. It is but natural, therefore, to find this idea introduced in the hydrating plants. The continuous hydrator is either a single, stationary, horizontal cylinder about 30 feet long and 4 feet diameter with revolving pedals, or it consists of several smaller cylinders arranged so that the material travels from one to another. The quicklime and water enter the machine at one end, and hydrated lime is discharged at the other. As it is of importance to use neither more nor less water than is necessary to hydrate the lime, a simple chemical or mechanical test should be applied frequently to regulate the water supply. If not enough water is used, we get a gritty powder that does not work well in mortar. The reaction, causing the same, may be expressed by the formula:



The product leaving the hydrator is transported to bins, where it is kept about 48 hours to temper, i.e., to finish the slaking. From there it is taken to screens or wind separator, where the coarse, not hydrated particles are separated from the rest of the mass. The fine flour thus obtained is ready for the market as hydrated lime.

The separated coarse particles are often discarded. Sometimes, however, they possess excellent cementing qualities and are then ground. The product thus obtained is either mixed with the hydrated lime or put on the market as cement. The well known Lafarge cement is obtained in this way.

The hydrated lime is generally shipped in either paper or cotton sacks. The former are preferable, as they make a dust-free, airtight package and save the trouble of returning empty bags.

The hydrated lime when made from suitable material and manufactured carefully, is light colored and extremely fine

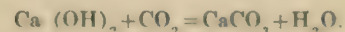
(about 94 per cent. pass No. 200). The specific gravity varies from 2.08 for pure white lime to 2.90 for hydraulic. Being dry, it can be stored any length of time without any detrimental effects whatever. The same can not be said about the quicklime, which by absorbing water and carbonic acid soon becomes worthless. The hydrate should not contain any excess of moisture, because this facilitates the absorption of carbonic acid from the air, thus injuring the product. Hydrated lime has another advantage over quicklime as far as storage is concerned. The latter is known to have caused fires in buildings in which it has been stored, owing to the great amount of heat generated when acted upon by water and carbonic acid. An instance may be mentioned. Over one-half the town of Amal, Sweden, was burned in 1900. It was found, when investigated, that the fire was started by quicklime stored in a barn. As hydrated lime is inert towards moisture and air, there is absolutely no danger of this kind. It can, therefore, be kept in any building that keeps out rain and snow.

Hydrated limes may be divided into the following classes, which are practically the same as those given above for quicklime:

Classification of Hydrated Lime

		Per cent Clay Matter Per cent Lime
White Lime	Hydraulic Limes	Weak Hydraulic Limes 0.00—0.10
		Average " " 0.10—0.16
		Strong " " 0.16—0.41
Grey Limes	Magnesian Limes	Weak Magnesian Limes a little over 4 Mg o
		Strong " " over 25 Mg o

The most important use for hydrated lime is as building material. It is then mixed with sand and water to mortar. After being put in place, the latter is dried out by absorption and evaporation. When, however, the moisture finally becomes about 6 per cent., the lime takes up carbonic acid from the air rapidly, forming carbonate of lime. This acts as cement and hardens the mortar. The reaction may be written:



Besides the advantages pointed out above, the hydrated lime presents here a few others well worth consideration. Masons at first objected to its use because it did not travel quite as easily as lime-putty. This, however, was due to inexperience. With the improved modern methods of manufacture there has been found to be little, if any, difference. Being an impalpable, perfectly hydrated powder, it will give a stronger and better product than it is possible to obtain in the ordinary way of preparing mortars from wet slaked lime. The mixtures (lime, sand) can easily be kept staked, or can be varied at any moment to meet the conditions encountered. The practice of using the same proportions of lime and sand in the mortar, no matter how much the two ingredients are changing, is wrong. Instead of doing so, one should test the materials and then determine the most economical mixture that will safely satisfy the requirements of the job. This would ensure good work and often effect a saving. The lime manufacturer and the contractor should be sufficiently interested in this subject to spend a little money in investigations of this kind, as the results would undoubtedly be of benefit to both.

It is often required that a mortar should harden more quickly or have greater strength than the ordinary one made with lime. Portland cement and sand fulfil these requirements, but the bricklayer objects to the mixture, because it is too lean to handle with the trowel. The difficulty is overcome by adding hydrated lime. The use of lime-cement mortars for brick and stone work is steadily gaining ground. This mixture is also employed successfully for waterproofing purposes. It has been found that the addition of hydrated lime to certain cement-sand mixtures will reduce their permeability for water. The hydrate itself is not waterproof.

Its solubility constant L_{15}° is 0.18. The real waterproofer is in this case the calcium hydrosilicate or cement-glue, formed by the hydration of the Portland cement.*

Any mortar is therefore waterproof that contains enough of the latter to close the voids. If that is not the case, the work will be more or less porous and the water will consequently go through. Suppose, now, that the said cavities were filled with lime instead of cement and sealed up with the above mentioned silicate. The result would be a waterproof body, where the cement glue would act in about the same way as a cork in a bottle, in keeping the lime from being carried away by the water. This is, to the author's mind, what takes place when cement mortar or concrete is made water tight with hydrated lime. Enough of the latter should be added to fill the voids and no more, as a surplus would be useless, or even injurious. The reason is that an excess of lime, above what can be protected by the cement glue, will be dissolved, and the result will be a porous structure.

The lime-cement mixture is used a great deal for facing cement blocks, partly to make them shed the water and partly to give them a light color. When mixed with white sand, it is possible to get a block-face white enough for any exterior work.

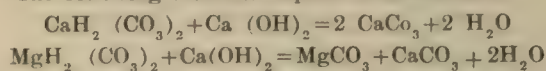
Hydrated lime plays a very important part in the manufacture of hard wall plaster. Being an impalpable powder, perfectly hydrated and easy to handle, it can be given a very good finish.

The manufacture of lime-sand bricks presents another opening for hydrated lime. As this industry is gaining ground steadily, it will undoubtedly become a good customer. Sharp, comparatively fine sand is mixed with 5 to 10 per cent. lime, and some water is added. The mortar is pressed into bricks, which, after being loaded on cars, are placed in large horizontal iron cylinders. These are closed up and the hardening is done with steam, having a pressure of 100 to 150 pounds per square inch. The time required for the curing depends on the steam pressure and varies from 4 to 12 hours. The bricks are then ready for use. The cause of the hardening is that the hydrate of lime unites with the silica on the surface of the grains of sand, forming a silicate, which, in its turn, acts like cement in binding the particles together. In the author's opinion, white lime is best adapted for the manufacture of lime-sand bricks. Good results, however, are reported from the use of magnesian lime.

A few of the most important uses of hydrated lime as a building material have been indicated above. Before leaving the subject, however, I should like to point out something that would undoubtedly facilitate matters and serve to strengthen confidence in the product. Many contractors, while acknowledging the advantage of using hydrated lime, raise the objection that it is difficult to detect any finely ground admixture to the same, such, for instance, as air-slaked lime, limestone, overburnt lime or ashes. To this I may say that the cement maker has just as many opportunities for adulterating his product as the lime manufacturer—and the consumer of cement seems to take care of himself pretty well. The reason is that the producer and his customers have agreed upon certain standards and tests that the cement must stand. The same can be done just as well in the lime industry. A nomenclature of the different kinds of lime together with standards defining their respective qualities should be agreed upon. In addition some practical tests should be devised for the control and identification of the product. Under such conditions it would be much easier for the contractor to order just what he wanted, and for the manufacturer to deliver what was asked for. Confidence in hydrated lime would also increase, as the consumer could

satisfy himself at any time as to the quality by a comparison with the standards.

Hydrated lime is used extensively for the purification and softening of water. Hard water often contains lime and magnesia as double carbonates $(\text{CaH}_2(\text{CO}_3)_2, \text{MgH}_2(\text{CO}_3)_2)$. These are precipitated by the addition of hydrated lime. The following formulæ explain the reactions:



There are other uses for hydrated lime in connection with water purification, but the above example may suffice.

Only a few of the important matters in the hydrated lime business have been discussed, as the scope of this article does not allow the author to enter into any details. For instance, it was impossible to give either a full description of the different methods of hydrating or of the cost of plant and manufacture. These subjects alone would furnish enough material to fill a good sized volume.

The Government House Competition

The Royal Architectural Institute of Canada and the Ontario Association of Architects have taken a decided stand in connection with the competition for plans for the Lieutenant-Governor's residence at Toronto. When the conditions of the competition were made public they did not include the appointment of an advisor satisfactory to the Institute, who should be employed to draw up the conditions and assist in the award. This omission was brought to the attention of the promoters of the competition, but was not acted upon by them. Other objectionable features were included in the competition, not the least of these being that there was no guarantee that the winner would be given the work of supervising the building. In addition to this, the time given for preparation of the plans was insufficient. A deputation of members of the Royal Architectural Institute of Canada and of the Ontario Association of Architects visited the Ontario Minister of Public Works and laid these objections before him. The Minister stated that he would do whatever he could in connection with the matter. Subsequently the time was increased but the other objections were not removed. The Royal Architectural Association and the Ontario Association of Architects have therefore decided to advise their members to refrain from taking part in the competition.

A very large mild steel plate, the largest ever produced in England, was recently rolled at the Grimesthorpe Steel Works of Messrs. Cammell, Laird & Company, Limited, Sheffield. The ingot utilized weighed 120 tons, its dimensions being 9 feet x 3 feet 10 inches x 18 feet 1 inch, and the charge was obtained from three S.M. furnaces. The ingot was stripped the following day after casting, taken from the casting pit, and within one hour charged into a horizontal re-heating furnace. The ingot was slabbled down under a 4,000-ton press to 12 feet 9 inches x 9 feet x 40 inches, reheated and rolled into a plate 18 feet x 10 feet 9 inches x 25½ inches, the latter operation occupying 45 minutes. When the scrap has been removed and the plate machined at Cyclops, the approximate finished weight will be 65 tons. Transit between the two works will have to be by road, three heavy traction engines being required for the purpose. Messrs. Cammell, Laird & Company are represented in Canada by F. H. Hopkins & Company, Montreal.

Vancouver, B.C., is to have a new dry dock which will cost about \$1,200,000 to construct. The Dominion Government has bonused the new docks to the extent of 3½ per cent. on its capital, for 25 years. The docks will lift ships of 15,000 tons capacity. The company will also have a ship repair and construction works, and car shops which will cost about \$500,000. This department is not bonused.

*See Author's Article "Notes on the Hardening of Portland Cement," "Contract Record," June 1st, 1910.

Road Materials and Rules for Testing Them

A Discussion of the Methods by which the Best Results are Obtained in Various Classes of Roadwork—Particulars of Some Recent Tests*

With the single exception of ordinary earth or loam, sand and clay in combination is probably the lowest type of material available for road purposes.

Without doubt loam should never be so used, with regard to economy, if anything better is obtainable at a reasonable cost. It is true that by the use of a log drag or road scraper, under the direction of trained operators, loam roads may be kept in excellent condition during the summer months, but in the spring with the frost coming out and the snow melting the condition of such roads is intolerable.

Sand, of itself, while at its best in winter and spring, does not ever have sufficient stability to sustain traffic over it, and clay, of itself, is open to the same or greater objection than loam.

It is possible, however, to combine sand with clay in such a manner that under moderate traffic and favorable climatic conditions a fairly serviceable road may be obtained. But were a gravel even of inferior quality available, a sand-clay road would not be considered seriously.

Gravel

Gravel, unlike sand, loam and clay, is not a simple material. Indeed, it is usually a mixture of materials, small pebbles or stone fragments combined with either sand or clay.

It is very widely distributed throughout the glaciated portion of the country. Prof. N. S. Shaler has stated that it rarely occurs that gravel cannot be found within an area of ten miles square in the glaciated field.

But gravel suitable for road purposes is not so plentiful as the foregoing statement would indicate, since unless the pebbles are combined with the sand or with the clay in proper proportions, the gravel, without treatment, may be of little value.

Probably the best gravel is what is called in some parts of New England, "blue gravel." This material is in effect finely broken trap rock which has been subjected to little or no water action. The fragments are angular; the graven contains little argillaceous matter and when placed on the road and rolled the fragments lock together into a mass having relatively few voids and great stability. The deposits of this blue gravel are rare and the community with a bed of such material is to be congratulated. Its road problem is not a serious one.

As between the sandy gravels and the clayey, the choice should be usually in favor of the former unless the clay is in relatively small proportion. Too much clay makes a muddy road and one which is easily rutted by traffic. Too much sand, with large pebbles makes a mass with little or no stability and no amount of rolling will compact it.

For the best results, in general, considering the ordinary gravels, the writer believes that all stones which will not pass through a two and one-half inch mesh should be screened out; that at least 50 per cent. by weight should consist of pebbles or fragments which will not pass through a one and one-quarter inch mesh; at least 80 per cent. should not pass through a one-half inch mesh; and that the remainder should consist of small fragments of pebbles and sand from less than one-half of an inch in diameter to an impalpable powder.

The writer admits that such a gravel is too rarely found but he offers it as an ideal to be approached as nearly as is

possible, always bearing in mind the economics of the problem.

A gravel so graded, when properly rolled, has great stability in the road. If the pebbles in the gravels are from rocks of a crystalline or eruptive nature, as is usually the case in New England, a road built of such material will make but little mud under traffic and should not rut to any considerable extent even when the frost is coming out of the ground.

Rocks

In general, the chief desiderata in rocks for road building are hardness and toughness, and the writer believes that toughness should be written first. It is wholly within the range of possibility that in the most modern types of road surfaces, considered economical for the kind of roads herein contemplated, namely, those in which some form of bitumen is used as a binder or matrix, or as a wearing coat, stones of somewhat inferior quality may be used safely.

If the road builder has a choice between stones for macadam purposes, and too often he has not, no scientific instruments of precision are usually required to determine the relative value of the stones. The stone hammer and the scratching of one stone with the other are all that are necessary. And it may also be generally stated that the rocks having a fine texture are more likely to be tough than those having coarse crystals. When there is not an excess of motor vehicles in the locality, a smooth surfaced road will be more often secured if ledge rock is used rather than field boulders. The field stones are usually of glacial origin. The fact that they escaped utter demolition in the cataclysmic grindings of the glacial period indicated that they were of the toughest and hardest parts of the rocks from which they were separated. But while they may be harder and tougher than the ledge rock in the locality, because of lack of uniformity in these characteristics, comparing boulder with boulder, the road surface in which they are placed is likely to wear less smoothly than if ledge rock is used.

Under very light traffic or when motor vehicles predominate, the writer believes that a relatively soft rock will often prove to be more economical than a relatively hard one; also that under such conditions when a good gravel is obtainable, its use will usually prove to be more economical than if the road is built after the macadam type.

Much has been said and written about the cementing power of the fine dust or powder which results from the crushing of stone by machinery. The writer believes that certain stones, notably the limestones, undoubtedly produce screenings of value in this respect. But while most of the other stones make a dust almost wholly lacking in this property, such screening when properly applied serve well as a binder. It would seem that the action is more mechanical than chemical. The fact that sand, if the particles are angular and not rounded, is often used satisfactorily as a binder would seem to prove this hypothesis.

Of the most common stones used for macadam work, it has come to be generally accepted that trap rock (diabases, diorites and some other rocks of an igneous metamorphosis) is the best. In the order of merit there follows the felsites, hornblende, granites, the harder limestones, schists and quartzites. It is not safe, however, without investigation and tests, to say for instance that a granite is always better

*A paper read at the American Congress of Road Builders at Seattle, by Austin B. Fletcher, secretary Massachusetts Highway Commission.

than a limestone, since some of the non-crystalline limestones are often found to be far superior to the large crystallized granites. This may also be found to be true when other rocks of the foregoing list are compared with one another.

Undoubtedly, the best laboratory tests of rocks for road building are those made by the Office of Public Roads at Washington, D.C.

That department undertakes to make tests and analyses of stones without charge. It has done much excellent work and tests and reports on tests are made with admirable promptness. The nature of the tests as made by the Office of Public Roads will not be discussed here. They include everything hereinbefore referred to concerning tests of rocks and much more, and they have been completely described in the bulletins of that department.

Bituminous Materials

The writer pauses before entering upon the discussion of the tests of bituminous materials which may be used in road work. While there is no doubt that this material is the most interesting that has so far entered into the construction of road surfaces, it is so new that no standards have been fixed.

The necessity for the use of such materials on our rural roads is wholly due to the rapid change in traffic conditions from horse drawn to self-propelled vehicles. Nor is it known precisely why motor vehicles require so different a kind of road surface. Much has been said and written, and the writer of this paper acknowledges his own errors in that particular about the suction caused by the tires of such vehicles. While suction may play some part in the erosion of road surfaces, it is coming to be recognized that the principal source of difficulty lies in the disintegrating action of the rear wheels of motor vehicles. The tractive power being applied through the rear wheels results in a tangential stress upon the surface instead of a pressure normal to the surface, as in the case of the horse-drawn vehicle.

Until comparatively recently it has not been necessary to provide against any such tangential stress, but no macadam road which will receive much motor vehicle traffic could now be planned without taking it into consideration.

Thus far bituminous materials, only, seem to offer a remedy for the difficulty at a cost which is reasonable, and the coal tars, asphaltic oils, and asphalts are the materials to which road builders have turned their attention in their search for a binder for the broken stone.

The writer is aware that the title of this paper mentions particularly simple tests. There is no such thing as a simple test of bituminous materials. There is no branch of chemistry which gives the chemist more trouble than the analyzing of materials containing bitumens.

It is true that the coal tars have been used for many years here and abroad for sidewalk purposes and to some extent in roadways, and that some of the men who have handled the materials have become more or less expert in their use. Indeed, some of these men claim to be able to judge of the quality of a tar when heated by watching it drip off the end of a stick or by chewing it. But these tests are rather too crude for the engineer and the expert chews cannot describe his sensations accurately enough for insertion in specifications. The results secured in the use of tar also indicate that these empiric methods are too crude, since while some of the work done has been excellent, other tar constructions have disintegrated rapidly.

All this leads the writer to the belief that the chemist must, in a large measure, work out this new problem for the road builder.

The coal tars have been used sufficiently in the past in road making to indicate that to be of substantial benefit they must be partially refined and possibly combined with other

materials. Unless they are treated so that all the water, the naphthas, some of the light oils and the ammoniacal liquors, are removed, they will prove of little value. But just what the permissible specific gravity and percentage of free carbon, and what the viscosity and other characteristics should be, are questions of greater difficulty.

The chemists, acting with the engineers, are working diligently on these questions, and it is hoped that by their combined efforts the essential characteristics will be standardized.

The asphaltic oils likewise promise to be useful as binders for macadam and gravel roads, but even less is known of them than of the tars. It seems to be reasonably safe to say that they should be free from water, and that no oil which has a base of paraffin should be used. The value of the oil should depend on the amount of bitumen contained in it. Oils having a relatively low percentage of bitumen are useful for surface application to alleviate the dust nuisance, but for use as a binder in gravel or macadam work it now seems that those oils which have the greatest percentage of bitumen will prove most economical.

It is an open question whether the best asphaltic oil is such as is made up synthetically by thinning down asphalts with lighter oils or fluxing oils, or whether the best oil is secured by stopping the refining process at just the right point and before the refining is carried to the hard asphalt stage. It would appear that the first process should give a product more uniform than the latter, but which process is the better is not yet determined.

The asphalts which are being experimented with as binders are mostly of those made from asphaltic oils. No one knows whether they will prove more economical for use than the so-called natural asphalts such as the Trinidad or the Bermudez. Lacking the test of time, the oil asphalts appear to be cheaper.

The following specifications will give some idea of the complexity of the artificial binders here under discussion. They are such as have been prepared for the Massachusetts Highway Commission by Mr. H. W. Clark, chief chemist of the Massachusetts State Board of Health, and represent the results of a considerable study of the materials in the laboratory and in the roads. It is not claimed that they are in perfect form but the commission is using materials conforming to them this year in its treatment of many miles of road. The specifications are intended to represent what have been so far offered as the best materials for bituminous road binders:

Refined Tar

Sec. 10a—The tar must be uniform in color, character, appearance and viscosity and must have the following qualities:

a—It shall contain not more than 0.5 per cent. of mineral matter or dirt.

b—It shall have a specific gravity between 1.18 and 1.25.

c—It shall not contain more than 14 per cent. by weight of free carbon.

d—It shall contain no body that distills at a lower temperature than 25 deg. C.; not over ten per cent. by weight shall distill below 270 deg. C. and it shall contain at least 65 per cent. by weight of pitch and bituminous material remaining after all bodies up to 360 deg. C. have been distilled.

e—When 20 grams are heated in a flat-bottom dish 3 inches in diameter for 21 hours in an oven kept at a temperature of 100 deg. C. the loss shall be not more than 10 per cent. by weight.

f—It shall be of such viscosity that 60 c.c. measured at room temperature (78 deg. F. or 26 deg. C.) shall, when at 100 deg. C., be not less than 85 seconds and not more than 240 seconds in passing through a viscosimeter orifice 5-64 of an inch in diameter when acting under a head of 4½ inches.

g—When 12½ per cent. by weight of the material is mixed with 87½ per cent. by weight of sand, of such grade that all will pass through a sieve having 10 meshes to the linear inch and practically none through a sieve having 100 meshes to the linear inch, and briquettes made 3 inches square and ½-inch thick, such briquettes will so harden in

seven days at ordinary room temperature that when laid flat and held by their edges by two parallel knife-edge bars, they shall not bend when a weight is suspended from a third knife-edge or parallel bar placed across their centre until this weight reaches 200 grams, and shall not break at less than 250 grams, and the weight causing bending shall not be greater than 80 per cent. of the weight causing breaking.

Asphaltic Oil

Sec. 10b—The oil submitted shall be of a uniform color, appearance, general character and viscosity, must contain no bodies not naturally present in an asphaltic oil and must fulfill the following requirements:

1. It shall not contain more than 0.5 per cent. of dirt or adventitious mineral matter.

2. It shall have a specific gravity of at least 0.97.

3. It shall not contain more than 1 per cent. of matter insoluble in carbon bisulphide and should not contain more than 10.0 per cent. insoluble in petroleum ether.

4. It shall contain no body that distills at a lower temperature than 250 deg. C. and shall not lose more than 55 per cent. by weight by distillation to 360 deg. C.

5. It shall be of such viscosity that 60 c.c. measured at room temperature (78 deg. F. or 26 deg. C.) shall when at 100 deg. C. be not less than 5 minutes nor more than 10 minutes in passing through a viscosimeter orifice 5-64 of an inch in diameter when acting under a head of $4\frac{1}{4}$ inches.

6. When 20 grams are heated in a flat-bottom dish 3 inches in diameter for 21 hours in an oven kept at a temperature of 100 deg. C. it shall not lose more than 5 per cent. by weight.

7. When $12\frac{1}{2}$ per cent. by weight of material is mixed with $87\frac{1}{2}$ per cent. by weight of sand and briquettes made 3 inches square and $\frac{1}{4}$ -inch thick, these briquettes must keep their shape and show some binding together.

Oil Asphalt

Sec. 10c—1. The asphalt submitted shall be of uniform color, appearance and character, and shall contain no body not naturally present in an oil asphalt.

2. It shall not contain more than 1 per cent. of dirt or adventitious mineral matter.

3. It shall have a specific gravity between 1.00 and 1.10.

4. It shall not contain more than 1 per cent. of matter insoluble in carbon bisulphide and should not contain more than 30 per cent. insoluble in petroleum ether.

5. It shall contain no body that would distill at a lower temperature than 225 deg. C. and should not lose more than 40 per cent. by weight by distilling to 360 deg. C.

6. When 20 grams are heated in a flat-bottom dish 3 inches in diameter for 21 hours in an oven kept at a temperature of 160 deg. C. the weight shall remain practically constant.

Concrete Hollow Blocks

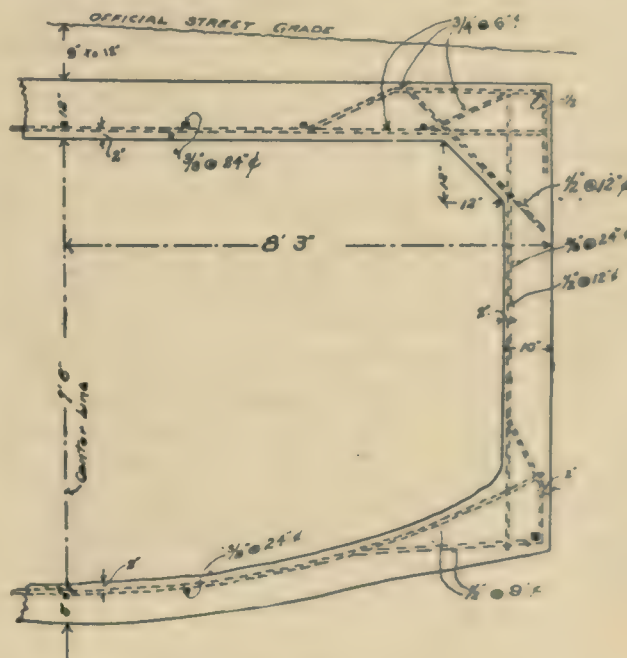
The "Engineering Record" comments in part as follows on the standard rules and regulations governing block making as adopted by the National Association of Cement Users:

"Concrete hollow blocks like a number of other concrete and reinforced concrete products, have come to stay, and have already found a wide and rapidly widening application in building construction and in some other lines of work. They constitute a useful and attractive building material in consequence of the ease with which they can be made of any shape, and because they may be conveniently and economically laid. Their utilization constitutes, so far as modes of manufacture and procedure in building are concerned, practically an extension of the use of bricks. Further than this, they possess an advantage over the latter in ease of manufacture and especially in the ease with which void spaces may be formed in the concrete, thus making, what is frequently much desired, an air space in the wall. At the same time they have one other characteristic, porosity, in which they are unfortunately too much like brick. Any process of manufacture or simple, economic treatment which will eliminate the porosity of the hollow concrete block will add much to its value. Again, inasmuch as the hollow blocks are bound to be used where more or less heavy loads will come upon them, it is of the utmost importance to be assured that they have the requisite carrying capacity, not only at the time of laying

them, but also at a subsequent period when they receive their greatest loadings. While the operations of hollow concrete block making constitute practically shop work and they may consequently be controlled with corresponding ease and accuracy, it is imperative that these concrete shop operations, so to speak, should be subject to just as stringent specifications as those which belong to the fabrication of steel structural members, also a shop operation. This is all the more necessary from the fact that the manufacture of concrete hollow blocks is essentially a new industry."

Reinforced Concrete Brick

Several structures which we have inspected recently have called to our attention the importance of paying more attention to the angles and corners of concrete structures than is frequently done, says the "Municipal Journal and Engineer." This is especially the case where there is a change in the thickness, form or conditions to which the two parts of the structure which meet at such an angle are subjects. An



angle of 90 degrees or less is an invitation for a crack to begin at that point, whereas a round surface will frequently prevent a crack from spreading. An illustration of the last statement is found in the fact that a crack in an iron or steel plate may sometimes be stopped from extending further by drilling a round hole at or just beyond the extreme limit of the crack.

The above would suggest that junctions between the side walls of tanks, reservoirs, etc., and between the sides and either top or bottom of a sewer or conduit should be made with rounded rather than with square corners; also that additional reinforcement be placed at such intersections to resist any tendency to cracking apart. An illustration of both of these is found in a recent design for a sewer or creek conduit to be constructed at Vasalia, Cal., made by Mr. M. L. Weaver, the city engineer. The section shown here, which will be about 860 feet long, is intended to carry the street traffic with a cover of only 9 to 12 inches above the roof. The most of the conduit, however, will be off the highway and in this section the construction will be lighter. In this plan it is seen that the top intersection is made with two 120 deg. angles rather than one 90 deg. In our opinion a quadrant of a circle would be still better than this.

Railways to Become Large Builders in Concrete

Officials of railways, who have in their charge the construction and maintenance of buildings, bridges, roadbed and other equipment, proceed with extreme care in the selection of materials and methods for handling them.

Concrete has already come to play an important part in railroad building and as yet only a start, as indicated by the committee reports submitted to the recent maintenance of way convention, held in Chicago. Concrete bridges, coaling stations and fence posts seem to be considered successful. The following paragraphs are taken from the reports of committees that have been investigating the different classes of construction mentioned:

In any bridge the qualities to be desired are: (1) adequate strength; (2) freedom from vibration and excessive deflection; (3) economy in first cost; (4) economy in maintenance, and (5) permanence.

The theory of flexure of reinforced concrete is sufficiently well understood to enable safe and economical designs to be made, and experience with reinforced concrete structures carrying dead loads only has been abundant. Experience with such structures carrying heavy live loads and subjected to the shock and vibration of these loads, moving at high speed, has not been so extensive, but reinforced concrete girders can be designed and built in short spans of any strength required (or likely to be required) by railway loads. In the event of overloading or defective construction, reinforced concrete will give quite as much warning of probable failure as other materials.

While the art of bridge construction in steel has so far progressed that the safeguards surrounding the manufacture of steel and its fabrication into bridges have come to be matters of course, the equally careful supervision of the manufacture of reinforced concrete seems burdensome to the engineer, although it is just as necessary as in steel, but no more so. This necessity for careful inspection of methods and materials of manufacture needs to be emphasized, for (like steel) concrete may most easily be ruined by careless workmen. But when the same pains are taken to produce good concrete as are now taken to produce good steel, with the same rigid inspection and insistence on proper specification, there will result a product which we believe will prove to be equally reliable.

Advantages of Reinforced Concrete

One of the chief advantages of reinforced concrete over steel for short spans is that the form lends itself more readily to ballasted floor construction, the superiority of which over open decks is evident, not only on account of the absence of wood, which may rot or burn, or exposed steel, which requires protection from brine drippings or other corrosive influences, but also on account of the freedom from vibration and excessive deflection, and the reduction of the cost of maintenance to a minimum.

The comparative economy of the two styles of construction is a matter which is not easily determined in general terms, depending as it does upon the market price of steel, concrete materials and labor. The character of the design is also a factor of first importance. Generally speaking, if it is not considered advisable to use ballasted floors in any particular case, for that case, the short span of I-beams with ordinary floor of wooden ties is the cheaper construction in first cost. If, however, a large number of similar spans is to be built, so that concrete slabs can be constructed in a central and conveniently arranged plant, and if the erected price of steel work approximates 3 cents per pound, the difference between concrete slab construction built with ballast floor and steel construction with open wooden floor, will be small, and in many cases will be favorable to the concrete.

If the designs contemplate the use of I-beams embedded in concrete, compared with reinforced concrete girders, economy will be all on the side of the latter.

Short spans of reinforced concrete also permit a substantial economy in the design of abutments carrying them.

Reinforced concrete flat slabs or girders are not generally advisable for railway loads in spans exceeding 40 feet. But as the great majority of structures carrying tracks over openings in the roadway are of spans less than 40 feet, the importance of these small structures is very great, and the use of reinforced concrete for these small spans is desirable.

Concrete Fence Posts

While American railways have been conducting extensive experiments to demonstrate the economy of the reinforced concrete post, the art is still in a primitive state. Distinct progress, however, is being made, and another year should produce much valuable information. The following facts have been established and are self-evident propositions:

(1) Concrete fence posts will heave very little and in most cases not at all; posts set from two to five years ago are still in almost perfect alignment.

(2) They appear sufficiently strong for all practical purposes after having been properly cured and set. A cedar post of dimensions identical with the average concrete post would weigh about 25 per cent. as much and is about four times as strong when new. But this only brings out the fact that the cedar post is stronger than necessary and that the concrete post with its lesser strength is yet strong enough to serve its purpose, and has a longer life.

(3) The claim that a concrete post reinforced with steel forms a lightning protector appears reasonable.

(4) They resist the action of fire and decay, and will not float and cannot be displaced as easily as wood.

(5) They must be handled carefully in loading and unloading, and be well cured before being set.

(6) They are much heavier than wood posts and the cost of distributing and setting is about 25 per cent. greater.

It is reasonable to assume that, since concrete has supplanted wood and steel for a great variety of purposes, it will also do likewise in the case of fence posts. It remains only to produce a really practical post from the viewpoints of economy and utility to bring them into general use. They will naturally have to be made by machinery. There are already a number of cheap portable machines on the market.

Reinforced Concrete Coaling Stations

The cost of reinforced concrete coaling stations averages about 50 per cent. greater than that of timber structures of like capacity.

It would seem that the use of the reinforced concrete type of coaling stations and storage bins is increasing. In many cases, no doubt, the freedom of this type from the danger of the loss of the structure and contents by fire due to spontaneous combustion of soft coal will cause many engineers to install one or more of these structures so that they may have a practical test of their efficiency.—“Concrete.”

The architectural firm of Michie & Dowler, Calgary, Alta., has been dissolved, and Mr. Dowler has engaged in partnership with Mr. G. M. Lang, C.E. The new firm will be known as Lang & Dowler, with offices in suite 6, Alexander corner, over Molsons Bank, Vancouver, B.C. Mr. Lang is an associated member of the Canadian Society of Civil Engineers, and was for several years in the engineering department of the C.P.R. Mr. Dowler is a registered member of the Alberta Association of Architects, and together with his former business associate, has been connected with the erection of a large number of the more important business buildings in Calgary.

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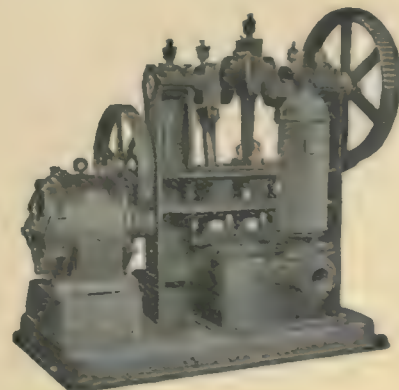
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Ottawa's New Building By-law

The new building by-law of the city of Ottawa contains over 100 pages. It does not cover the plumbing or electrical fittings, which will come under separate by-laws.

At first it was proposed to limit the height of buildings in this city to eight storeys, but at the council meeting at which the by-law adopted this clause was cut out. However, the by-law does not make any provision for the thickness of walls over eight storeys, and this table will have to be added. All dwellings of over 80 feet in height must be fireproof. No frame building can be erected over three storeys high. Dwellings on inside lots must not cover more than 75 per cent. of the area of the lot. A back yard 10 feet wide for a dwelling 25 feet high and widening 3 inches per every additional foot, must be provided. If there is an alley at the back, half the width of this may be included as back yard. In case there is a side yard the entire length of the lot, the back yard need only be five feet. In case of a corner lot, the dwelling may cover 90 per cent. of the lot. All ceilings in dwellings must be at least 8 feet high and every room must have at least one window opening onto outside air. The aggregate of the window area for each room must be equal to 10 per cent. of the floor area. Attics, of course, are excepted from this regulation. Business buildings may cover the entire lot, but if upper storeys are used as dwellings, they must be reduced in size to comply with the clauses respecting dwellings. Enclosed courts must have horizontal intakes at the bottom whose area must be equal to 10 per cent. of the area of the court.

Particular specifications are made with the view to making foundations secure, such as that all buildings up to 40 feet in height must have foundations of at least 13 inches in thickness for concrete and 18 inches if of stone. The permissible load per square foot to which different kinds of soil under the foundation walls and piers of buildings may be subjected is as follows:

Gravel and coarse sand, well cemented.....	.8 tons per square foot
Dry hard clay	.4 tons per square foot
Sand, compact and well cemented	.4 tons per square foot
Moderate dry clay or clean sand	.2 tons per square foot
Soft, wet clay	.1 ton per square foot
Quick sand or alluvial soils	$\frac{1}{4}$ ton per square foot

The width of all footings and ranging timbers shall be at least sufficient to meet these requirements.

The load per square foot placed upon walls, piers or other supports of masonry constructed of first class materials of the several kinds mentioned, shall never exceed the limit given in the following table:

	Safe load per sq. ft.
Gravel and coarse sand, well cemented.....	.8 tons per square foot
Ordinary brick laid in Portland cement mortar	5 tons
Hard brick laid in lime mortar	6 tons
Hard brick laid in Portland cement and lime mortar	9 tons
Hard brick laid in Portland cement mortar	12 tons
Pressed brick laid in lime mortar	8 tons
Pressed brick laid in Portland cement mortar.....	14 tons
Rubble stonework in lime mortar	4 tons
Rubble stonework in lime and cement mortar	6 tons
Rubble stonework in Portland cement mortar	8 tons
Concrete, one part cement, two parts sand and five stone	15 tons

Water tanks erected over roofs of buildings are to be supported on sufficient brick bearing walls or beams, and pillars of metal, and so constructed as to protect the bearing walls and walls of building from water.

Before getting permits for a reinforced concrete structure, specifications, giving the composition of the concrete, must be filed.

All stone or lime offered for sale, if required, must be weighed on the city scales. Each vehicle for delivering materials must be numbered and its capacity stamped on it.

No projection will be allowed from a building over the sidewalk at less than 10 feet above the walk, and (except in the case of main cornices) none may project more than two feet. Main cornices are limited to four feet. All canopies or hoods over the sidewalk must be supported entirely from the building.

All public buildings or places of amusement with a capacity of over 1,200 persons, must be fireproof. Smaller theatres, etc., must be of slow burning material. There must be emergency exits on each side of the auditorium whose area will aggregate half the area of the main entrance. None shall be less in width than 3 feet 6 inches. These exits must have two doors which open outwards. Main stairways and doors must aggregate in width 18 inches for each 100 persons' capacity.

Canadian City Engineers

A. J. Latornell, Edmonton, Alta.

Mr. A. J. Latornell, who was recently appointed city engineer of Edmonton, is of French Huguenot descent but is a Canadian by birth, having been born at Meaford, Ont. After acquiring all the education to be obtained at the public and high school of his native town, Mr. Latornell began his engineering training in the autumn of 1898 by entering the chops of the W. A. Johnson Electric Company, of Toronto,



A. J. Latornell, City Engineer of Edmonton, Alta.

as special apprentice. After serving in these shops and those of the United Electric Company of Toronto, he entered the School of Practical Science in October, 1900, from which he graduated in May, 1903, with honors in the Department of Civil Engineering. His vacations during this period were spent in survey work in the West.

In May, 1903, he entered the services of the Canadian Pacific Railway as assistant to the resident engineer on Maintenance of Way at Ottawa, Ont. Resigning from this company in June, 1904, he made connections with the Public Works Department of the Northwest Territories, in whose employ he continued until October, 1905, when he returned to the University of Toronto to take the post graduate work in civil engineering. In May, 1906, he graduated from this University with the degree of Bachelor of Applied Science.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brockville, Ont.

The tenders for the erection of new pumphouse were as follows: Barclay, Fair & Fox, granite and brick, \$12,996; Street & Anderson, granite and brick, \$10,911; Stret & Anderson, brick, \$10,661; W. Patterson, concrete, \$9,000; W. Patterson, granite and brick, \$9,481; W. Patterson, brick, \$9,600. Work will be done by day labor.

Chilliwack, B.C.

The by-laws for drainage improvements and purchase of road machinery were carried.

This municipality requires a rock crusher. \$10,000 is available.

Hamilton, Ont.

S. Cheeseman's tender for the St. Patrick street sewer was \$1.75 a foot. The city engineer bid \$1.05, and will build it.

Tenders addressed to J. L. McLaren, chairman Board of Control, will be received until August 3rd for constructing sewers on Hillyard, Wilkinson, Niagara and Wentworth streets.

New Westminster, B.C.

The by-law to vote \$150,000 for street improvement was carried.

North Toronto, Ont.

The council sanctioned the assessment of some six miles of water mains and about the same of concrete sidewalks.

Orangeville, Ont.

The by-law to procure system of waterworks was carried. See Public Buildings.

Strathcona, Alta.

For unavoidable reasons it is not possible to proceed with the construction and installation of the sewage demonstration plant which is to be established here, until after the session of the legislature.

St. Thomas, Ont.

Tenders for concrete reservoir, capacity 900,000 gallons, were received as follows: G. A. Ponsford, St. Thomas, \$12,930; A. E. Ponsford, St. Thomas, \$13,300. These tenders were considered too high and no contract was awarded.

Vernon, B.C.

Tenders addressed to S. Somerville, city treasurer, will be received until August 29th for the purchase of the following debentures: Waterworks extensions, \$10,000, 25-year, 5 per cent.; local improvement cement walks, \$8,000, 15-year, 5 per cent.; sewer extensions, \$3,500, 25-year, 5 per cent., etc.

AWARDED.

Islington, Ont.

The tenders for the erection of a steel concrete culvert on the Burgess side road were as follows: R. J. Low, \$375; I. M. Scott, \$355 (awarded). R. J. Lowe's tender of \$325 for a steel concrete culvert on the Albion road was accepted.

Lacombe, Alta.

The contract for construction of concrete sidewalks was awarded to Davidson & Westaway, Calgary, at 23½ cents per square foot; curb and gutter at 68 cents per lineal foot. Other bids: for walks, 24, 35 and 36 cents; for curb and gutter, 60 and 75 cents.

North Bay, Ont.

The contract for construction of concrete sidewalks has been awarded to the D. W. Mitchell Construction, of Niagara Falls, Ont. Other tenderers were, W. G. Carr, North Bay, H. A. Nickle, Owen Sound, and R. L. Francis, Huntsville, Ont. Tender was awarded at a price of 10 3-4 cents per square foot. M. W. Flannery, town clerk.

Outremont, Que.

The Outremont council has awarded contracts for the construction of six brick and three tile sewers at an approximate cost of \$60,000, as follows: W. G. A. McDonald, Champagneur avenue, Querbes avenue, De l'Eppe avenue and Rockland avenue; R. T. Smith & Company, Maplewood avenue, Sunset avenue and Pagnuelo avenue; M. Lapointe, Bloomfield avenue; and W. Duquette, Outremont and Wiseman avenues.

Peterboro, Ont.

The contract for concrete walks of the Township of North Monaghan has been awarded to James Boyer at 9 7-8 cents per square foot.

Railroads, Bridges and Wharves

Aylmer, Que.

Tenders are being called by Public Works Department for construction of a wharf. R. C. Desrochers, assistant secretary.

Chatham, Ont.

The Western Bridge & Equipment Company contemplate building a new plant to accommodate their increased business, and would like to have an assurance of a fixed assessment.

Galt, Ont.

The Board of Works have decided to call for tenders for the construction of cement bridges over the creek on Anislee and also on Kerr street.

Kamloops, B.C.

Plans are now being prepared by direction of the Minister of Public Works for the new bridge across the Thompson river at Waihashin. The work will be started this fall as soon as low water permits, and the bridge, a handsome steel structure, will cost about \$30,000.

New Westminster, B.C.

The \$30,000 by-law for Lulu Island bridge was carried.

North Vancouver, B.C.

The money by-law on bridge propositions was carried.

Quebec, Que.

It is stated that 83,000 tons of steel will be required for the Quebec bridge. It is expected that the bids will be taken about September 1st.

St. Catharines, Ont.

The Buffalo, Niagara & Toronto Railway by-law will not be voted upon, nor will it be voted upon on August 8th at Niagara-on-the-Lake, owing to decision of directors.

Victoria, B.C.

The proposition from J. Wolkenstein, of New York, president, British Columbia & Alaska Railway Company, to build the 800 miles from here to Fort George will likely come before the government shortly. Surveys have been completed by L. M. Rice Company, of Seattle. Estimated cost, \$25,000 a mile.

The Canadian Northern Railway has applied to the Dominion Government for a charter for a railway to run from Edmonton to Bear River on the Portland canal.

Vancouver, B.C.

The promoters of the bridge across the Second Narrows of Burrard Inlet are now considering the choice between two forms of low level bridges. The location plans for the bridge have already been approved.

AWARDED.

Chatham, Ont.

The following tenders for laying concrete floor on south approach to Kent bridge were received: G. Fielder, of this place, \$575 (accepted); W. Graham, Kent Bridge, \$825; A. S. Everett, Thamesville, \$925; G. Coumbar, Chatham, \$1,325.

Edmonton, Alta.

It is stated that the contract for the substructure of the big million dollar high-level bridge over the Saskatchewan connecting Edmonton and Strathcona was let by the C. P. R. to John Gunn & Sons, of Winnipeg. The C. P. R. has charge of the building of the bridge.

Port Arthur, Ont.

The following tenders for construction of concrete bridge over Current river were received: Seamon & Penniman, Port Arthur, \$17,792.75; Stewart & Hewitson, Port Arthur, \$20,687.10. Contract awarded to the former. J. Antonisen, engineer.

Vancouver, B.C.

W. P. Tierney, Nelson, has been awarded the contract for building a ten-mile section of the C. N. R. in the Fraser River valley. Chas. Johnson, of Seattle, has a sub-contract.

Public Buildings, Churches, Schools, etc.

Battleford, Sask.

Tenders for construction of post office will be received until August 22nd. R. C. Desrochers, assistant secretary, Department of Public Works, Ottawa. J. Greenfield, resident architect, Winnipeg, Man.

Beaverton, Ont.

Tenders will be received until August 10th for the electric wiring of the town

hall. L. J. Cameron, Chairman Building Committee.

Britcola, B.C.

Tenders will be received for supplying and installing heating appliances for North Hastings school. C. Corder, secretary.

Chilliwack, B.C.

The City Hall by-law was carried.

Digby, N.S.

Tenders for electric light fixtures, wiring, etc., for the public building here, will be received until August 10th by Public Works Department, Ottawa. R. C. Desrochers, assistant secretary.

Edmonton, Alta.

Tenders addressed to J. Stocks, deputy minister, will be received until August 4th for supply of about 200,000 square feet wire fabric for concrete floors for Parliament Buildings.

Eganville, Ont.

We are informed that no tenders for the erection of a school here had been received at the time specified. Simpson & Young, architects, Toronto. J. R. Campbell, secretary, P. S. Board.

Edwardsburg, Ont.

Tenders were called until August 3rd for erection of school house, section 20. Plans, etc., with S. L. Spicer, secretary-treasurer, Prescott. C. N. McFarlane, chairman, Cedar Grove.

Enfield, Ont.

Tenders addressed to R. Pascoe, secretary, will be received until August 8th for erection of brick school, Section No. 15, Darlington. Plans, etc., at Mr. A. Ormiston's, this place.

Fort George, B.C.

The site for the new government buildings has been chosen at corner of Central and Wincenester avenues. Construction will proceed at once. Government agent, Mr. Randall.

Guelph, Ont.

A suggestion has been made by the County of Waterloo that the County of Wellington co-operate in the erection of large tuberculosis sanatorium. J. P. Downey, M.P.P., president, local anti-tuberculosis league. W. Brewster, Hespeler, secretary for Waterloo association.

Grand Valley, Ont.

No tenders were received for erection of school here. Architect Geo. Gray, Harrison.

Montreal, Que.

The Protestant School Commissioners of Longue Pointe Ward, will erect a new school building. Trustees—S. A. Gidlow, Alex. Robertson and Albert Clark. Secretary-treasurer, H. Martin Gower, M.A.

The Post Office Building on St. James street will be rebuilt instead of repaired as originally intended. Steel work and fire-proofing the old building will be the new order, in order to give more room and light.

The St. Georges Home will have certain alterations made to their property on La-gauchetiere street. Mr. Walter Livermore, Building Superintendent, 72 Anderson street.

The members of St. James Club, located at the corner of University avenue and Dorchester street are at present considering extensions which may either take the form of additions to and remodelling of their present premises at an expense of approximately \$100,000, or this structure may be demolished and a new one erected at a cost of \$300,000. Nothing has yet been definitely decided. Lieut.-Col. Starks, Do-

minion Transport Company, is secretary of the building committee.

Tenders are now being invited and will be received until August 20th for the construction of new Central Y. M. C. A. building. Messrs. Ross & MacFarlane, architects.

North Vancouver, B.C.

The Knights of Pythias propose to erect a hall at the corner of Chesterfield avenue and Fourth street at a cost of about \$15,000. Mr. Jamieson, architect.

Orangeville, Ont.

The by-law to issue debentures for \$20,000 to be expended in general improvements, including the erection of a town hall and procuring a system of waterworks was carried.

Ottawa, Ont.

Weeks & Keefer, architects, will call for tenders shortly for a fire station on Cumberland street. It will be three storeys, of solid brick, 102 by 43 feet. Estimated cost \$25,000.

Horwood, Taylor & Horwood have been chosen as architects for an addition to Perley Home for Insurables on Wellington street. Taylor and Lackey have the general contract.

Red Deer, Alta.

Tenders will be received until August 12th for furnishing, hauling and putting on fix drop siding on Willowdale school-house. G. McIntosh, secretary, Willowdale, S.D.

Sedley, Sask.

Tenders are called until September 1st for erection of fire station and hall here. Reilly, Dawson & Kelly, architects, 108 Willoughby and Duncan streets, Regina.

Souris, Man.

Tenders addressed to R. C. Desrochers, assistant secretary, Department of Public Works, will be received until August 15th for the erection of public building here.

Saskatoon, Sask.

Tenders have been received for the erection of Anglican college and principal's residence for University of Saskatchewan, but no awards have yet been made. Messrs. Brown & Vallance, architects, Montreal.

St. Bernard, N.S.

Contracts have not yet been awarded for erection of Roman Catholic church here, noted in issue of July 20th. Estimated cost of building, \$50,000; architect, R. A. Frechet, Moncton, N.B.

St. John, N.B.

Tenders are out for general renovating of Court House, St. John, which will include electric wiring, painting and general remodelling, etc.

Toronto, Ont.

Inspector Guthrie in his report recommends a new Registry building for this city.

The Board of Control is calling for tenders for the erection of a temporary fire-hall on the new Wychwood avenue site at St. Clair avenue and Hendrick street. The temporary building will cost \$2,200.

Permits were issued to Bathurst Street Methodist Church, two-storey brick Sunday school, \$30,000; Danforth Avenue Methodist Church, two-storey brick church, corner Danforth and Jackman, \$12,000; Free Masons, for hall, College street, \$25,000.

Tenders are being asked by Darling & Pearson, architects, for various trades required in connection with erection of the out-patient department and the emergency hospital in connection with the new gener-

al hospital. See advertisement in "Tenders and For Sale Department, of this issue.

Uxbridge, Ont.

The school here was destroyed by fire on the 25th ulto. Estimated loss, \$15,000.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until August 4th for erection of two suburban police stations, etc. Plans with Building Inspector E. H. Rodgers.

AWARDED.

Cadboro Bay, B.C.

The contract for the erection of the new two-room public school was awarded to Ald. W. M. Ross, Victoria, at \$2,900.

Dunnville, Ont.

Mr. A. E. Faulkner, contractor, Brantford, has secured the contract for the new collegiate institute here at \$35,000.

Edmonton, Alta.

A. B. Ormsby, Limited, Toronto, has been awarded the contract for fireproof doors at new school here.

McHardy & Company, Strathcona, were awarded the contract for the erection of new fire hall at \$16,680, with tower, or \$14,980 without. Smith, Freeze & Company will do the plumbing at \$1,540; and the Freeze Metal Company, supply sheet metal for \$520.

Guelph, Ont.

The Sheldon Company, of Galt, have secured the contract for the ventilation of Central School. An electric motor to drive the fans will be used instead of steam exhaust engine.

Montreal, Que.

Messrs. Henry Morgan & Company, Limited, general contractors, 25 Beaver Hall Hill, are carrying out the extensive internal repairs at the Centenary Methodist Church in Point St. Charles.

Messrs. Hutchison, Wood & Miller, architects, Royal Insurance Building, have awarded the general contract for the erection of the First Presbyterian Church, Prince Arthur and Mance streets, to Reid, MacGregor & Reid, general contractors, 688 St. Catherine street west.

North Vancouver, B.C.

The contract for erection of an 8-room school house here has been awarded to Young & Wright, North Vancouver, at \$20,000. Hope & Barker, architects, Vancouver.

Newmarket, Ont.

Contract for the high school was let to Mr. McIntosh, of Alexander, Ont., \$13,000.

Ottawa, Ont.

Geo. W. King has been awarded the contract for glazing and painting the Rideau Club, at over \$5,000. The alterations are to be completed by November 1st. Total cost, \$90,000. H. C. Stone and Jas. Mather are architects, and H. C. Hitch, general contractor.

St. Catharines, Ont.

The Martin Electric Supply & Construction Company has the contract for wiring new wing at General and Marine Hospital.

Toronto, Ont.

The contract for the masonry work on the new Earls Court Public School was finally awarded by the Board of Education to E. Hewitt & Son, at \$14,361.

Appliances for steam heating of the Yorkville avenue fire hall will be supplied by Gentile & Travis, at \$1,170; and appliances for the heating of the Agnes street

police station, will be furnished by Mr. J. E. Gray, at \$892.

Wainwright, Alta.

We are informed that the contract for supply and installation of heating plant in 4-roomed school with large basement was awarded to McKnight & Frost, Edmonton, at \$2,649. Others tendered as follows:—F. E. Colling, Wainwright, \$3,400; J. Lock-erbie, Edmonton, \$3,161. E. D. Stimpson, architect, Wainwright.

Residences

Hamilton, Ont.

Permit was issued to J. A. Jones, brick dwelling, Eastbourne avenue, \$2,500.

Montreal, Que.

Mr. B. J. Perry has purchased property on Fort street, on which, it is reported, he will erect an up-to-date apartment building.

Ottawa, Ont.

Horwood, Taylor & Horwood, architects, are preparing plans for extensive alterations to Mr. Dewar's residence, Wilbrod street.

Tenders wanted at once for excavation and masonry for tenement house corner of Bronson and James streets. Plans at M. C. Eddy's, 71½ Sparks street. Address Box 11, Shawville, Que.

Peterboro, Ont.

W. Blackwell, architect, is calling for tenders until August 4th for erection of residence on Water street.

AWARDED.

Montreal, Que.

Mr. Alex. Shields is erecting two dwellings on Prud'homme avenue, and the contract has been awarded to L. Germain, contractor, St. Joseph street, Verdun.

Montreal, Que.

The contract for the erection of a residence on Cedar avenue for Mr. R. MacFarlane has been awarded to Chas. Thackeray & Company. Messrs. Saxe & Archibald, architects.

Business Buildings and Industrial Plants

Berlin, Ont.

Messrs. Baetz Bros. have offered to rebuild in Berlin, if the town will give them a loan, etc.; the factory to be of solid brick, 60 x 125 feet, four storeys.

Beverly, Man.

The elevator owned by the McCabe Company was destroyed by fire recently. Loss about \$25,000.

Bridgeburg, Ont.

The G. T. R. Station at Amigari near here was destroyed by fire on the 28th ulto.

Brownville Junction, N.B.

The C. P. R. repair shops were burned on the 28th ulto. Loss, about \$25,000.

Campbellton, N.B.

F. Neil Brodie, architect, of St. John, N.B., is preparing plans and specifications for a warehouse for Messrs. Jones & Schofield.

Mr. Neil Brodie, architect, of St. John, N.B., is preparing plans and specifications for the Bank of New Brunswick, to replace the one destroyed by fire. It will be of pressed brick and cut stone, and will be a purely bank building, having no offices in connection.

Chase, B.C.

The C. P. R. will build an \$8,000 station.

Colpoys Bay, Ont.

Mr. O. E. Whicner's saw mill was burned recently. Loss about \$5,000.

Esquimalt, B.C.

It is reported that a Canadian syndicate of eastern capitalists has absorbed the B. F. Graham, Limited, and that they will erect eventually a lumber mill with a total daily output capacity of 250,000 feet.

Golden, B.C.

The Columbia River Lumber Company's saw mill was destroyed by fire on the 20th ulto. Estimated loss, \$300,000.

Hamilton, Ont.

Building permit was issued to D. Dick & Son, erection of brick, steel and concrete fireproof building, 100 by 515 feet, one storey (forge building), Hilliard street, East Hamilton, for Oliver Chilled Plow Company, \$65,000.

Morse, Sask.

The Hotel Elkhorn, Canadian Bank of Commerce and Imperial Lumber offices are reported destroyed by fire on the 26th ulto. Total estimated loss, \$30,000.

Montreal, Que.

Application has been made from a shirt and collar manufacturing firm in Troy, N.Y., for the purpose of erecting a factory in St. Lambert, Que., to employ 400 hands.

Plans and specifications have been prepared and tenders are invited until August 4th for the erection of a five-storey, steel and concrete building, 125 feet by 200 feet in extent, for the Canadian Rubber Company. Messrs. T. Pringle & Son, Limited, architects.

Nanaimo, B.C.

A Vancouver syndicate will erect a brick plant at Nanoose Bay, near here. Proposed expenditure, \$40,000. Output of plant, 25,000 bricks per day.

Nelson, B.C.

W. H. Kreyscher, it is stated, is organizing a company to rebuild his mill.

New Liskeard, Ont.

Mr. W. E. Binning, architect, of Listowel, has been commissioned by the Imperial Bank to visit New Liskeard and Cobalt with a view to the erection of bank buildings, there similar to the bank in Listowel.

New Westminster, B.C.

Announcement has been made by A. Barnet, of Renfrew, Ont., that the Barnet-McDonald mill on Lulu Island, which was burned down last winter, would be rebuilt, probably next year.

North Vancouver, B.C.

The Bank of Hamilton have had an engineer taking levels at the southeast corner of First street and Lonsdale avenue, the site for their new building.

Plans prepared by Architect A. J. Henderson for the offices of the Ferry Company were informally approved and instructions issued for further details and specifications to be made ready.

Honeyman & Curtis, Vancouver, B.C., are the architects for the business block being erected for Irwin & Billings Company, Limited, Lonsdale avenue; Smith Bros., North Vancouver, are the contractors. Estimated cost, \$9,500.

Portage la Prairie, Man.

Architect C. H. Mounsey has plans for the Hart-Parr plant, which will occupy a ground space of 140 by 100 feet, and be of brick.

Prince Albert, Sask.

The plans for the new abattoir for N. H. Russell have been completed by Architect Albretsen, and show designs for a

building two storeys high with a large basement.

Quebec, Que.

The contract ratifying the sale of the Champlain market site to the Transcontinental Railway Commission for the construction of the Union depot, has been agreed to by Hon. S. N. Parent, Chairman of the Transcontinental Railway Commission, and his worship, Mayor Drouin.

Revelstoke, B.C.

The entire plant and stock of the Revelstoke Lumber Company, at Eddy, two miles from here, was destroyed on the 18th ulto. by fire. Estimated loss, \$100,000.

Sandwich, Ont.

A by-law to give the Canadian Salt Company a fixed assessment of \$35,000 will probably be submitted to the ratepayers shortly, in return for which the company will erect a large plant.

Saskatoon, Sask.

The Canadian Fairbanks Company is opening a branch here. A large warehouse will be built at once. F. H. Craue, has been appointed manager.

Stratford, Ont.

The by-law to guarantee the bonds of Duftons, Limited, for \$12,000 was carried.

Three Rivers, Que.

It is rumored that the Gres Falls Company will establish a large pulp and paper manufactory in this locality in the near future.

Toronto, Ont.

The Fairbanks-Morse Company will build a warehouse on Bloor west.

Curry & Sparling, 90 Yonge street, are calling for tenders until August 10th for erection of fireproof building on Melinda street.

Vancouver, B.C.

Plans have been presented to Inspector Jarrett which cover a three-storey extension to City Hall.

Work has been started on a telephone exchange for the B. C. Telephone Company, at the corner of Tenth avenue and Prince Edward street, by the contractors, McDonald & Wilson. Mr. A. A. Cox is the architect.

Vernon, B.C.

The Board of Trade are in receipt of a letter from C. P. R. Superintendent Kilpatrick, in which he assures them that appropriations will be asked this fall for a new station to cost about \$25,000.

Victoria, B.C.

Building permit was issued to Geo. Carter for stores and hall on Courtenay street, \$4,650.

It is announced that the G. T. P. has secured options on property to be used as the site for their hotel. W. P. Hinton, Winnipeg, general passenger agent, was in the city the third week in July.

The Colbert Plumbing & Heating Company will commence work immediately on the erection of a two-storey brick and concrete warehouse on the north side of Fort street, between Douglas and Blanchard streets, to cost \$8,000.

The British Columbia Sand & Gravel Company, Limited, and the Victoria Contracting Company, Limited, have amalgamated and will be known as the Producers' Rock & Gravel Company, Limited. The plants at Albert Head and at Royal Bay will be extended, for the purpose of which \$100,000 new capital has been added. Directors, F. W. Jones, Geo. W. Mitchell, H. B. Thomson, M.P.P., etc. Messrs. McPherson & Fullerton, are fiscal agents.

Wardner, B.C.

The establishment of a paper mill here is being discussed. Power would be furnished by the Bull River Electric Company.

Winnipeg, Man.

Tenders are called for material and erection of basement for Downie Bros., 307 McGreevy Building.

It is stated that the Canada Cement Company will build a cement mill here with a capacity of 3,000 barrels per day. F. P. Jones, general manager.

AWARDED.**Montreal, Que.**

It is stated that the C. P. R. have awarded contracts for the completion of the new annex to their Windsor street station. The contract for the building was awarded to C. E. Deakin at \$1,000,000, and the contract for the structural steel work went to the Dominion Bridge Company at \$250,000.

The sub-contract for roofing and sheet metal work on the Kollert Building, St. Catherine and St. Urban streets, has been awarded to Douglas Bros. Messrs. Peter Lyall & Son, Limited, general contractors. Messrs. Hutchison, Wood & Miller, architects.

General contract for the erection of a two-storey factory building on Parthenais street, for the Montreal Smallwares, Limited, has been awarded to D. G. Loomis & Sons, contractors, Cote St. Paul. Architect, H. C. Stone, 84 St. Francois Xavier street.

Mr. Abel Woolenberg is erecting a two-storey factory at 570 St. Dominique street. General contractor, Joseph Faille, 1144 Wellington street. Architect, C. Dufort, La Patrie Building.

General contract for alterations to store at 416 St. Catherine street west for the Diemel Linen Mesh Company has been awarded to O. LeBeau, contractor, Board of Trade Building. Architects, MacVicar & Heriot, 104 Union avenue.

Mr. Walter Livermore, building superintendent, 72 Anderson street, has awarded the following contracts for the erection of a stable at 29 Ermine street: Masonry and brick, Ward & Baldock; carpentry, H. Tessier; roofing, Campbell, Gilday Company, Limited; plumbing and heating, John A. Gordon; painting and glazing, W. E. Potter & Company; asphalt floors, Geo. W. Reed & Company, Limited.

General contract for the rebuilding of the old Carsley property recently purchased by the Royal Edward Hotel interests, has been awarded to C. E. Deakin, general contractor, 11 St. Sacrament street. Architects, Finley & Spence, 46 Beaver Hall Hill.

The contract for the plumbing and heating of the new store for Messrs. A. E. Rae Company, Limited, St. Catherine, Victoria and University street, has been awarded to The Garth Company, 26 Craig street west. Architect, A. D. Dunlop, Lindsay Building. General contractors, Byers and Anglin, 18 St. Alexis street.

Prince Albert, Sask.

The contract for the new hotel on Thirteenth street has been let to J. Routhier.

Regina, Sask.

The contract for the new building of the Regina foundry has been let to T. Spray, of this city. It will be brick on concrete foundation, 80 feet by 142 feet, with steel truss roof.

Toronto, Ont.

A. B. Ormsby, Limited, were awarded

contracts for galvanized iron and slating work at the Parkdale Station; galvanized iron work, roofing and metal windows at the Newell Building, Ontario street, and metal windows at Gooderham & Worts Building.

Welland, Ont.

The contract for Peters' clothing factory has been let to Albert Mason, P. S. Peacock and S. P. Gourlay. Other contracts to be let include roofing, elevators, electrical work, sprinkler system, etc.

Winnipeg, Man.

The contract for erection of McLaren hotel has been awarded to C. W. Sharp & Sons at \$175,000. Building to be completed by June 1st, 1911.

The contract for the erection of the Bakery Building, owned by W. R. Milton, this city, has been awarded to the Gleggery Construction Company, Winnipeg; the plumbing, etc., will be done by C. C. Young Company, Winnipeg. Estimated expenditure, \$37,300.

Power Plants, Electricity and Telephones

Charlottetown, P.E.I.

Tenders are being asked by W. W. Clarke, city clerk, for the supplying of the city with electric light for street and commercial purposes. See advertisement in "Tenders and For Sale Department" of this issue.

Digby, N.S.

Tenders are being called by Public Works Department, Ottawa, until August 10th for electric light fixtures, wiring, etc., for the public building here. R. C. Desrochers, assistant secretary.

Grand Falls, N.B.

It is stated that the company in which Sir William Van Horne is interested purpose constructing a hydro-electric plant and pulp and paper mills here. Among those interested are, B. B. Kinman and H. McLaughlin, of New York (both members of the Grand Falls Power Company); Jas. Robinson, ex-M.P., of Millerton, N.B.; A. J. Gregory, K.C., of Fredericton, and J. A. Brock, of Montreal.

Matheson, Ont.

It is reported that the provincial government will recommend to the legislature at the next session that a syndicate be given permission to build an electric railway from a point at or near here to the shores of Metagami Lake. It must be started within ten days and finished by the first of January next. R. Shillington, M.P.P., is interested.

Lanark, Ont.

The water power at Playfair will be transmitted to Lanark and used to run the factory of T. B. Caldwell. The capacity is quoted at 500 h.p.

Stratford, Ont.

The by-law to grant privileges to the street railway about to be run in Stratford and vicinity was carried.

St. Catharines, Ont.

The by-law to give the Ontario Power Company, of Niagara Falls, a franchise over the city streets was carried.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until August 9th for pole line supplies, punch and shear concrete mixer, steel bars and crushed stone. Specifications obtained from Hydro-Electric System, City Hall.

Tillsonburg, Ont.

A by-law to raise \$25,000 for the purchase, construction and installation of the necessary receiving and distributing buildings and plant in connection with power purchased from the Hydro-Electric Commission, will be submitted to the rate-payers on August 23rd.

Vancouver, B.C.

The Western Canada Power Company will call for forty miles of three-eighths inch steel cable for early delivery at once. This will be used for the ground and guy wires of the transmission line now under construction from Stave River falls.

Winnipeg, Man.

The city engineer has been instructed to prepare plans and estimates for a municipal gas plant to be submitted at the next meeting of council.

Weyburn, Sask.

Tenders are asked for electrical machinery by Geo. Ross, secretary-treasurer of the municipality. See advertisement in "Tenders and For Sale Department" of this issue.

AWARDED**Edmonton, Alta.**

The contract of supplying steel fastenings for the street railway's new track was awarded to Gorman, Clancey & Grindley, the order given to Drummond & McCall being cancelled owing to that company's inability to supply the material until September. The former company guarantee delivery within three weeks from date of order.

Guelph, Ont.

The following contracts were let by the People's Railway recently: Concrete work between New Hamburg and Guelph, Chas. Robbins, Galt; grading, Berlin to Blooming, McMillan & Company, Berlin to New Hamburg, O'Brien Construction Company.

Regina, Sask.

The following list of successful tenderers for telephone exchanges in the Province of Saskatchewan, has been forwarded to us: Scott—F. Somerville, Box 32, Regina, \$1,810; Humboldt—Simpson & Craig, Virden, Man., \$1,938; Vonda—Simpson & Craig, Virden, Man., \$1,800; Davidson—Simpson & Craig, Virden, Man., \$1,850; Outlook—Stanley L. Ross, Regina, Sask., \$1,570; Broadview—Stanley L. Ross, Regina, Sask., \$1,970; Whitewood—Stanley L. Ross, Regina, Sask., \$2,123; Carlyle—Stanley L. Ross, Regina, Sask., \$1,990. Letting of the contract for the construction of watrous and Craik exchanges has for a time been deferred.

St. Hyacinthe, Que.

Contract for installation of gas pumping engines and street lighting system for town of St. Hyacinthe, has been awarded to the Colonial Engineering Company, Limited, of Montreal. Contract price, about \$54,000.

Miscellaneous

Toronto, Ont.

The following building permits were issued by the City Architect from July 16th to July 23rd: J. H. Shales, 1 pair semi-detached 2½-storey brick dwellings, 22-24 Dearbourne, \$5,000; E. A. Kantel, 1-storey brick warehouse, 189 Church, \$6,000; A. A. Wright, 2½-storey brick and stone dwelling, on Warren road, \$16,000; W. J. O'Reilly, 8 attached 2½-storey brick and stone dwellings, Dundas street, \$24,000; A. B. Coleman, 3-storey brick and stone apartment house, Nanton avenue, \$8,000; Harris Abattoir, 3-storey steel and wood store and

cold storage building at St. Lawrence market, \$7,000; Frank Britton, 1 pair 2-storey brick dwellings, Greenwood avenue, \$7,000; Meismiller and MacKenzie Bros., 1 pair semi-detached 2-storey brick dwellings, on north side, Pearson avenue, \$5,000; J. A. Simmers, 4-storey brick office and warehouse, King street east, \$11,000; J. Brodie, 1 pair semi-detached 2½-storey brick dwellings, Pape avenue, \$6,000; Wm. Rankin, 3 attached 3-storey brick and stone stores and dwellings, north side of Dundas, \$10,000; Love Bros., 2 detached, 2½-storey brick and concrete dwellings, 24 Fairview avenue, \$5,000; R. J. Beamish, 2½-storey brick and stone dwelling, Roxborough, \$6,000; Wm. Pendleton, 2 pair 2-storey rough-cast dwellings, brick fronts, east side of Greenwood avenue, \$6,000; A. E. Osler, 2½-storey brick and stone dwelling, on Summerhill Gardens, \$6,000; H. H. Williams, 2-storey brick office, 36 King street east, \$5,000; H. Blake, 2-storey brick and stone addition to Clarendon avenue, \$25,000; W. J. Dempster, 3 attached, 2-storey brick dwellings, Perth avenue, \$6,000; Shurly & Derriitt, 2-storey brick addition to factory on west side Bartlett avenue, \$5,200; A. Duff, 2 pair semi-detached 2-storey brick dwellings, south side Columbus, \$6,000.

Vancouver, B.C.

Recent building permits include: S. McLellan, 1115 Lilly street, \$2,700; Kwang Chong, Pender street east, \$15,000; Jefferson & Clapham, 2475 Sixth avenue west, \$2,700; A. S. Bain, 1656 Eleventh avenue, \$2,600; J. Rodway, Park Drive, \$10,000; G. P. Ballentine, 1146 Eleventh avenue west, \$3,000; R. Leigh Spencer, 2326 York street, \$5,500; S. Hovick, 685 Eleventh avenue west, \$6,900; W. G. McIntosh, 636 Eighth avenue east, \$3,500; W. A. Stephens, 1456 Tenth avenue east, \$2,500; L. C. Kyle, 2446 Third avenue, \$3,000; Kitsalano Methodist Church parsonage, 2526 Second avenue west, \$3,500; F. Burdis, 1818 Barnard street, \$2,800; W. H. Gallagher, stable, 1088 Hornby street, \$6,000; Vancouver Trust Company, 614 Pender street, \$10,000; P. Agren, 1324 Comox street, \$3,500; Mrs. E. G. Donoghue, 1138 Burnaby street, \$4,000.

Winnipeg, Man.

The Board of Control are calling for tenders until August 25th for supply of machinery capable of boring holes in the limestone, etc. M. Peterson, secretary.

Recent building permits include: Duncan & McDonald, dwelling, north side of Yale avenue, \$6,400; J. F. Scribner, dwelling, Horne street, \$2,500; J. C. Hicks, dwelling, north side of McMillan avenue, \$4,000; Dunn & Wallace, dwelling, south side of Kingsway, \$6,500; Canadian Bag Company, alterations, 831 Henry avenue, \$6,000; John A. Saul, dwelling, garage and stable, south side of Harvard, \$4,200; M. Simmons, two houses, north side of Bannerman, \$4,000; J. E. Parker, west side of Young, \$3,000; H. McKenzie, house, east side Raglin road, \$2,500; F. H. Martin, dwelling, west side of Lenore street, \$4,500; A. G. Davidson, dwelling, north side Beresford avenue, \$2,500; J. C. McNabb, dwelling, west side of Horne street, \$2,800; C. H. Fox, dwelling, south side of Cathedral avenue, \$3,000; John Crichton, dwelling, south side of Grosvenor avenue, \$8,000; A. McDonald, dwelling, south side of Arnold avenue, \$3,000; J. Isenberg, three dwellings, south side of Mulvey avenue, \$7,500.

Gareau Motor Car Company, Limited, Montreal, Que., capital \$300,000. Incorporators, Julien Therrien and Napoleon Giroux, merchants, both of Montreal.

CONCRETE PILES.

The subject of concrete piles was taken up in considerable detail in the report of the committee on masonry presented at the recent annual meeting of the American Railroad Engineering and Maintenance of Way Association. The principal argument to be advanced against this form of piling, according to the report, is its cost. This, however, is more apparent than real, as the report goes on to point out. The cost per lineal foot is certainly greater for a concrete pile; but when the saving in excavation, the size of footings, number of piles and time of completion are taken into consideration, the additional cost per foot is discounted. Generally when these items are taken into consideration the report says they show a decided advantage in favor of concrete piles.

Wooden piles are loaded to about 15 tons and while many engineers think they are capable of carrying greater loads, this load represents conservative practice. The loads allowed on concrete piles vary from 25 to 50 tons each, depending upon the nature of the ground, and the systems used; in European practice they are loaded to 40 or 50 tons each, and there are records of piles loaded to 80 tons. The best American practice, however, limits the load to 35 tons.

To prevent decay, wooden piles are cut off at low water and the foundations must be carried down to this level. The tops of concrete piles may be at any elevation desired and the depth of the footing course will be governed by the spacing of the piles, and the weight of the superstructure. In this way the expensive excavation for deep footings, as well as the cost of the additional depth of footings, is saved.

Concrete piles cannot be driven as rapidly as wooden piles, but since the load per pile is greater, their use may result in a saving of both time and cost. If concrete piles are used no delay is occasioned by waiting for the arrival of the piles; wooden piles are difficult to obtain in certain parts of the country, but sand, stone and cement are generally available. There is no reason why concrete should vary in quality, while it is becoming more and more difficult to obtain wooden piles of a standard grade.

A wooden pile rots if alternately wet and dry and is subject to attack by the teredo and other wood borers, when placed in salt water. The elevation of ground water fixes the point of cut-off, but the building of deeper sewers in the neighborhood may lower the ground-water level, and when this occurs wooden piles are subject to decay.

RAPID STEEL ERECTION IN CHICAGO.

Rapid structural steel erection was accomplished between March 1st and April 15th on the second section of the 20-storey, 170 x 190-foot Peoples' Gas Light & Coke Company's building at the corner of Adams street and Michigan avenue, Chicago. The company wished to remain in the five-storey building which stood on the site of the second section until the first section was ready for occupancy. This old building was, therefore, shored up and the foundations of the new building constructed under the old structure. By February 28th, the old building had been wrecked and cleared away and the foundation completed ready for the steel work. On March 1st, the first steel columns were put in place, and on April 15th the last of the steel had been erected.

The steel was handled from the wagons in the street to its place in the building by two stiff-leg derricks equipped with 80-foot steel booms. The derricks were set on the roof of that part of the building

already completed, and the hoisting engines on the first floor. The second section is 52 feet wide by 170 feet long, so that the 80-foot booms covered the whole area and both streets.

A total of 3,640 tons of steel was erected and riveted in 36 eight-hour working days, an average of over 50 tons per day for each derrick. Four teams were employed in hauling the steel from the unloading crane in the Randolph street freight yards to the site of the building, a distance of about one-half mile. There was a total force of 80 men employed in the work of steel erection, exclusive of teamsters.

MASONRY ARCH.

A long-span masonry arch has recently been completed on the Bellegarde-Chizery Railway in France, from the plans of Chief Engineer Picard, which is interesting not only on account of the long span, but also the method of construction. The main arch is 262 feet 9½ inches long and springs from one side to the other of a rocky gorge 215 feet deep at the elevation of the structure. The arch is 4 feet 11 inches thick at the crown and 8 feet 2 inches at the springing lines. The main arch carries eleven spandrel arches supporting the roadway. In order to construct this arch three timber towers 133 feet high were first erected and then a system of braced centering was built out from them, the whole calling for nearly 22,000 cubic feet of timber and about 30 tons of steel. According to the "Builder," no settlement was noticed when the arch was struck, but this is hardly surprising because special provision had been taken to avoid any such settlement by constructing the main arch in eight sections, finally connected by closing voussoirs. The total cost of this structure is given as only about \$90,000.

OIL-MIXED CONCRETE AND STUCCO.

Recent experiments in the mixing of mineral oil with concrete appear to have yielded very encouraging results. The oil, alkalis and water form an emulsion, becoming thoroughly incorporated in the concrete. If the concrete is to be mixed by hand, proceed as usual, and, after the water has been added and the resulting mass turned and raked, add non-volatile mineral oil, in the proportion of 10 to 15 per cent. of oil to the weight of the cement. Turn the concrete with shovels two or three times, raking while turning. If this is properly done, the oil will quickly emulsify and become thoroughly mixed in the concrete. If a mixing machine is employed, use a batch-mixer, turning a sufficient number of times to thoroughly mix the cement, sand, crushed stone, or gravel and water. Then add 10 to 15 per cent. of non-volatile mineral oil. Turn again the same number of times as it requires to mix the concrete.

Again, there are special advantages with regard to stucco and exterior plasters. The following specification for stucco is suggested: One part portland cement, 20 per cent. (volume of cement) of hydrated lime, three parts coarse white sand. Dry mix the sand and cement, and with these mix dry hydrated lime, turning each three times with shovels; rake while shovelling. Add water, turning and raking until the desired consistency is obtained. Then add 15 to 20 per cent. of white oil petrol, the oil to be by weight in percentage to the weight of the cement. If it is desirable to tint the stucco, colour the oil with any limeproof colouring matter in proportion which by experiment with small samples is necessary to give the desired tint.—Building World.

Tenders and For Sale Department

FOR SALE

Kelly Steam Pump Horizontal Cross Com-pound, in good condition, capacity 2,000,000 imperial gallons, must be removed to make room for electric equipment. Inquire the Water Com-missioners, London, Ontario. 31

Town of Oshawa

Tenders are called for the construction of 4,000 lineal feet of First Class Heavy Macadam Pavement, 43 feet wide, on King Street and Simcoe Street, and 2,500 feet of Light Macadam, 32 feet wide, on Simcoe Street.

These will be received up till noon of the 18TH DAY OF AUGUST, 1910, at the office of the Town Engineer of Oshawa.

Specifications and forms of tender will be sent on application, and all applications must be made on the forms provided.

Plans and specifications may be seen at the office of the Town Engineer. The lowest or any tender not necessarily accepted.

FRANK CHAPPEL,
Town Engineer.

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City of Moose Jaw Saskatchewan

Sealed tenders will be received by the under-signed City Clerk until 8.30 o'clock p.m. on MONDAY, AUGUST 15TH, 1910.

Supply materials for and constructing approxi-mately:

63,000 square feet of Concrete Walls.
9,000 lineal feet of combined Curb and Gut-ter.

6,000 square feet of Concrete Crossings.
6 miles of Wooden Walks.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw.

The lowest or any tender not necessarily ac-cepted.

J. M. WILSON, W. F. HEAL,
City Engineer. City Clerk.
Moose Jaw, Sask., July 28th, 1910. 32

Reinforced Concrete Viaduct

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on TUESDAY, AUGUST 9TH, 1910, for the con-struction of a reinforced concrete viaduct of beam and slab construction on the Weston Road, in the City of Toronto, containing the following approximate quantities:

Excavation—1,068 cubic yards.
Concrete (retaining walls)—472 cubic yards.
Concrete (viaduct)—577 cubic yards.
Reinforcing steel—126,000 pounds,
Also Pipe Railing, Waterproofing, etc.

Plans and specifications may be seen and forms of tender obtained at the office of the Bridge Department, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties, the bond of a Guarantee Company approved of as aforesaid.

The usual conditions relating to tendering as prescribed by the city by-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman of Board of Control.
City Hall, Toronto, July 22, 1910. 31

Tenders

Toronto General Hospital College Street

Tenders addressed to the Chairman of the Building Committee will be received by the under-signed up till noon

Monday, August 15th, 1910

for all the various trades required in the erec-tion and completion of buildings for the Out-Patient Department and the Emergency Hospital in connection with the General Hospital.

Plans and specifications and all other informa-tion may be obtained at the office of the archi-tects.

The lowest or any other tender not necessarily accepted.

DARLING & PEARSON,
2 Leader Lane, Toronto.

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accepted.

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City of Winnipeg Electrical Distribution System

Tenders for

Underground Cable

Sealed tenders on prescribed forms, addressed to the Chairman of the Board of Control, Winni-peg, Canada, and marked on the envelope "City of Winnipeg Electrical Distribution System, Ten-der for Cable," will be received at the office of the undersigned up to noon on THURSDAY, SEPTEMBER 1ST, 1910, for the manufacture, delivery and installation, 46,000 feet of thirteen thousand volt, three-core cable.

Copies of the specifications and form of tender may be obtained at the Power Engineer's Office, Carnegie Library Building, Winnipeg.

These specifications may also be examined at the offices of Messrs. Smith, Kerry and Chace, Confederation Life Building, Toronto, Ontario.

Each tender must be accompanied by a certi-fied cheque for one thousand dollars, which cheque will become forfeit to the corporation in the event of the successful tenderer refusing or neglecting to sign a satisfactory contract when called upon so to do.

The city reserves the right to reject any or all tenders or to accept any bid which shall ap-pear advantageous.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, July 15th, 1910. 31

Steel Viaduct on Queen Street East

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon, on TUESDAY, SEPTEMBER 6TH, 1910, for the construction of a steel viaduct on Queen street in the City of Toronto, crossing over the River Don, and the roadways on each side, and over the tracks of the Canadian Pacific, Canadian Northern and Grand Trunk Railways, including the following approximate quantities:

Excavation (ordinary)—5,400 yards.
Excavation (trenches)—2,300 yards.
Filling—24,000 yards.
Concrete reinforced walls and footings—1,570 yards.

Concrete reinforced floor slab—880 yards.

Piling concrete—10,400 lineal feet.

Steel reinforcing rods—118 tons.

Reinforcing fabric—20,000 square feet.

Structural Steel—752 tons.

Paving (wood block)—8,010 square yards.

Paving (macadam)—9,000 square yards.

Also Railing, Waterproofing, etc.

Plans and specifications may be seen, and forms of tender obtained at the office of Bridge Department, City Hall, Toronto, or may be seen at office of "Contract Record," B34, Board of Trade Building, Montreal, Que.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties, the bond of a guarantee company approved of, as aforesaid.

The usual conditions relating to tendering as prescribed by city by-law must be strictly com-plied with.

The lowest or any tender not necessarily ac-cepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.
City Hall, Toronto, July 22nd, 1910. 32

Tenders for Electric Lighting

Sealed tenders addressed to the undersigned and marked "Tenders for Electric Lighting" will be received at the office of the City Clerk, Charlottetown, Prince Edward Island, until 12 o'clock noon on SATURDAY, THE 10TH DAY OF SEPTEMBER, 1910, for supplying the City of Charlottetown with Electric Light for Street and Commercial purposes. Tenders to state price and illuminating capacity per lamp for street light, and rate per kilowatt hour for com-mercial lighting.

The lowest or any tender not necessarily ac-cepted.

Further information can be obtained by apply-ing to

W. W. CLARKE,
City Clerk.
Charlottetown, P.E.I., July 20th, 1910. 34

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 inch x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail. —WM. LESSLIE, Walkerville, Ont. TF

CONTRACTOR'S OUTFIT FOR SALE.—Six Wheeler, No. 3, concrete line plant, nearly new. Owner going into another line of business. Joseph Patterson, Box 114, St. Marys, Ontario. 35

City of Moose Jaw

Saskatchewan

Sealed tenders will be received by the undersigned City Clerk until 8.30 o'clock p.m. on MONDAY, AUGUST 15TH, 1910.

Supplying materials for and laying 3286 lineal feet of 6-inch and 700 lineal feet of 12-inch Cast Iron Water Main.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw, and also at the office of the Canadian Engineer, Winnipeg.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer. W. F. HEAL, City Clerk.
Moose Jaw, Sask., July 16th, 1910. 32

Town of Weyburn

Province of Saskatchewan

Sealed tenders (marked, Tender for Electrical Machinery) will be received by the Secretary-Treasurer of the Town of Weyburn until 5 p.m. on TUESDAY, AUGUST 9TH, 1910, for the following Electric Lighting Equipment:

One Cross Compound Engine.
Condenser, Feed Water Heater and Piping.
One 250 k.w. Alternating Current Generator with Exciter Switchboard, etc.

An accepted cheque for \$500.00 must accompany each tender.

The lowest or any tender not necessarily accepted.

GEO. REED, 31 Superintendent. GEO. ROSS, Secretary-Treasurer.

Tenders

for

Sewers and Sidewalks

Township of York

Sealed tenders plainly marked on the outside as to contents will be received by the undersigned up to twelve o'clock noon of MONDAY, AUGUST 15TH, 1910, for the construction of the following works in the Township of York:

982 feet Vitrified Pipe Sewer on Spadina Road northerly from the city limits;
592 feet Vitrified Pipe Sewer on Walmer Road northerly from city limits;

986 feet Granolithic Sidewalk on Markham Street, northerly from the city limits.

Separate tenders will be required for the works named, but bidders may tender on any one or all of the three.

Plans and specifications may be seen and all necessary information may be obtained at the office of the undersigned, 57 Adelaide Street East, Toronto.

The lowest or any tender will not necessarily be accepted.

BARBER & YOUNG,
York Township Engineers. 32

WATERPROOFING EXTERIOR OF CEMENT WALLS.

C. F. L., Waterville, Me., has a house built of concrete blocks and desires to coat the exterior of the walls with a waterproofing solution that will not change the color of the blocks. Desires advice as to the proper material.

Answer: We believe the best method is to apply a first coat or wash of equal parts by weight of zinc sulphate and water in solution, which is best applied with a paint spraying machine. This will, to some extent, stop the suction in the cement and make it much more resisting to water, hardening the surface also. But it alone

will not make it impervious to moisture. A coat of sodium silicate (waterglass, soluble glass), which can be bought in liquid form in the consistency of syrup and is made more liquid by the addition of clear water, is applied with a paint spraying machine, and will effectively stop moisture from entering into the cement. Try it on a cement block first before going over all, and if one coat of waterglass will not answer apply a second one. Dilute silicate of soda of 33 degrees Be. to a consistency that will work well in the spray and see that the coating is applied uniformly. The work should be done in dry weather and in a temperature not below 50 degrees F., allowing at least 48 hours between the application of the zinc sulphate wash and the application of the first coat of waterglass. If a second coat of the later is found necessary it can be applied as soon as the first has well set, but it is best to give twenty-four hours between coats. If the concrete blocks have been prepared originally with a solution of zinc sulphate, as is often the case, the zinc sulphate wash can be dispensed with and the waterglass alone will be sufficient to keep out moisture. You can probably ascertain this from the manufacturer of the cement blocks.

CAUSE OF FLOOR PAINT SHRIVELLING ON DRYING.

A. L., Minnesota, sends us a piece of glass showing how paint, which he describes as being composed of lead, zinc, coloring matter, oils, turps and driers, shrivelled when applied as the seconde coat on a hard pine floor. He says that the temperature of the room was 80 dgerees F. all the time and the first coat was hard and had an eggshell gloss. The paint was mixed in a cold room, however, and the materials were all cold when paint was mixed and taken to the job and applied immediately in a temperature of 80 degrees F., as before stated.

Answer: While the change of temperature may have had something to do with the action of the coat, we believe the trouble to be due to fatty oil, which may have been used in thinning the lead, zinc and coloring matter, or the coloring matter, which we take to have been yellow ochre and drop black ground in oil, may have stood exposed and become fatty. Paint of such character will act that way.

A DEFINITION OF ENGINEERING.

The best known and probably most generally accepted definition of engineering is that given in 1828 by Tredgold, and embodied in the application of the Institution of Civil Engineers of Great Britain for a charter. It describes the profession of an engineer as "the art of directing the great sources of power in nature for the use and convenience of man." Tredgold then went on to specify some of the branches of the profession and concluded with the prediction that the extent of the profession was limited only by the progress of science and that its scope and utility would be increased with every discovery in philosophy and its resources with every invention in the mechanical or chemical arts. The definition was formulated at the time when the minds of engineers were principally occupied with the new discoveries relating to power, such as the steam engine, the steam boat and the steam locomotive. Hence the emphasizing of power in the definition. A year or so Mr. Henry G. Scott, in his address as President of the American Institute of Electrical Engineers, proposed the following as an improvement of Tredgold's definition: "Engineering is

the art of organizing and directing men, and of controlling the forces and materials of nature for the benefit of the human race." Another definition of engineering was given last year by Professor G. F. Swain in an address at the Worcester Polytechnic Institute. Professor Swain's definition was as follows: "Engineering is the science and art of applying, economically, the laws, forces and materials of nature for the use, convenience or enjoyment of man."

"THE HOME BEAUTIFUL."

Much has been written about The Home Beautiful—but nearly all of it has had to do with the interior of the home, yet a cosy, comfortable home must have the exterior well-kept and this requires ornamental wire fence, guards and accessories. The surroundings of the home should be treated in an artistic manner. Well-kept lawns and flower-beds about the house, enclosed by attractive ornamental wire fences will present a scene quite irresistible.

The Crowley Fence Company, 1516 Hennepin avenue, Minneapolis, makes a specialty of ornamental iron and wire fencing for lawns, gardens, cemeteries, public grounds, etc.

This is a subject well worth the attention of house owners. It enables a finish and a protection to the grounds which is not available otherwise.

The B. C. Gazette gives notice of the incorporation of the following companies:—Prudential Builders, Limited, capital \$100,000; Producers' Rock & Gravel Company, Limited, capital \$350,000; The Anvil Island Brick Company, Limited, capital \$100,000; British Columbia Electrical Hot-Water Supply Company, Limited, capital \$25,000; Dominion Sawmills and Lumber, Limited, capital \$5,000,000; The Bagnall Box Factory, Limited, capital \$10,000; The Wood Lake Water Company, Limited, capital \$50,000; Pacific Lime Company, Limited, capital \$100,000, incorporated to carry on business as dealers in lime, cement, concrete and building materials of all kinds; Burrard Sash & Door Factory, Limited, capital \$20,000; Western Construction Company, Limited, capital \$25,000; American Timber Holding Company, capital \$6,000,000; Rupert Marine Iron-works & Supply Company, Limited, capital \$25,000; Newport Timber Company, Limited, capital, \$400,000; British Columbia Log Brokerage Company, Limited, capital \$100,000; The Pyramid Asphalt & Oil Company of British Columbia, Limited, capital \$75,000; Cranbrook Sash & Door Company, Limited, capital \$100,000; Moosejaw Electric Railway Company, Limited, capital \$400,000; The Tulameen Power Company, Limited, capital \$10,000; Portland Canal Lumber Company, Limited, capital \$50,000; Vancouver Midway Oil Company, Limited, capital \$600,000, incorporated to construct, control, etc., electric lighting and power works; Dominion Motor Car Company, Limited, capital \$50,000; Canadian Door-Hanger Manufacturing Company, Limited, capital \$10,000; Quain Electrical Supply Company, Limited, capital \$50,000; Great West Light Company, Limited, capital \$10,000; Munson Lumber Company, Limited, capital \$350,000; The Enterprise Power & Irrigation Company, Limited, capital \$10,000; Finnish Building Company, Limited, capital \$5,000; The Fort George Water & Light Company, Limited, capital \$100,000; Newport Timber Company, Limited, capital \$400,000; The Placer Mining & Pier Building Company, Limited, capital \$250,000; Texada Island Copper Company, Limited, capital \$250,000.

Good Roads for Toronto Suburbs

The city of Toronto and the county of York at last seem to have come to an agreement in regard to the improvement of the principal roads radiating from the city. The meeting of representatives was held at Cooksville on July 27th, at which Controller Ward presided and at which after a lengthy discussion it was decided that the city should pay one-third, the county one-third and the government of the province one-third toward the reconstruction of the main thoroughfares leading out of Toronto, for an average of about 20 miles, covering 7 roads, and comprising in the neighborhood of 120 miles. It was the general consensus of opinion at the meeting that the government of the province should take charge of the good roads movement, have their engineers lay out the work, submit it to the municipalities for approval and co-operation, and either through their own public works department or through the good roads commission, take charge of the work and look after the subsequent maintenance of the roads. Others represented at the meeting were the Toronto Board of Trade and the Guild of Civic Arts. The resolution which was finally passed was introduced by Reeve W. H. Pugsley, of Richmond Hill, who has been an active advocate of the good roads policy for some years past.

The next step will be a meeting of the York County Council, to be followed by a conference on August 9th, of the city and county authorities, at which it is expected also that Hon. Dr. Reaume, Provincial Minister of Public Works and his deputy, Mr. W. A. McLean, will be present. At this meeting it is expected that negotiations will reach a stage which will enable application to be made to the legislature at its next session for power to issue debentures for the work. Mr. Lionel H. Clark, ex-chairman of the Board of Trade's good roads committee, estimates that \$500,000 will be sufficient for present purposes.

The Ontario Government's share is fixed under the good roads act, whereby the government undertakes to contribute one-third of the cost of any plan of roadway improvement decided upon by the municipalities. The roads to be improved if the plan is carried out are the following: Lake Shore, Dundas, Weston, North Yonge street, Don Mills, Kingston, Danforth and Kennedy,

The city of Toronto finds that although it is laying 1,500 feet of water pipe every day and using the output of two pipe foundries it cannot supply more than 50 per cent. of the demand for new water mains. The contractors are employing about 150 men at pipe laying and they are hampered by lack of pipes.

The Board of Control of the city of Toronto have found out by experience that they are unable to enforce the penalty clause on their contracts, no matter how much behind the contractor may be with his work, unless it can be proved that the city actually suffers damage by reason of the delay. It is impossible in the majority of cases to prove any such damage and the penalty clause is therefore not worth much. The Board of Control has therefore instructed the City Solicitor to report on a proposed grading of the pay of contract work, which would have a similar effect to the enforcing of a penalty for delay.

The C.P.R. in British Columbia

We are informed that estimated expenditures by the C.P.R. for repairs during the present year in the Nelson district, exclusive of the Proctor hotel project, will aggregate \$1,080,000. Some three hundred miles of railroad will be built; several new steel bridges are under construction; 70 miles of road will be laid with the 85-pound steel rails; wooden bridges will be filled in, retaining walls of stone masonry built; 60 miles of track ballasting done; a brick roundhouse

built at Smelter Junction and a multitude of smaller jobs handled. Between 500 and 600 laborers are now at work at the various points and within a few weeks almost as many more will be engaged.

A survey of the work which the C.P.R. is doing in Southern British Columbia sustains the belief that the railway authorities are decidedly optimistic as to future development work in the district mentioned. Probably no other territory in North America produces more business, freight tonnage and passenger traffic and more railroad revenue per capita of population. According to a census recently taken by the railway officers, the population in the district between Kootenay Landing and Midway, south of the main line, does not exceed 30,000 in number, and the expenditure of so large a sum in one year for railroad improvements points to a volume of production highly creditable to the province.

Steel rails weighing 85 pounds per foot, the heaviest rails used, are expected to arrive from the east the latter part of the present month, and the work of laying them in place will start at once. These new rails will be used on the Phoenix-Eholt branch to Greenwood, Castlegar, Smelter Junction, from Castlegar westward for ten miles, Nelson to Shore Acres, and on the Granby spur from Grand Forks to the smelters. It is estimated that the cost of laying these new rails will be \$2,600 per mile and for the total of 70 miles this item alone amounts to \$182,000.

One of the biggest bridge building jobs on hand is that of Cascade, where a wooden structure is being replaced by a steel one on stone masonry piers of nearly 3,000 cubic yards. It will be 100 feet above the water, and will consist of two spans of 130 feet, two of 100 feet and two of 40 feet. The railway company is doing the masonry work. This bridge will cost the railway company \$115,000.

Twelve miles north of Cascade work has started on another steel bridge of 130 feet, single span. Men are now engaged on the foundation. An 80-foot span will be put in on the Lardo branch, but the remainder of the cut will be filled with gravel and stone. A number of important operations are on hand in the filling in of old wooden bridges. Men are at work at Fisherman, between Grand Forks and Eholt, where 160,000 cubic yards of earth will be required to fill in a bridge. Instead of building a masonry culvert, the railway at this point is driving an 8-foot tunnel through the rock for 400 feet to carry off the water.

East of Farron, on Porcupine Creek, 700,000 cubic yards of material will be required to fill in the wooden bridge, and it will take three years to complete the job. At present the work is confined to building a hydraulic plant by which method the work will be done. Actual filling at this point can not commence before next year, an 8-foot stone arch culvert 520 feet long being necessary first. The cost of this improvement is estimated at \$150,000. Other filling jobs on hand include one south of Robson of 80,000 cubic yards, one on the Phoenix branch of 50,000 yards, and one of the Nakusp line, totalling 180,000 yards. Economy prompts the filling in of wooden bridges. They require constant watching and yearly repairs. When once filled in they are permanent and entail no further expense.

In the Boundary district 40 miles of ballasting work is under way and half done. This the railway company estimates costs \$1,000 per mile. Four retaining walls are under construction between Nelson and Cascade, and at Smelter Junction work is started on a fine five-stall brick roundhouse, to cost \$22,000.

The strike of the Builders' and Laborers' Union at Toronto which has been in progress for six weeks has been concluded. The wages secured by members of the union are now from 28 cents an hour up. The settlement of the strike was largely in the nature of a compromise, as some of the builders had granted the advanced wages and others had not.

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The Ontario Government House Plans

An interesting situation has developed in connection with the competition which the Public Works Department of Ontario has inaugurated for plans for the new Lieutenant-Governor's residence to be erected in Toronto. Briefly, the trouble amounts to a disagreement between the Department and the architects, the latter being represented by the Royal Architectural Institute of Canada, and the Ontario Association of Architects. Competitions for plans have always been a fruitful source of trouble and it was with a view to preventing trouble as much as possible that the architects of the country through their various associations, adopted certain professional codes of ethics, to guide them in their work. An important feature of these codes relates to competitions. Clause nine of the code of ethics of the Royal Architectural Institute of Canada is as follows: No member shall furnish designs in competition for private work or for public work, unless an advisor, previously appointed, satisfactory to the competitors is employed to draw up the conditions and assist in the award. In the competition under consideration this requirement has not been complied with. Furthermore, the competitors were given no guarantee that the winner would be given the commission of superintending the work. Still another cause of complaint from the architects was that the time given for submission of plans for considered inadequate. This objection has been removed, however, by the doubling of the time.

A number of architects interviewed the Minister of Public Works recently and submitted their objections.

The only result was the increase granted in the time. The result now is that the Royal Architectural Institute and the Ontario Association of Architects have advised their members to refrain from taking part.

It is regrettable, in connection with so important a work, that such a situation should have developed. The architects are well within their rights in refusing to participate in the competition. Their code of ethics is based upon a desire to improve the standard of architecture and the clause at issue is based largely upon a desire to avoid those difficulties which have so often occurred, when the plans of competitors have been exploited by unscrupulous people, or the details of the competition have been so arranged as to be fruitful of misunderstanding. No architect cares, any more than a contractor, to compete for work unless he knows that the conditions are practical and that the successful competitor will secure the work. The prize or honor of securing first place are quite secondary to the actual business advantage of superintending the work. Those who fail to secure the prize, moreover, very naturally have reason to feel incensed if they discover that their efforts have been expended in an enterprise which was certain to have been comparatively fruitless.

From the Government's side of the case there may be some reason for feeling that they know their own business better than others and that the proper parties to draw up the competition details are the Minister of Public Works and his staff. There is another side to the matter, however, inasmuch as the public supplies the money and has to look at the building after completion. The public's interest can probably be best assured by giving the architects their own way so far as the competition is concerned. Moreover, if the Government persists in refusing to carry out the wishes of the architects they will lay themselves open to the very natural suspicion that some favored architect has been selected to whom the work is to be given and that the competition is merely being used as a blind. In the interests of architecture and of the Government's good name a change should be made in accordance with the suggestions of the architectural associations.

Tarred with the Same Stick

Who shall doubt the secret hid
Under Cheop's pyramid
Was that the contractor did
Cheops out of several millions?
Or that Joseph's sudden rise
To Comptroller of Supplies
Was a fraud of monstrous size
On King Pharaoh's swart civilians?—Kipling.

In a recent advertisement for tenders for paving work, the town of Sarnia stipulated that the contractors and laborers must be ratepayers of the town. This appears to be limiting contract work to a very limited sphere in that locality, but after all it is only what a section of the community is fighting for at Toronto.

Design and Construction of Bowled Floors

Discussion of Problems Arising in an Interesting Type of Building—What is the Best Pitch—The Proper Treatment of Levels

The design and construction of slanting floors for audience rooms, in churches, theatres, etc., is a matter which requires perhaps as much careful attention and study as any other problem of construction. Enquiries upon this subject are frequently received, among the questions most generally asked are the following: should the front circular rows of seats be level from end to end, or is it permissible that the outer ends be somewhat elevated? What is the proper incline, and should it continue to the rear of the seating space, or can, say, one-fourth or one-third of the rear be made level?

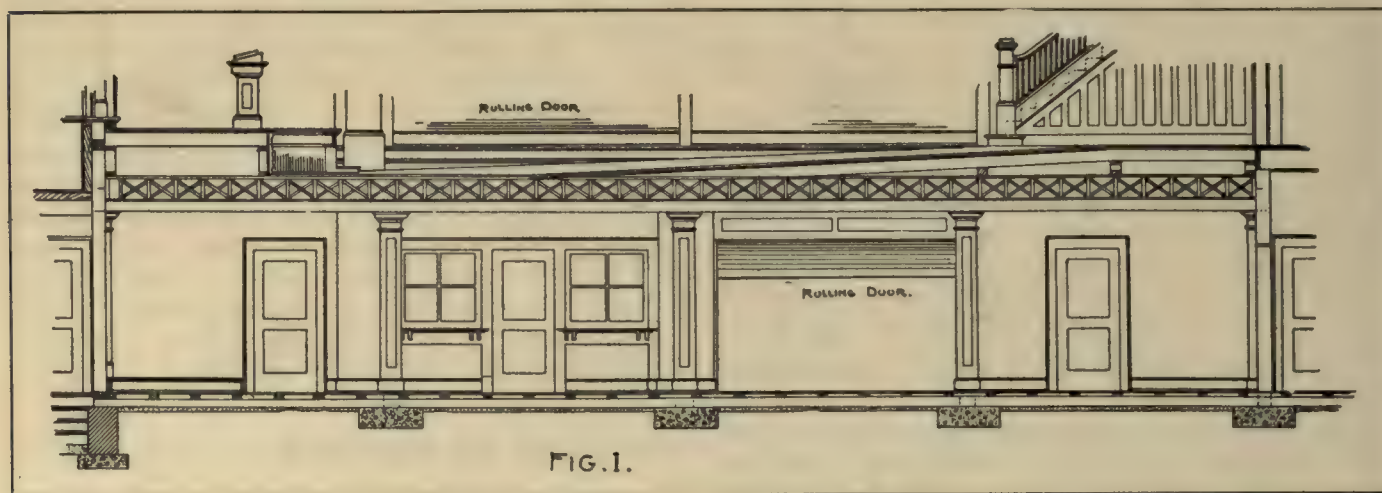
As to the question concerning dish-shaped or "bowled" floors, as they are called, they are a decided improvement over the all-level floor. The audience can see the speaker better and the speaker can see his hearers; and if there is any one thing that a public speaker desires above another, it is to be able to look his people squarely in the eyes all the time, so that he may have their undivided attention. Nothing lends to this end so much as the inclined floor.

Many new church buildings of any importance nowadays are being built with bowled floors. It is true they cost more, but the extra expense required to build them is well spent, and when once done the extra cost is never regretted.

How to build and what the best pitch to give them are questions requiring careful consideration before the

The proper slant to give the floor varies with the size and arrangement of the rooms. Usually from a half to three-fourths of an inch to the foot will be found to give very satisfactory results. All points should slope to a common centre on a line back of the speaker's stand. This point should be in the open; that is, it should be a fixed point at an accessible place, a point to which a light wire may be attached to use for a radius to strike off the required arcs or part of circle at front and back; that is, where the slant dies out on the low floor and where it begins to fall from the high floor. Thus, it will be readily seen that any point of the dish will be at a dead level with any other point on the radius line of equal distance from the central point. Then each row of seats will be level from end to end as they should be. Mistakes are often made by not understanding this levelling question by supposing that the line of the dish where it strikes the wall or sides of the room in a straight incline. This cannot be, except where the central point is located in the corner of the room; then the walls are in line with that point and consequently the lower edge of the base will be straight.

Where one set of joists are used to form the dish, they must be laid in line with the central point, or fan shape, and the girders on which they rest, must be a part of a circle conforming to the radius from the central point. These girders should be built up with

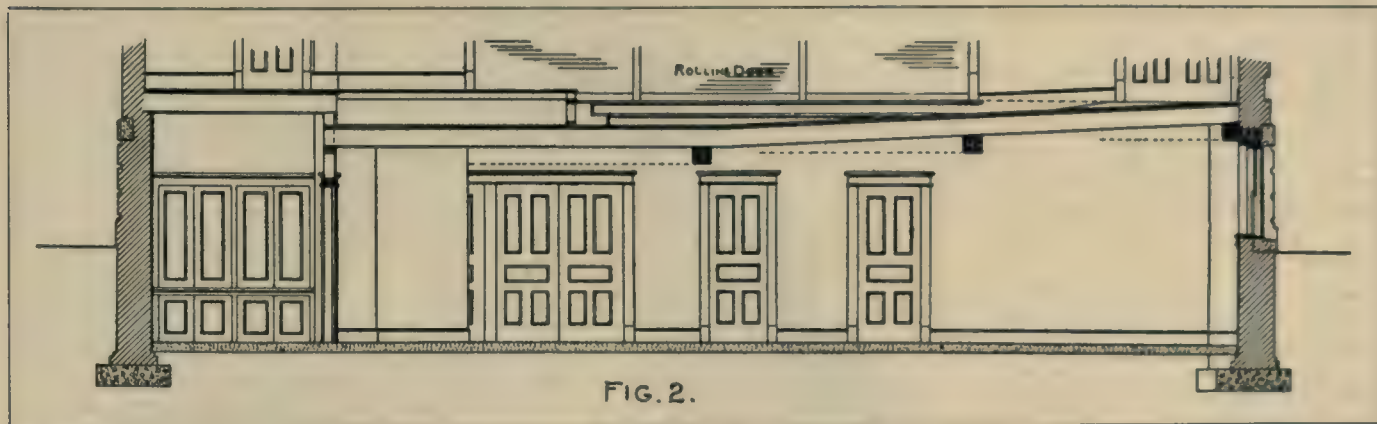


construction is attempted. Otherwise the builder will soon find himself engulfed in a brain-wracking, lopsided problem that will tend to make him almost, if not wholly, forget what churches were ever intended for. There are high floors, low floors and intermediate floors that lead off from the bowled floor into lecture-room, etc., all of which should be carefully figured out as to the proper levels with one another; since they affect the stairways, doors, entrances, height of windows—especially those in the basement—as their tops should clear the ceiling in the lowest part of the basement, the height of the water-table, etc. In fact, to have all these things harmonize inside and out is the part which properly belongs to the architect to put down in black and white for the builders to read and follow.

$\frac{1}{8}$ -inch dressed plank with width equal the desired depth of girder, sprung to the proper curve and well nailed with joints broken, and be continuous from end to end. This construction, as shown in fig. 2, is all right where it is not particular about the supporting posts being regular in the basement rooms, or to have the ceiling level, as the posts must conform to the girders' curve and the ceiling to the slant of the floor. But where it is desired to avoid these objections, it is best to have a supporting floor level with the lower point of floor. This will require straight girders, which with their supporting posts will permit of better taste in the arrangement of the basement rooms, and the ceilings will be level. The joist for this floor should be reckoned not only heavy enough to carry the live load that it

will be subject to, but also its own weight and the dished floor that is to go on top of it. These joists should be covered with good sound sheathing, or better still, with shiplap, which will serve for a working floor, during the construction of the building. Then after all heavy work is done, on top of this floor build the dished floor with lighter timbers; 2 by 6-inch joists will do if properly supported. These joists must rest with reference to the common centre as before mentioned, and should be cut to a feather edge where they die out on the lower floor. These joists should be covered with sheathing, changing their course as often as necessary to get good bearing for same; then on this place the

being operated by anybody and everybody. Our hydrants, in common with the rest of our fixtures, open to the right or exactly opposite to the direction in which most mechanical devices unscrew. The ignorant operator in his vain endeavor to open to the left applies all kinds of force, with the frequent result that before he realizes that he is turning the screw the wrong way it is strained, bent or broken, and the valve packing below is crushed into a useless mass. . . . It can easily be imagined what a serious state of affairs this might cause at the start of a fire. Helpless to stay its progress because of lack of water, the firemen would have to view the development of a conflagration, perhaps. Again,



finished floor, straight across the ditch. It is necessary that the foreman in the factory that builds the seats should know the incline given the floor and the radius of the front and back curves, so that he may lay out the seats accordingly, so that their backs will have the proper flare and the pew ends fit to the floor. Then when all is completed each row will be level from end to end. The pews should be placed from 32 to 36 inches apart. It gives the best effect to have the first two or three rows of seats rest on the level floor before starting the incline, which should extend back to the last row in the rear of the room.

The accompanying illustrations show sectional elevations of the construction of bowled floors.

Fig. 1 shows the level bearing floor as above specified, and on this the bowl floor is constructed.

Fig. 2 shows the section of a bowl floor at the outer wall line, the bowl being formed by the one set of joists which must rest on circular girders to the curve to correspond with that of the bowl. The basement ceiling would, of course, have the same incline as the floor above. This section shows that for a corner rostrum, the centre from which the curves are struck, being at the corner of the room.

Abuse of Fire Hydrants

The Superintendent of the Water Department of Boston, Mass., in his annual report describes the possible results of promiscuous use of fire hydrants. He says: "While upon the subject of hydrants I wish to call your attention to a very serious matter which before long will have to be dealt with in a firm and decisive manner, viz., the abuse of hydrants by careless and ignorant operators. As you no doubt know, hydrants are primarily a fixture for the use of the fire department, and their value as such depends upon their readiness for use, which, in turn, is dependent upon their working order. Now it is an almost hopeless task to keep hydrants in a good mechanical condition while they are

very few of these ignorant and careless men, who act without authority in many cases and without knowledge in every case, understand that there is a waste in the hydrant that will not operate unless a means is provided for the entrance of the air by leaving the nozzles open while the water is draining out of the barrel. . . . Upon shutting off the main valve they immediately close the independent or nozzle valve and thus trap the water in the barrel. It is not difficult to realize how in cold weather a frozen hydrant will result from these conditions, and a frozen hydrant is not a trifling matter in the event of a fire. I am of the opinion that hydrants should be operated exclusively by the fire and water departments, and other departments and contractors should secure their water through other means.

Slogans of the West

- Wetaskiwin—"The Elevator City of Alberta."
- Yorkton—"The Metropolis of Northeastern Saskatchewan."
- Lanigan—"Yesterday: The Prairie; To-day: A Town; To-morrow: A City."
- Strassburg—"The Heart of the Last Mountain Valley"
- Saskatoon—"Happy, because its people are prosperous."
- Gainsboro—"The Gateway to Southeastern Saskatchewan."
- Stettler—"The Marvel of the West."

"The engineers find Gatun dam safe," read Mr. Jones from his newspaper headlines to grandma, knitting at the other side of the table.

"Well," she said, looking over her glasses in pained surprise, "I don't know anything about the safety of Gatun, but I think a family newspaper oughtn't to use such language in print."—*Emporia Gazette*.

Montreal's New Transportation Building

Handsome Ten Storey Structure of Practically Fireproof Material—To Face Three Streets and Cover Approximately Twenty Thousand Square Feet

The new Transportation Building to be erected in Montreal will occupy the Seminary property bounded by St. James, St. Francois Xavier and Notre Dame streets, and will cover an area of approximately 20,000 square feet.

The building is to be ten storeys in height and when constructed, including basement and sub-basement, will have a floor area in the neighborhood of 200,000 square feet. A unique feature of the design is a broad arcade extending through the ground floor from St. James street to Notre Dame street, with an intersecting corridor leading to the St. Francois Xavier street entrance, and having a monumental staircase giving easy access to the Mezzanine or half floor above, and cafe, barber shop and other accommodations below.

The building is to be constructed as fireproof as modern science can make it; nothing but fireproof materials being used throughout, the structure itself being composed of steel, concrete, terra cotta, tile roof, metal doors and windows, and corridor floors, wainscots and the trimmings around all doors are to be of Canadian marble, the stairways are to be constructed of marble and iron, and materials of non-fireproof nature have been almost eliminated.

On the three streets between the arches, are single massive columns, giving an appearance of strength and solidity necessary to a building of this height.

The location of the building, and its frontage on three streets, makes it admirably suited for its purpose, and this has been kept in mind constantly by the architects in the preparation of their plans, in order that no detail might be neglected, which would add to its efficiency as an office building.

Messrs. Carrere & Hastings, of New York, to whom is credited the finest office building in New York City, and Mr. E. G. Bird, of Toronto, for many years associated with this New York firm, who have recently constructed the Traders Bank Building of Toronto, and structures of a similar nature throughout Canada and the United States, have been entrusted with this interesting project, while Messrs. Ross & MacFarlane, of Montreal, have been awarded the details of supervision and erection of the building. Messrs. Peter Lyall & Sons, Limited, have been awarded the contract for construction of building, and it is expected that work will



be commenced early in 1911 and completed during the following year.

Sewer Contractress

About all fields of endeavor that formerly were considered for men only have been invaded by the fair sex. The last few years have seen the entrance of women into the civil engineering field, and even the contracting field has been invaded; at least three women control very successful street grading businesses. Now comes the announcement of a young woman student in the Engineering Department at the University of Michigan that she intends to make a specialty of sewer contracting. In a recent press report she announces her intention as follows:

"Why shouldn't there be just as much opportunity for a girl to win success building sewers as in writing stories, teaching school, doing sociological work or lecturing on woman's suffrage? I intend to devote my energies to becoming a successful sewer contractress."

Some Causes of Failure

The fact that a contractor fails to make a profit on a piece of work is not *prima facie* evidence that his estimate was inherently too low, says "The Contractor." It merely means that it was too low for the methods employed. There are some men who would lose money on a job at almost any figure, seemingly because, like the bark and bite of the dog, "it is their nature to." They have not the vision which sees the end of the work from the beginning, and therefore they are constantly in hot water.

A practical example was furnished on this point on a 40-mile piece of railroad construction in Pennsylvania. All of the work was let to one contractor, who sublet as much as possible in five and ten-mile sections. When the work was nearing completion most of these "subs" had to be kept under surveillance to prevent them from pulling out from a losing proposition.

One day the general contractor walked over the work and pointed out to the various sub-contractors where they had failed. In one instance too much had been invested in building a camp of boards, where tents would have been equally efficient, and far cheaper; besides the location chosen was very poor. Another had used pitcher pumps, where a power pump would have saved time and labor, and still another insisted on napping stones by hand where a crusher would have been advisable. A striking example was that of one of them who finished the grading very roughly, leaving it inaccurate to the stake readings and badly rutted by carts. All profits were sacrificed when the engineer, requiring neater work, and he by no means insisted on "sandpaper" finish, either. Another used carts and lost money during the wet season, where cars would have saved the situation. The height of folly was reached by the man who had a small steam shovel on the job, but insisted on mucking the top layer of a cut. When he was ready to use his shovel he found himself in rock, and as the work was let unclassified, it was easy to figure where his profits had gone.

Costs of Construction

Everyone who has had much to do with construction work during the last two years has become painfully aware of the steadily increasing costs and of the great difficulty in getting full competition in many departments of construction. Just what is the reason for this state of things is almost as difficult to determine as the cause for the general increase in the cost of living, more difficult, in fact, since one cannot attribute the former, as a shrewd observer attributed the latter, to the cost of high living. The situation is so serious as to call for more than casual comment and it ought to be the subject of thorough investigation; particularly to determine whether there is any one principal factor in the increase which is definitely ascertainable.

It is obvious, of course, that year by year the labor question becomes more and more serious, not alone from increase of wages, but, what is far more damaging, from a decrease in efficiency. Added labor costs alone, assuming the labor to be of uniform quality, certainly do not count for the final result. It would be a good and appropriate task for the Bureau of Labor statisticians to go into this question and to attempt to determine, let us say, the cost of laying 1,000 brick at various dates during the last 20 years. Figures of this kind are conspicuous by their absence in most statistical reports on labor matters. It does precious little good to state what the mason's wages and hours of labor are unless you know how much he is by custom or rule likely to do;

the same investigation ought to be extended to other branches of structural labor to determine for them similar data.

Another similar line of investigation ought to deal with the distribution of employment throughout considerable periods as bearing on the question of supply and demand. It is one thing to say that a certain grade of laborer receives \$4 a day and it is quite another to conclude from this that he obtains this amount through any considerable proportion of the year. In other words, how far is the apparent rise of wages an indication of a real increase in earning capacity per annum, and how far does it merely represent irregular production with accompanying abnormal demand for comparatively short periods? This matter has a very serious bearing in some lines of manufacture in which it is rather doubtful whether the annual earnings of the workmen have much increased, a rise in labor costs of a manufactured article being largely due to changed methods of production.

It would also be extremely interesting for the statistical departments of the Government to analyze the increased cost of materials of construction, to find out not merely what the increase in current quotations has been, but what is its underlying cause. Take, for example, the matter of lumber, in which the rise of price is notoriously great. How far is this due to actual scarcity and how far to the operations of very large lumber companies which keep extremely careful watch of prices? The factor first named is undeniable, for the forests have been most recklessly cut away, and yet, on the other hand, within 10 or 15 years there has been a good margin for grades of lumber which a contractor would hardly have looked at previously, so that the scarcity is in part compensated by the access of material previously almost unutilized. And how much of the increase in costs due to lumber and other materials is to be charged to increasing indirection in handling and to formal or informal agreements to maintain the prices?

A genuine analysis of the distribution of costs between the original provider of structural material and the contractor, who takes it finally in hand, would be interesting and perhaps somewhat sensational. With all the talk of rising costs and all the ingenious explanations offered, there has been comparatively little done in the way of close investigation of the subject, and its importance would seem to demand much more rigorous treatment at the hands of the statistician than has yet been accorded it.

Mr. Malcolm D. Barclay, civil engineer and surveyor, has opened an office in the Lake of the Woods Building, Montreal. Mr. Barclay is a graduate of McGill University. For some years he has been associated at Montreal with Mr. Joseph Rielle.

Charles Moad, of the Carpenters' and Joiners' Union, Toronto, has been appointed the union's delegate to the convention of the United Brotherhood of Carpenters and Joiners, which is to be held at Des Moines, Iowa, in September.

J. R. Barry, A. Finlayson, Bert Beaton and J. O. Palmer all of Port William, Ont., have taken sub-contracts on the new line of the Canadian Northern Railway from Edmonton to the Pacific coast. Work on 70 miles of this line has been started.

A report is in circulation that gypsum deposits in large quantities are to be found at Grande Prairie, near Kamloops, B.C. An electric railway may be constructed between the two districts.

False Economies in Purchasing Machinery

Final Costs Reduced by Using the Best Types—Some Interesting Examples—A Contractor who Erected a Monument to his Folly

The best goods are the cheapest; but this does not mean the lowest in first cost always. A certain foreman thought he had made a good bargain when, instead of the 90-cent shovel he had been sent to purchase, he brought back three dozen shovels at 75 cents each. There was a clear saving of 15 cents per shovel, or a total of \$5.40 on the lot; and he felt proud that he had discovered the bargains. The superintendent looked them over; and while not well pleased with the material, put them out on the job, for time was pressing and he thought a trial was worth while at any rate.

So long as the work consisted principally of shovelling loose material the shovels were good enough and the men handled as much material as they did with the more expensive shovel. When the material became tough and there was digging to be done, they found that the blades had a tendency to kink unless handled carefully. Over on the next street the same number of men were employed digging with the more expensive shovel. The two gangs were carefully compared in the evening; the gang having the strong shovel was found to be digging 50 per cent. more earth than the gang with the cheaper shovels. The superintendent had an idea that the shovels were to blame; so late that night the night watchman opened the tool boxes and changed the shovels without the knowledge of the foremen. The next day the men who had been using the poor shovels the day before were pushed and their output was considerably improved. The men who had the better shovels the day before bent their shovels when they tried to do as much as on the day previous, so before noon were nursing their shovels. The record sheets that evening showed the result and the superintendent took pleasure in telling the foreman all about it. The low cost shovels were scrapped and good ones purchased in their place. The saving of 15 cents per shovel was lost twice over each day they were used in ground that was the least hard.

Pumping to Keep Ahead of the Elements

A contractor had a hole to keep clear of water. He found that a proper pumping outfit would cost \$150 and that gasoline to run it would cost about 20 cents per day. Looking carefully over the work, he concluded that the cost of pumping would be very small, so had a tinner make a common suction pump at a cost of about \$3. One man in the course of a day's hard work made little impression on the water, so two more pumps were made and three men set to work the next day. It rained the following night and the cost of pumping had been about \$17 to take out just a little less than the rain put back. This was discouraging and the men complained that the pumps were back-breakers. A telephone call brought down a nice little suction pump, \$15, requiring two men to operate it and they did not work any too hard. They cared so little for the work, in fact, that they quit when pushed. The valves kept getting out of order continually and that delayed matters. Finally, after spending \$2 for new valves and \$12 for labor, making a total cost to date for pumping of \$46, the hole was cleared of water and concrete materials

carried into the bottom to be used the next day. It rained that night and \$140 worth of cement was ruined. The hole had to be pumped out again.

A good make of diaphragm pump was put in at \$35, and men set to work. They did not work enthusiastically and were sensitive when spoken to, so gangs were constantly being broken up to replace the disgusted pumpers. The labor cost was \$18 by the time the diaphragm pump had the water out; and as the skies looked clear the materials were again taken down and everything looked fine. Several days went by without mishap, and some one accidentally put a lot of stuff on top of the inconspicuous pump, hiding it from view. That night a sewer burst and flooded the excavation. The pump could not be found and the contractor in disgust telephoned for the \$150 self-contained outfit that did not require any attention. It was put to work and the hole was empty before the pump had been working four hours. A sump was dug and the suction pipe put into it. If a black cloud appeared or anyone got nervous over the possible breaking of a sewer, some one rushed over to the pump and lighted a match, and in a second the hum of industry was heard where the pump stood.

The contractor said he had bad luck with that excavation. But it was not altogether luck; he simply failed to realize that good machinery is worth all its costs.

Thought Old Methods Good Enough Until Shown

A certain concrete contractor preferred to build a platform around his concrete mixer and wheel the stone, sand and cement up a long incline in wheelbarrows in preference to spending a good price for a hoisting bucket, or elevator. A contractor just finishing a job close by tried to sell him a second-hand loading outfit, but failed. Finally he asked the privilege of permitting his son to stay a couple of days on the job and take some cost data, which permission was readily given. The young fellow kept careful track of the cost of taking the concrete materials from the stock-pile and cement shed to the mixer, and showed the figures to the contractor, who was well pleased, for they were low for that sort of work. The next day the father came and made him a proposition to install the loading attachment and contract to do the loading for 75 per cent. of what it was costing by the wheelbarrows. The contract was signed and it was not until the saving amounted to the price asked at first for the second-hand outfit that he realized what a saving he could make by the use of such devices. His job was of a pretty good size and that little saving of 25 per cent. in the loading amounted to almost twice the price of the second-hand loader, yet the loader was the property still of the other man when the work was completed. To-day when that contractor is buying machinery he carefully estimates every item of his work in order to see if savings can be effected by buying labor-saving devices.

This Contractor Built a Monument to His Folly

A contractor priced a steel concrete bucket for hoisting concrete from the mixer on the ground floor to the upper floors of a new building. The cost of the bucket when divided into the yardage ran rather high, so he

designed one and built it of wood. It was strong and heavy. It worked all right, but took twice the power the steel bucket would have taken, so was slower in operation. The first cost was less than one-half that of the steel bucket and it did look as if a saving had been made, until one day some one blundered when the full bucket was 40 feet above the ground, and it dropped "kerplunk." Of course work stopped and the men went home. Carpenters made a new bucket and repaired the tower, getting everything in shape by evening, and everybody felt badly; for if the bucket had not dropped the job would have been finished that day. On his way home that evening the contractor saw a bucket drop in another tower from a height of about 50 feet, and went over to look at the wreck, feeling there was after all some balm in Gilead. The bucket was all right, as a patented friction hanger had made it fall slowly. In fact, if it had been empty it would have fallen hardly more than 10 feet. The bucket was one he had decided not to buy because it cost too much.

He went home thoughtful, but his wife cheered him up by saying he really would have saved money if the bucket had not dropped. That night the heavens opened wide and stayed open for a week. All contractors know how that is. The farmer has no monopoly of trouble, due to weather conditions being less than perfect. Contractors do not make so much noise about it as the farmers do, but they suffer just the same. When this particular contractor went into the hands of a receiver after the rain ceased, he asked for the wooden bucket and it was given to him. He, of course, got on his feet again and is now in the contracting business. In the back yard of his nice little home is a well with a small

house over it, consisting of roof and four small pillars. The roof of this well is that wooden concrete bucket upside down and having attached to it a little sign reading "Don't Be a Tight-wad." This well, the contractor says, furnishes refreshment for man and beast, including foolish persons. The story is true.

She Delivered the Dynamite All Right

Every man to his trade. A contractor in the heart of Africa or away in the wilds of some half-civilized country is compelled to make shift, and the more he knows about rough and ready ways of doing things the better fitted he is to survive. He can be expected to do many things that would be simply foolish in this country where the telephone is at one's elbow and obliging supply and material men are ready to take things out to the job at once. They go so far in being obliging that once the writer was surprised to have a lady come out to a job he was handling, in an electric runabout and ask for him. She explained that her husband asked her to take out to the job two kegs of nails, a can of oil and five sticks of powder, as the wagon was not at the store when the hurry order went in. She also brought the husband's apology for not sending out the whole order, which he promised to get out as soon as the wagon got back, even if he paid the driver overtime. The stuff was taken out of the runabout and the lady rode away with a glad feeling that she could help her husband. She was probably in a heavenly frame of mind, but little thought, or perhaps realized, how near she came to heaven that afternoon riding with the dynamite rolled up in the cushion to keep the sun away from it. That was carrying business courtesy to great lengths.

The Effect of Sewage Gases on Concrete

Results Noted at Hampton Disposal Works—Experiments with Coatings of Coal Tar, Pitch, Linseed Oil and Resin

At a recent meeting of the Concrete Institute of England, Mr. Sidney H. Chambers read a paper describing the effect of sewage and sewage gases on the Portland cement concrete of the disposal works at Hampton, which are under his charge. The following is a summary thereof:

The sewage on its arrival at the works is delivered from the force main into a screening chamber, and after passing through the screen, is conveyed by a channel to the detritus tanks. From these tanks the sewage enters a hydrolytic tank, which, together with the detritus tank, was installed in 1903. The main bulk of the sewage, 80 per cent., passes through at a comparatively high rate of flow, issuing in four hours as a clarified liquid, while 20 per cent., containing the deposited matters, is 16 hours in the tank. After flowing over the weirs of the first portion the liquid enters a channel which leads to the second portion of the tank, consisting of four hydrolysing chambers arranged in sequence, and filled with large flint stones. The liquid, having taken three hours in its passage through these four chambers, enters the lower channel, which conducts it to the contact beds.

The sewage of Hampton is of a strong domestic character. It has undergone thorough disintegration by the lifting operations, and by the putrefactive changes occurring in the rising main. It is malodorous on its arrival at the screening chamber, where, as it leaves

the rising main, it evolves sulphuretted hydrogen and other bad-smelling compounds. The liberation of these gases constitutes a nuisance necessitating the screening chamber, channels, and tank being covered in, and a means being provided for drawing a large volume of air through them before discharging the gases into the atmosphere.

The whole of the tank and channels is constructed of Portland cement concrete. The walls of the tank are 6 feet 6 inches in thickness at the base, and 1 foot 6 inches at the top, and are strengthened by tie-rods; the roof is 6 inches in depth and is reinforced by expanded metal, and the channels are covered by 2-inch indurated paving slabs. The work was executed by departmental labor, and the best materials were used.

The concrete was composed of one part of Portland cement properly mixed with clean water and six parts of ballast thoroughly free from loam, clay, mud or dirt of any kind, and no material was allowed to be used larger than would pass through a 2-inch screen.

The makers of the indurated paving flags state that they are composed of granite chippings, washed and crushed to pass through a $\frac{1}{4}$ -inch mesh sieve, and heavy Portland cement made by themselves, the raw material for which is obtained from the Barrow-on-Soar blue lias beds. The materials are mixed in the proportion of 1 part cement to 3 parts of granite.

Early in 1905, a few months after the hydrolytic

tank had been put into use, it was noticed that the roof and walls of the hydrolysing chambers above the liquid level were white or yellowish in appearance. This efflorescence was not crystalline in structure, but was of a chalky subsistence, and resembled distempered work on a damp wall. On examination it was found to be due to a thin covering of sulphur, which could be easily removed by rubbing. Later the face of the walls and the roof in the second part of the tank showed signs of peeling, and the concrete appeared to be disintegrating. A thorough inspection of the installation was thereupon made.

At the screening chamber nothing appreciable was observed, neither at the highest water level nor on the underside of the roof. The concrete was sound, and when struck had a good ring. Immediately adjoining this chamber was the main sewage inlet channel, along which the whole of the gases pass to the main air duct leading to the air filter. At this point slots were made in the concrete to receive a dam; the concrete at the back of the grooves was found to have disintegrated, although the sides were perfectly sound.

Further along this channel it was observed that the greatest disintegration had taken place on the walls at the liquid level. Owing to variations in the flow of the sewage, the level of the liquid in the tank and channels rose and fell; thus a certain area of the walls was constantly being immersed in the sewage, and then exposed to the air. This area was, consequently, even when not immersed, much wetter than the part of the walls which was always above the level of the liquid. The latter area at this point showed erosion, which, however, had not penetrated so deeply as that at the level of the liquid itself. At the liquid level there was a deep groove in the concrete, and above this the face of the work had bulged out and lost its nature.

The first portion of the tank, the hydrolytic tank proper, appeared to have suffered very little. The walls and roof had only the slight sulphur deposit. At the liquid level, which varied less than in the channel, there was a slight erosion. The second part of the tank, the hydrolysing chambers, was found to have suffered in places to a marked degree. It was observed on breaking through the erosion on the surface that the concrete at the back was moist, soft and gritty. Also, it was noticed that increased dampness constituted an important factor in the destruction of the concrete, for the lower parts of the vertical faces of the beams supporting the roof were more affected than the upper parts. The lower portions of the vertical walls of the tank also were more eroded than the upper. At the liquid level the concrete had been severely attacked, and a deep groove existed in it.

Two samples of surface concrete were taken above and below the liquid level, and the following was the result of the analyses:

Character.	Below liquid level. Sound.	Above liquid level. Unsound.
Appearance	Gray	White
Texture	Hard	Soft
Ratio cement to sand	1:2	3:2
Sulphate of lime in cement	Trace	66 p.c.

The same pronounced effect was to be seen in connection with the concrete blocks, which were grooved to receive sliding boards ad project above the liquid level; these blocks had in many instances crumbled away to such an extent as to be almost shapeless. Recently these chambers were emptied, and it was found that the concrete below the liquid level was perfectly sound and in a good state of preservation.

The lower channel conveying the liquid from the tank to the contact beds revealed the same character-

istics as were observed in the upper channel, but the portion at the liquid level was very much more markedly affected.

Samples taken of the lining of the sides and covering gave the following analyses:

	Ratio Cement.	Sand.	Sulphate of Lime in cement.
Concrete at varying liquid level....	1	1	70.26 per cent.
Underside of slab forming covering	5	1	74.61 per cent.

The air duct taking the gases from the effluent channel of the primary beds and communicating with the tank outlet channel was found to have a coating similar in appearance to that observed on the underside of the covering to the channels.

Analyses of this coating were made, with the following results:

	Ratio Cement.	Sand.	Sulphate of Lime in cement.
Underside of slab forming covering of air duct	2	1	70.71 per cent.

The point to observe in the above analyses was the conversion of the lime in the cement into sulphate of lime, the sulphur being obtained from the sewage flowing through the tank and channels, as well as from the gases expelled from the sewage, and contained in the air withdrawn from the several parts of the installation.

Mr. Chambers has concluded that the effects arose from the putridity of the sewage and the oxidation of the putrid products by the air supply. The main erosive effect is at the varying liquid level, and is therefore dependent upon the amount of sulphuretted hydrogen in solution in the liquid. The gas is comparatively small in amount in the incoming sewage and in the liquid in the hydrolytic tank, and increases as the liquid passes through the hydrolysing chambers. The results of this are especially well shown in the two channels; the alternate wet and dry area of the upper channel conveying the sewage from the rising main is less markedly affected, while in the lower channel the corresponding area is severely attacked. So with the two parts of the tank; the first part into which the sewage is delivered, and wherein comparatively little putrefaction takes place, has not been affected to anything like the extent that the second part or hydrolyzing chambers has.

When the level of the liquid falls it leaves the concrete which it previously covered wetted with a liquid containing sulphuretted hydrogen in solution. This wet surface is then exposed to the action of the air supply, which oxidizes the sulphuretted hydrogen with the production of sulphur and sulphuric acids; these decompose the concrete, the lime being converted finally into sulphate of lime. What the exact nature of the intermediate compounds is cannot be stated, as none of them have been isolated, but it is probable, Mr. Chambers believes, that the active agent is sulphurous acid, as it is known that cement is insoluble in sulphuric acid. When the liquid rises again, the decomposed concrete is washed away either wholly or in part, and a fresh surface is exposed to action when the liquid falls again. It is the continuation of this cycle which leads to the formation of the grooves at the varying liquid level.

The erosive effects on the concrete above the liquid level are dependent upon the sulphuretted hydrogen, evolved from the liquid and mixed with the air supply. Some of this gas is dissolved by the moisture which is present on the walls and roofs, from evaporation and condensation; it is then oxidized by the air, and decomposes the concrete as described above. In this case the decomposed concrete either remains as a coating on the surface, peels off, or crumbles away.

In order to observe the phenomenon on concrete

tubes, two 9-inch concrete tubes were selected, which were supplied by the makers of the paving slabs previously referred to, and were composed also of similar materials in the same proportion. One of the tubes was coated with Dr. Angus Smith's composition (coal tar, pitch, linseed oil, and resin). They were placed side by side in the second part of the tank in such a position that they would be subjected to the rise and fall in the level of the liquid. At low level the tubes were not in contact with the liquid, and at high level the liquid rose to half the diameter.

After the tubes had remained in the tank for eight months they were taken out and examined. The coated tube did not appear to have been affected, other than at the highest liquid level, where a thin line could be observed, and when struck it was found hard and had a good sound. It was noticed that there were two areas on this tube without any coating, due no doubt to its having been placed upon two supports to allow it to dry; these areas were soft on the surface and similar to the uncoated tube. With these exceptions the tube appeared to be in as good a condition as when first placed in the tank. On the other hand, the uncoated tube had a distinct line at the highest liquid level, which was found to be soft, and when tapped with a chisel had a dull sound; the interior of the tube which had been immersed appeared soft and had a dull sound when struck; the portion of the tube above the liquid level was unaffected, and when struck had a clear ring.

Canada a Field for American Builders

A wide and profitable field for additional activities of American contractors presents itself to-day in connection with the development of the rich territory of western Canada. As in other lines of activity, Americans have not been slow to grasp the opportunity offered there, and many contracting firms in the northwest border States and in other localities have been taking up contracts north of the line. The country is being exploited and improved rapidly, but there will be great future development, which is now barely started. Assistance is needed from the highly organized forces and improved methods which have been evolved in the handling of large and difficult projects in the making of our own west. The American takes to the new northwest country a valuable fund of experience, obtained under similar conditions in his own country, which is an asset not possessed by many of his competitors.

Americans are constantly becoming more intimately associated with western Canada in a great variety of activities. Settlers are moving over the line by thousands annually to take up the promising agricultural lands there. Capitalists are investing hundreds of millions of dollars there in industries and railroad enterprises. As the agriculturist and the capitalist become interested, the contractor is also turning his energies into this profitable channel to assist in carrying out their enterprises. So far the chief trend of his activities has been along the lines of railroads, docks and irrigation works. It is probable that for some time yet large projects of that character will be the chief source of attraction for the American builder. But with further development in the new country, additional profitable fields are sure to open.

The tariff presents an obstacle to the contractor carrying new plant and equipment across the border, but he maintains an advantage through favorable position, good transportation facilities and superior organization, together with the apparent indifference exhibited by many firms of British connection. The initiative of the

American and his willingness to take risks which promise good profit give him a decided advantage over his British cousin when competing for such work.

The power of the American as a factor in Canadian enterprise is well shown in an article by Mr. Arthur Hawkes recently published in the "Nineteenth Century Review," of London. It is a summary of observations made during several years of extensive travel in the United States and Canada. Mr. Hawkes points out that the English have shown comparative indifference to the opportunities offered in Canada, being slow to take advantage of them, or to follow up actively such enterprises as they have entered. On the other hand, the Americans have followed their advantage with characteristic energy at every point. The Americans are at work there with the same energy which has produced such remarkable results in the middle west of their own country. He points out that the development of Canada will be beneficial alike to Great Britain and the United States, and makes a plea for greater activity on the part of the home people so that they may get their full share of the benefits.

Large sums of money are being expended in Canadian development, and will continue to be invested in the future. The contractor as well as the manufacturer and promoter, should keep his attention on that quarter. —The Contractor.

Importance of Good Roads

The Premier of Saskatchewan, Hon. Walter Scott, made the following extended reference last week to the good roads question:

"The problem of highways, in my opinion, is scarcely second in importance to the problem of railways. Quite likely our railway question will be solved at least in fairly satisfactory degree long before we have reached any approach towards a complete solution of the highways or good roads problem. Such has been the experience of most of the States of the American Union and of the Provinces of Eastern Canada. In the eastern Provinces and in a majority of the States, the people are now reasonably well served by railways as far as concerns proximity to railway shipping points, but in how few sections can it be declared that the roads are all that can be desired? In connection with the highway problem the people of America have a great deal to learn from the people of England and Germany and France and other parts of Europe where there are public roads vastly superior as a rule to those existing up to the present day on this side of the Atlantic. Possibly the reason for these conditions may lie partly in the fact that in England and Europe the highways preceded the invention of railways, whereas in America it is largely true to say that the railway has preceded the highway. And I firmly believe it to be true that as between railways and highways a disproportionate amount of attention has been devoted to the railway question, to the neglect of the good roads problem, which is at least equally important."

The action brought by the Concrete Pole Company, of St. Catharines, against the York Construction Company, of Toronto, for over \$9,000, in connection with certain work on the Trent Valley Canal, has been settled out of court, the defendants having paid the claim in full.

The city council of North Vancouver invited applications for the position of engineer and the position of assistant engineer for the district. The applications were to be in by July 21st and an appointment will probably be made shortly.

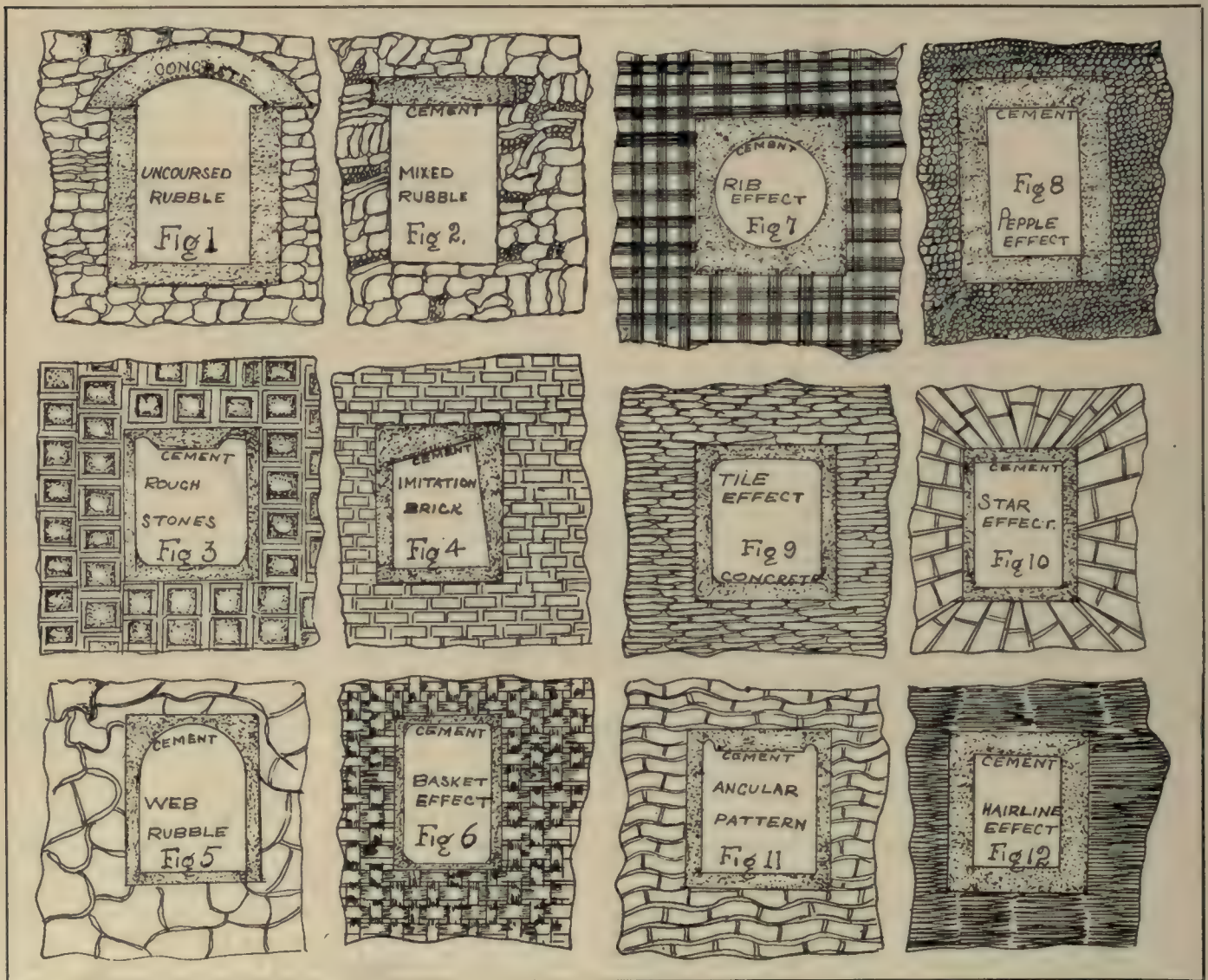
Effects in Rubble Masonry and Concrete

Employment of Irregular Sized Stones in Patterns—Increasing Adoption of this Principle as a Means of Building Decoration

Rubble work of irregular-sized stones employed in conjunction with patterns formed from cement, is being used quite extensively in modern building operations, says George Rice, in the "National Builder." Walls of exceedingly attractive appearance are being laid up with the

there are imitations of rubble work made in the cement stock direct and applied to the building service with good results.

In fig. 1 is a model of uncoursed rubble work surrounding the window frame of concrete. Under the heading of coursed work, as here shown, there might be a classification of ran-



assorted stones and concrete creations. In some instances the stones are chosen in the rough and used, in any manner they come. Then again, the hammer and chisel are brought into play to get the stones into the various forms needed for the development of certain artistic designs. While granite and sandstones are picked out for this work, so far as is possible, one may find almost any grades of stones used in the building of the combination concrete and stone rubble walls. There are different classes of the rubble work, as is well known to the profession, and some of these kinds are elaborated in the cuts in connection with the concrete portions. The concrete part may consist only in the window sash about which the rubble work is built, or the concrete may be in blocks intermingled with the rubble work. Then again,

dom-coursed, square-coursed or irregular-coursed designs. Or the work can be developed on the plan of the mixed rubble with a concrete top for the window opening, as in fig. 2. In fact, quite a range of styles can be wrought out.

In fig. 3 is shown a cement window frame, about which is arranged the blocks cast in the form of rough stones. In fig. 4 is another combination made up with the sash of cement and the imitation brick wall moulded from cement. In fig. 5 is the web rubble sometimes seen in walls is shown. Hammered dressed stuff is sometimes used. The proportions in the stones in some of the walls must be calculated in proportion to the degree of breaking strength required. For the average type of wall, however, the rubble work is usually put up with the class of stock on hand. In case the

rubble work is of a character likely to crush under the weight upon it, sheet lead can be inserted in the joints. Unless done right, the pressure often forces the lead out, hence care has to be taken to get the lead properly set.

A basket effect is shown in fig. 6.

You can find angular and diagonal effects in rubble work to a greater extent now that cement is used in forming the material used in the creation of the walls. The concrete manufacturers are capable of making patterns in imitation of high-class rubble service of any description you desire. For this reason ribbed patterns, blocked patterns, two-point patterns and other styles of unusual effects are observed. A rib effect for illustration is shown in fig. 7. Then, in fig. 8, a pebble style of erecting the wall is given. A tile presentation is shown in fig. 9. This combination is popular. The tile effect can be found in use in colored stone and in pure white marble. I saw some highly polished illustrations in tile creations finished with polished surfaces so that the surfaces shone brightly. Granite can be made with an excellent

finish with proper rubbing tools. Then there is sunk work likewise used in the tile effect, in which certain pieces are depressed below the common level of the tile.

Fig. 10 illustrates a star effect developed by extending the courses outward regularly from a given point. The given central point in this instance is the centre of the window sash.

An angular effect is shown in fig. 11. This involves the coursing of series of stones in which the stones are composed of slightly curved pieces. Hairline effects are in use and a sample sketch of this class is given in fig. 12.

Since the manufacturers of cement articles for building purposes have taken an interest in the combining of rubble work with concrete parts, there has been considerable advancement made along these lines. The creation of new patterns, the elaboration of antique styles and the bringing out of certain typical hues in colored stock have tended to develop a market for this line of wares for building purposes.

Improvements in Concrete Construction

Complex Problems which Have Been Solved—Scientific Tests Resulting in Increased Safety of Buildings—The Value of Specifications

The fact is that concrete construction of all kinds must in the last analysis possess a high degree of fireproof quality and rigidity of form. If either of these qualities are weakened or reduced the standard of concrete buildings must suffer. Concrete is used by so many different kinds of builders and contractors that its abuse is quite common. The building collapses of concrete were typical of poor or ignorant workmanship. They simply illustrated the weakness of this material when handled by incompetents.

Concrete differs from clay as a building material in that it can be employed by builders generally without the equipments, which gives a certain standardization to clay products. The latter are produced by companies who employ only specialists, and consequently there is a uniformity of material, which gives standard results. On the other hand, any builder who can afford to buy a few barrels of cement can put up structures of more or less dangerous character.

City building departments have consequently been forced time and again to regulate the use of concrete and to issue specifications governing its mixing and setting. For many years concrete engineers were not in entire agreement as to the best manner of using concrete, and it required long and severe tests to secure the proper data to demonstrate the highest efficiency of certain mixtures.

When we come to reinforced concrete the problem becomes even more complex. In this form of building material we have two scientific factors to consider carefully. The tension and expansion of the reinforcing metal must be considered and also the mixing and setting of the concrete. Ignorance of either one of these factors must eventually lead to disaster. It may not be that a single mistake in estimating the strength of either will cause a collapse, for often buildings with distinctly weak walls or piers will stand for years without falling. But this is due chiefly to the fact that the load factor has not been severely tested.

Ordinary building laws must specify the nature of the reinforcing material as well as the nature of the concrete mixture. This is particularly true where the material is being used for floors. The danger is that builders in their effort to economize in the metal reinforcing rods will whittle down the size and strength of the rods to the danger point. They apparently trust too much in the rigidity and strength of the concrete. Hence collapses. Another point of vital

importance; very often the metal reinforcements are not properly clothed with the concrete, and a small interior fire warps and twists the metal rods. This warping and twisting cracks the concrete and causes disaster. Metal for carrying the load of a building can never be looked upon as a fireproof material. It is too easily affected by the temperature of the air and it can be depended upon only when it is protected by a good covering of concrete.

Reinforced concrete has been subjected to severe and repeated tests, and many of these tests are still in the process of development. The United States Geological Survey has recently finished the most elaborate of tests. These have been carried out through twelve months of time, so that the relative value of the concrete up to a year after mixing can be determined. A further desire aimed at in these tests was to ascertain the actual value of different kinds of gravel, granite, limestone and cinders for use in the concrete. The questions of age and consistency of the material in giving strength and stiffness to the walls were matters of prime importance.

Scientific tests of this nature are of the utmost value to city building departments and special commissions. The average man looks with suspicion upon many of the so-called tests. He is afraid that some of those making the tests are interested in the business, and hence there is an inclination to accept the figures with a certain degree of allowance. Official tests by government experts are not subjected to this suspicion and consequently they represent a certain standard for general use.

Specifications for cement users are of the greatest value in helping city building departments to arrive at proper building regulations and also for guiding the builder who may wish to erect a few structures of concrete. The man who wishes a concrete house put up for himself cannot be expected to follow all the technical discussions about the mixing and setting of cement. He must depend upon the builder or architect to supply this information. Similarly the investor who puts his capital in big reinforced concrete houses must depend both upon the builders and the city's building regulations. The chief objects of building concrete houses of any kind or shape are economy, durability and fire protection. The first may be obtained often at the expense of the latter. Cheap concrete houses can be easily planned and

erected, but unless the walls and partitions are durable and fireproof the cost in the end is far from cheap.

The best builders of to-day have reached a consensus of opinion that specifications cannot be too rigid in the use of materials and their proper proportions. Columns and other structural parts that are subjected to high stresses require exceptionally rich mixtures, carefully compounded and set. In the past very often this rule has not been carefully followed, and collapses have resulted. For columns and supporting parts of the structures the proportions should be at least one of cement to one and a half of loose sand and three of loose gravel or broken stone. Anything short of this mixture will reduce the strength and rigidity of columns so that danger is invited. Even this proportion is not strong enough for high buildings where the load factor is great. It applies to rather low buildings not intended to carry any great load, such as factories and storage warehouses. These latter require particular specifications worked out according to the weight of the load to be carried by the upper floors.

Reinforced floors, beams, columns and arches in buildings subjected to a good deal of vibration, especially in factories and lofts where machinery is used, require proportions of 1:2:4. That is, one part of cement should be used for every two of loose sand and four of loose gravel or broken stone. Here, too, variations must be made according to the load to be carried. The size and number of the metal rods used for reinforcing are matters that have to be worked out in each individual case.

Concrete machine foundations, retaining walls, abutments, piers, thin foundation walls, building walls, ordinary floors and sewers with heavy walls should have a proportion at least of one of cement to two and a half of loose sand and five of loose gravel or broken stones.

There is finally unimportant work in masses where concrete of a thinner mixture can be used with success. These include foundations supporting stationary loads, heavy walls and the backing of stone masonry. The proportions recommended for this work are 1:3:6. The danger in using concrete for building purposes is that an unscrupulous person will confound the different classes of work and attempt to use the specifications of one for another. Thus, if the lean specification for a stationary foundation should be used for foundations subject to heavy vibrations where machinery is used, there would be a collapse sooner or later. Likewise, if such a mixture should be employed for columns and structural work the building would be unsafe. Reinforced concrete needs also a rather strong mixture, so that the metal rods are held firmly in position and not permitted to bend or change position. The fireproof quality of the walls or beams is in direct proportion to the amount of cement used. Reinforcing rods must be covered with at least several inches of good concrete to protect them from the action of fire.

The quality of the sand and gravel must be considered as well as the proportions and the nature of the cement. Thus, anything which will not pass through a sieve with $\frac{1}{4}$ -inch round holes should be rejected and must be included in the coarser gravel or broken stone. The careful measuring of the different parts is essential to success, and any attempt to use the sand without careful sifting means danger. Cement passes through a chemical process in the course of setting, and it must have the right particles to bind the mass together securely. The ideal concrete is a mixture with just enough cement to cover all particles of sand and stones and fill the voids without an appreciable excess of the binding agent. Thus, too much, as well as too little cement may work evil in any kind of building operations.—The National Builder.

A campaign is in progress among the residents of St. Catharines, Ont., and the Niagara district for the deepening of the Welland Canal.

Victoria City Engineer's Report on Dust Problems

The following is an extract from a report submitted recently by Mr. Angus Smith, city engineer of Victoria, B.C.:

"The result of experimentation of the last few years and the study devoted to it by highway engineers and chemists demonstrates that the road surface is constructed to advantage with bituminous binders exclusively. The experiments for the last year or two both in Great Britain and in the United States to demonstrate that the laying of the dust can be satisfactorily accomplished by the calcium chloride method and by the application of oil.

"During the year 1909 the city of New Bedford, Mass., spent \$14,000 on dust laying preparations. It was a popular expenditure and although there was some complaint from owners of bicycles that the oil caused a rapid deterioration of the rubber tires and the press recorded a few complaints of injury to carpets, the general opinion was one of approval. The city was unable to comply with the request for oil. The dust layers were dustoline and a heavy asphalt oil and standard road oil.

"The city of Victoria has approximately 23 miles of macadam roadway. The roadways are of varying ages and in various conditions of maintenance. The older roadways are quite dusty. It will be necessary for the city to confine its attention in the immediate future to the using of dust layers and it should experiment in the direction of dust prevention by using in the construction of a macadam roadway a more homogeneous and harder stone together with some form of elastic binder.

Use of Calcium Chloride

"There are several of the older macadam roadways that should be spiked, cultivated, graded and rolled and after resurfaced with a material mixed with a binder. The city has recently received from England ten tons of calcium chloride. The solution used for watering is made by dissolving 100 pounds of calcium chloride in 100 gallons of water. The roads should be watered twice with this solution, an interval of one day being allowed to elapse between the first and second watering. Three hundred gallons should be made to cover 800 square yards at each watering. For subsequent waterings, one thorough watering will suffice, using 300 gallons for 800 square yards. The solution may be applied with the ordinary street sprinklers. Calcium chloride is a chemical and in its ordinary commercial form is a solid mass, and is hauled in hermetically sealed drums. It is a delinquent salt with the property of absorbing water from the air and retaining it in solution. The quantity of this chemical when exposed will absorb a definite quantity of water, varying with the humidity of the atmosphere.

"Toronto uses a petroleum residue, a portion of which comes from Pennsylvania and the balance from Canada. This oil is of a paraffine base and is not so suitable as the California oil, which has an asphalt base. The cost of the latter precludes its use in Toronto. The ordinary street sprinklers are used with the exception that the bore of the sprinkler proper is increased and made uniform throughout. Toronto has had its macadam roadways well surfaced and crowned with oil five times a year. Tacoma, Wash., has had very little experience with this question, but proposes trying oil on the macadam roadways. Portland uses oil on its macadam roadways applied with a sprinkler; 125 barrels is made to cover one mile of roadway 20 feet wide. The oil costs \$1.05 per barrel. This city does not oil the full width of the streets, but where a street is 30 feet wide only oils 20 feet in the centre. The oil is used cold, but better results are obtained on a warm day.

"I believe the most permanent and satisfactory method of treating the present macadam roadways is to resurface the partly worn roads with some one of the accepted and approved bituminous binders."

Ottawa Parliament Buildings Poorly Protected From Fire

The Parliament Buildings at Ottawa have been severely criticized by Fire Chief Graham in a special report which he has prepared upon the fire protection appliances afforded in these buildings. One of the buildings, he refers to as a fire trap, on account of the quantity of waste paper, boxes, etc., which have been allowed to accumulate in the corridors. In some cases extinguishers have been found to be useless and outside standpipes to be of a size that would not fit the city's hose. He recommends more extinguishers in the House of Commons. In the library, with all its valuable books, he found two hydrants enclosed in cupboards and locked. To open one of them required five minutes before the key can be found. Accumulations of paper and boxes were found in great quantities in the basements of most of the buildings, and, in fact, the situation was one which surprised the fire chief greatly.

In the west block the fire chief was told that the pressure was always at 30 pounds on the mains, but upon inquiry he found that it is supplied only to the lower floors, not to the attic or roof, which were without water nearly all the time. The corridor throughout the basement he found in a very bad condition, being littered with waste papers, boxes, straw, etc., and also large wooden cupboards filled with surplus stock of paper. "We do not permit rubbish of the kind," he says, "to accumulate in any business buildings throughout the city. There should also be more chemical hand extinguishers placed at convenient points in the basement."

In regard to the east block, he reports as follows: "The conditions were very good with the exception of the attic and the record library in the Secretary of State's department. This part of the building is a fire trap and there are only a few pails half filled with water. This portion especially should be well supplied with chemical extinguishers."

"In the Langevin block the basement could not have been in a worse condition. I found every room and corridor filled with paper and cardboard boxes." He suggested that if the basement was always to be used for storage, an automatic sprinkler system should be installed. The printing bureau he reported had not ample fire protection. He recommended more chemical extinguishers. In the Supreme Court there was no fire equipment whatever. In the Post Office there were no hydrants or horse. The condition of the Archives Building, the Royal Mint and Rideau Hall were all good.

News and Notes

Fort William, Ont., plasterers have raised the price of lathing from 4½¢ to 5¢ per yard.

The formation of a citizens guild for the promotion of civic improvements is under discussion in Guelph, Ont.

The formation of a citizens' guild for the promotion of civic improvements is under discussion in Guelph, Ont.

The British Columbia Sand & Gravel Company, Limited, and the Victoria Contracting Company, Limited, have formed an amalgamation to be known as the Producers Rock & Gravel Company, Limited. By means of this arrangement the business covered will be greatly enlarged and the plants will be extended.

The arrangements which were being made by the city of Victoria, B.C., for obtaining a supply of water from Sooke lake have had to be abandoned. Much opposition to the proposed work arose and a great deal of unpleasant feeling was engendered between those who were urging the work and those who objected to it, which finally resulted in complete abandonment of the idea.

The city of Vancouver is making a wonderful record for itself this year. The total value of new buildings for the first half of July amounted to \$365,315, whereas the record for the whole month of July, 1910, was only \$549,107. At that date the total value of building permits for the year amounted to \$7,251,195, which is only \$7,370 less than the total for the whole of the year of 1909, which in itself was the record of all previous years. The entire total of permits for the remaining five and a half months will therefore go towards establishing an increase upon all previous records.

An interesting situation has developed in Vancouver in connection with the eight hour day provided for on all city contracts. Mr. M. P. Cotton, one of the city contractors, has had trouble with the Italians working on his jobs, as they want to work for nine hours a day. They have tried to enforce their desires by striking and by intimidating workmen upon other jobs. A number of the Italians visited gangs working on Mr. Cotton's various jobs and displayed knives, and in other ways sought to intimidate the men and force them to lay down their tools. Mr. Cotton brought the matter before the city council, where a lengthy debate resulted. After a long discussion a unanimous decision was reached and a resolution passed to the effect that 48 hours per week should be allowed on city contracts, and in no case should the contractors be allowed to work their men except between the hours of 7 a.m. and 6 p.m.

The town council of Orillia, Ont., has received the report of the town engineer, Mr. W. K. Greenwood, on the reorganization of the town's utilities department. The report recommends that the utilities be divided into four departments: Waterworks and sewerage, electrical, roadways (including the town property), and parks. It recommends that the waterworks department should have a foreman, who should be familiar with the work to be done. In dealing with the roadways department, Mr. Greenwood recommends that in future the town should make use of broken stone, instead of gravel. The broken stone is very much better. There is plenty of material available in the country round, the town has a stone crusher which is idle most of the time, and power is cheap. He also recommends that the streets should be properly curbed at the corners, and crossings made at proper grade level, which would add very much to their appearance.

Railway Strike Affecting the Building Trade

The effects of the G.T.R. strike of conductors and brakemen in delaying construction work have already been widespread.

At Montreal, where a strike of bricklayers is in progress, the situation has been rendered more complicated by a shortage of bricks.

In Toronto, the strike is holding up supplies of gravel, sand, cement and lime. No serious harm has yet been done but if the strike should be prolonged the result might be a costly interruption to building operations.

At Ottawa, the plumbers who were to have commenced work on the Chateau Laurier were unable to do so on account of lack of material, which was to have gone by G.T.R. from Montreal to Ottawa. The stonemasons on the same building were also threatened with a similar interference.

The Dominion Sewer Pipe Company, of Mimico, have begun to feel the effects of the strike by running short of clay. The G.T.R. found it necessary to spike all its switches leading from the main line between Toronto and Hamilton. This will make it necessary for the factory, along with many others, to close down. The Ontario Sewer Pipe Company is also forced to reduce its operations, involving the laying off of over 100 men. The Toronto Indestructible Brick Company expects to have to close down soon.

Trade News from Montreal

Mason and Brick Strikers Losing Ground — Cement Becoming Scarcer—Railway Strike Affecting Supply Markets

Montreal Office of the "Contract Record."
August 1st, 1910.

The strike of Montreal mason and brick contractors has, if anything, lost ground during the past fortnight. The leading spirits among the strikers contend that they are meeting with success in their fight, but in moving about one cannot learn that the larger contractors are seriously handicapped for the lack of this class of laborer. Mr. John Stewart, of Messrs. John Stewart & Company, Westmount, declares that his company have lost very little time on any of its present contracts since the strike was organized, nor are any of the other contractors experiencing serious difficulty in getting all the men they require. Bricklayers and stonemasons are coming into the city, enticed by the opportunity afforded of obtaining work while the strike is on. The strike on the Grand Trunk is having its natural effect on the supply of bricks, which are now becoming very scarce. This latter condition has had the retroactive effect of hindering progress on a number of contracts, making less demand for the services of brick contractors. The report is also current at the present time that the local strikers have been informed that they need expect no further assistance from the International Union of the United States. The latter has its own troubles in Chicago and finds that these will create a sufficient drain upon their funds. It is further stated that the men are now going back and employers are making their own separate contracts.

And now the unions of sheet metal workers and roofers have decided that after September 1st their members shall not accept a less wage than 30 cents per hour. A conference with the master roofers is said to be pending, with what result it is impossible at this stage to predict.

Cement Situation.

There is a marked scarcity of cement at the present time on the Canadian market and conditions have been far from improved by the present strike on the Grand Trunk Railway tying up, as it has, a considerable portion of the freight traffic.

At the headquarters of the Canada Cement Company we learn that in order to meet their customers' requirements, they have in instances been compelled to ship from American mills to Vancouver. Owing to summer scarcity the Montreal market has made two sharp advances, yet the Canada Cement Company have kept to the low level prices. Prices are quoted as follows, f.o.b. Canadian centres (exclusive of cost of package): Montreal, \$1.40; Toronto, \$1.60; Fort William, \$1.50; Winnipeg, \$2.20; Calgary, \$2.60; Ottawa, \$1.40; Halifax, \$1.50.

Mr. Frank P. Jones, general manager of the Canada Cement Company, is at present making a western business trip. It is expected that work will be commenced this year on the construction of the new mill at Winnipeg, to supply a portion of the cement required in the West.

Supply Markets

The strike on the Grand Trunk is not without its general effect on the supply market conditions. Cement continues in good demand with prices unchanged in spite of the marked scarcity. Bricks are no longer plentiful as in the earlier part of the season, when the market was in receipt of numerous shipments from the Eastern Townships. During the brick and mason contractors' troubles the demand was to some extent curtailed, but this was quickly counterbalanced by the loss in receipts occasioned by the railway strike.

Building Operations in St. Lambert

Building operations are in full swing at St. Lambert. "Brooklyn Park" is being boomed by an interested company and during the year a number of fine residences will be erected in this district. A number of tenement houses are also in project and the erection of this latter type of structure is an indication of the growth of the new city.

Remodelling of Carsley Property

A new hotel and restaurant will shortly occupy the old Carsley property on St. James street. A group of capitalists have purchased the building and rented it to Freemans, Limited, who will remodel the building and fit it up. The hotel will have about 130 rooms. Part of the ground floor facing on St. James street, will be sublet for business purposes.

The Carsley property now taken over by the City Central Real Estate Company, consists of about 12,800 square feet of land and the five-storey building thereon. In addition, the company have leased the adjoining premises on Notre Dame street from the Caverhill estate. This has an area of about 18,000 square feet. Mr. C. E. Deakin has the contract for making alterations to the present structure and has already commenced operations.

Must Only Comply With Building Laws

Mr. Recorder Dupuis last week gave judgment in the action of the city against J. B. Baillargeon for an injunction preventing him using a stable at the corner of Berri and Ontario streets. Mr. Baillargeon was refused a permit for the building by the city when he made application but commenced to build, and when the work was completed, used the premises as a stable. The city contended that as no permit was granted the building could not be used. The Recorder said that although no permit had been taken out, the defendant had complied with all the requirements of the city by-laws, and that being so, the city was bound to grant the permit. He dismissed the action.

Big Terminal Scheme

Mr. A. P. Gillies, C.E., and a party consisting of Messrs. F. M. Andrews, L. O. Hedden, A. E. G. Godridge, New York, F. E. Townsend and H. O. Eakins, Toronto, were in Montreal recently in connection with the matter of establishment of underground terminals in this city. Mr. Gillies and his company propose to construct these terminals at a cost of approximately \$100,000,000. They have had extensive experience in similar enterprises at Tacoma and Cincinnati.

Larger Building Inspection Office

The Montreal Citizens' Association in recent session passed a resolution advocating that the city building inspector should at once be supplied with additional competent and responsible inspectors to aid him in the survey of new building, issuing of permits and enforcement of the city building laws. They contend in their resolution that the Building Inspector's Department should not wait until notified or requested to make inspections, but should be in a position to take the initiative and make thorough and careful examinations of all buildings which might offer danger to the public's safety.

The Citizens' Committee also take exception to a recent private inspection of Montreal's water tanks. Their contention is that such a private inspection by any one whom the interested parties would choose would offer little or no protection to the public.

Longueuil Alters Building By-laws

The council of Longueuil recently made some additions to the town building by-laws. In future buildings must be at least two storeys in height and when frame buildings are

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.

A by-law to extend the sewage system at a cost of about \$8,300 will be voted on August 29th.

Carleton Co., Ont.

Tenders are being called for \$20,000, 20-year, 5 per cent., good roads debentures.

Calgary, Alta.

By-laws have been passed to issue the following debentures: \$284,000 for water-mains; \$30,000 sewer connections, and \$125,000 for building and equipping an addition to the electric power plant.

Dauphin, Man.

Tenders addressed to the secretary-treasurer of this town will be received until September 1st next for labor and material on waterworks and sewerage contracts. For full particulars, see advertisement in this issue. Chipman & Power, Toronto and Winnipeg, engineers.

Estevan, Sask.

By-laws to raise \$10,000 for cement sidewalks and \$8,000 for the extension of sewers were carried.

Esquimalt, B.C.

A committee has been appointed to gather all available data on the installation of a sewerage system. J. Jardine, chairman.

Halifax, N.S.

It is proposed to erect a reservoir for the high pressure service system.

High River, Alta.

Tenders were called until August 9th for construction of about 3,000 square yards of cement sidewalks. G. E. Mack, secretary-treasurer.

London, Ont.

Tenders are being called until August 15th for construction of drain, North Dorchester. Plans, etc., at office of F. W. Farncomb, C.E.

The council decided to purchase a self-registering Venturi meter to cost \$1,063 to be installed on the Springbank main to the city.

Manion, Ont.

Tenders will be received until August 17 for Rudsdale Creek improvement and municipal drain. Township of Bathurst. J. H. Moore, C.L.S. & C.E., Smith's Falls.

Moose Jaw, Sask.

The City Council have decided not to award any contract on the basis of tenders received for the sewerage disposal plant. City Engineer Wilson was instructed to revise plans and call for tenders to be in by October 17th.

Tenders addressed to W. F. Heal, city clerk, will be received until August 15th for supplying materials for and laying 3,286 lineal feet of 6-inch and 700 lineal feet of 12-inch cast iron watermain. Plans and specifications at office of city engineer, J. M. Wilson.

Outlook, Sask.

Tenders addressed to A. C. Viets, secretary-treasurer, will be received until August 15th for the following works: Contract A, laying water mains, etc.; contract B, constructing power house; contract C, construction of reservoir; contract D, construction of settling tank and intake. J. Darlington Whitmore, Regina, engineer.

Point Grey, B.C.

The four debenture loan by-laws authorizing the borrowing of \$500,000 for a water system, \$250,000 for sewers, \$100,000 for parks and \$100,000 for roads, were all carried.

Prince Rupert, B.C.

The report from City Engineer Davis recommends Woodworth lake as a source of supply, and advises that a survey party gauge the flow of water; etc. Mr. Agnew was placed in charge.

Toronto, Ont.

The Board of Control has instructed the city engineer to report on the cost of constructing storm sewers to relieve the present system in time of flood.

Tenders will be received until August 15 for sewers and sidewalk. Barber & Young, York Township engineers.

City Engineer Rust will lay the 500-foot extension to the intake pipe.

Tenders will be received until August 6th for the construction of asphalt pavement and grading of Davenport road and St. Clarence street. G. R. Geary, mayor.

At a meeting of the Board of Works on August 9th City Engineer Rust submitted recommendations for concrete and other sidewalks, water mains, etc., estimated to cost \$64,997.

Vancouver, B.C.

The contract for the supply of sewer pipe has been awarded by City Engineer Clement to the Dominion Glazed Cement Pipe Company, Limited, Vancouver, at \$70,910. Other tenders were received from Evans, Coleman, Evans, Limited, Vancouver, at \$76,930, and C. Gardiner Johnson & Company, Vancouver, at \$75,261.

Toronto, Ont.

Tenders will be called for the paving of Westminster road from Prince Edward street to Westminter avenue. Tenders will be called for the wood block paving of Cambie street from Hastings to Robson.

Winnipeg, Man.

The Provincial Board of Health has advised this municipality to take immediate steps for the establishment of a more adequate water supply.

M. Peterson, secretary, Board of Control, will receive tenders until August 25th for the supply of well drilling machinery capable of boring or drilling holes in the limestone rock from the bottom or top of the city water works wells, which are 15 feet in diameter and from 60 to 100 feet deep. Specifications and forms of tenders on application to City Engineer Ruttan.

AWARDED.

Belleville, Ont.

The tender of the Canada Foundry Company for an electric pump for the waterworks was accepted. It is to be a two and three stage turbine, with capacity of 70,000 gallons per hour, driven by a motor of 115 horsepower.

Harriston, Ont.

The contract for construction of municipal drain, No. 3, Township of Minto, was awarded to D. B. Campbell, Strathroy, at \$5,939; Daniel Shea, Egerton, tendered at \$5,111, and Crowley & McDonald, Rostock at \$6,987.

Hamilton, Ont.

S. Cheeseman was awarded the contract of building a sewer on Wentworth street at \$1.15 per foot. The city engineer got the contracts for sewers on Hilliard, Gilkinson and Niagara streets, at \$1.05, 99 and 58 cents respectively, but is too busy to undertake the work and he was instructed to sublet the contracts at the same figures, if possible.

London, Ont.

Gartshore-Thompson Company, of Hamilton, were awarded the contract for special castings for the Horton street pumping plant at 4 1/4 cents a pound.

Moose Jaw, Sask.

The Kettle River Company was awarded the contract for the laying of tracks by the street railway company on that portion of the system route within the paved area.

North Toronto, Ont.

Tenders for the construction of a large number of concrete sidewalks were received and the contract for concrete sidewalks awarded to the Royal Official Stone Paving Company at 44 cents per lineal foot.

Prince Rupert, B.C.

Contract for the supply of lumber for plank roadway was awarded to the Westholme Lumber Company, Limited, Prince Rupert, B.C. \$12 per M. feet spruce, f.o.b. wharf, free storage. \$16.50 per M. feet fir, f.o.b. scow at wharf, free wharfage, or \$18 per M. feet delivered anywhere in city where teams can haul. Other bidders and their prices were as follows: The Canadian Pacific Sulphite Pulp Company, Limited, Swanson Bay, B.C., \$14.95 per M. f.o.b. wharf, spruce. H. A. Sprague, Prince Rupert, B.C., \$14.25 per M. spruce, f.o.b. wharf; \$17.50 per M. fir, f.o.b. wharf. F. E. Hunt, Prince Rupert, B.C., \$16.50 per M. spruce, f.o.b. wharf; \$20.50 per M. fir, f.o.b. wharf. Wm. T. Robinson, Prince Rupert, B.C., \$13.50 per M. spruce. Vancouver Lumber Company, Vancouver, B.C., \$20.25 per M. fir, f.o.b. wharf. Flewin and Sons, Limited, Port Simpson, B.C., \$13.50 per M. spruce, on scow at dock.

Swift Current, Sask.

The contract for tile pipe has been awarded to Blackmer & Post Pipe Company, St. Louis, U.S.A., \$10.082 78, and for water mains to Munderloh & Company, Limited, Montreal 2 inch, \$16.42 per 100 feet; 3 inch, \$25.87 per 100 feet; 4 inch,

\$38.82 per 100 feet; 6-inch, 63.70 per 100 feet; 8-inch, \$100.55 per 100 feet; 10-inch, \$177.16 per 100 feet. Specials, 15 cents per lb.

St. Boniface, Man.

The following tenders were received for the construction of trunk sewer: A. C. Van Horenbeck, \$110,134 (accepted); Kelley & Fry, Winnipeg, \$134,594; Guibault & Company, St. Boniface, \$144,379.51; M. A. Pigott & Sons, Hamilton, Ont., \$125,889.80; National Paving, Winnipeg, \$129,766.90; Rigby & Kellet, Winnipeg, \$110,071.90; Jackson & Son, Winnipeg, \$125,465.46. Contract for sidewalks was given to Moen & Sweeney for \$12,767.35.

Toronto, Ont.

The tender of the Orpen Company, Limited, of \$23.07 a foot, for the construction of section No. 6 of the high level interception sewer, was accepted by the Board of Control. The City Engineer's tender was \$23.48. Matthew Warnock was awarded the contract for stop valves for the waterworks, \$5,717.52.

Vancouver, B.C.

J. C. Kennedy was awarded the contract for the laying of the Tenth avenue sewer at \$48,700. Palmer Bros. & Henning put in a tender for \$52,572.

The following tenders for sewer pipe were received: Evans, Coleman & Evans—4-inch, 12 cents; 6-inch, 18½ cents; 8-inch, 27-25 cents; 10-inch, 41 cents; 12-inch, \$1.06; 18-inch, \$1.31½; 20-inch, \$1.35½; 60¼ cents; 14-inch, 81 cents; 16-inch, 24-inch, \$2.23; total, \$76,930.60. Dominion Glazed Cement Pipe Company—4-inch, 12 cents; 6-inch, 17 cents; 8-inch, 25 cents; 10-inch, 39 cents; 12-inch, 50 cents; 14-inch, 75 cents; 16-inch, 95 cents; 18-inch, \$1.20; 20-inch, \$1.50; 24-inch, \$2.25; total, \$70,910 (accepted). Gardner, Johnson & Company—4-inch, 12 cents; 6-inch, 20¼ cents; 8-inch, 31 cents; 10-inch, 43 cents; 12-inch, 55½ cents; 15-inch, 80 cents; 16-inch, \$1.00; 18-inch, \$1.41; 20-inch, \$1.64; 24-inch, \$2.31; total, \$75,261.

R. S. Blome & Company were awarded by the Board of Works the contract for the paving of Davie street from Granville to Denman with granitoid paving, at \$103,000. M. P. Cotton & Company tendered at \$90,000. This tender was not considered as the specifications called for granitoid paving. This contract calls for 25,000 yds of surface. The engineer's estimate was \$110,058. M. P. Cotton & Company's was the only tender received for the asphalt paving of First avenue, their figure being \$60,000. A representative of the Barber Asphalt Paving Company requested that the time of guarantee be cut down to five years, etc. If this were done his firm would put in a tender which he ventured to say would be inside the engineer's estimate of \$50,000. It was finally decided by the board to reduce the guarantee from ten to five years, and also cut down the amount held back when the contract was completed to five per cent. for five years. New tenders will be called for, to be in at the next board meeting.

Winnipeg, Man.

The tender of the National Water Meter Company, of Chicago, for two thousand water meters at \$11.75 each was accepted.

Yorkton, Sask.

The contract for the construction of sewers was awarded to N. B. McInnis, of Regina, for the following prices: 2,900 feet of 20-inch sewer complete at \$2.35 per foot; 3,200 feet of 15-inch sewer complete at \$2.35 per foot; 1,700 feet of 10-inch sewer complete at \$1.60 per foot; 2,800 feet of 8-inch sewer, complete at \$1.25 per foot.

Price for manholes per vertical foot, \$6.50.

J. M. Christie, of Yorkton, was awarded the contract for the disposal works exclusive of distributing apparatus and valves at \$6,450.

Railroads, Bridges and Wharves

Belleville, Ont.

The Board of Railway Commissioners has approved of the plans submitted by the C. N. R. for its entrance into and passage through Belleville.

Dundalk, Ont.

Tenders will be received until August 15th for the erection of a reinforced concrete bridge over the Saugeen river. I. Traynor, tp. engr.

Galt, Ont.

Tenders addressed to E. O. Fuce, town engineer, will be received until August 11 for construction of two reinforced concrete bridges. Plans, etc., in the office of the engineer.

Guelph, Ont.

The city of Guelph, Ont., are calling for tenders up to August 16th for the construction of a plain concrete arch, span fifteen feet over the raceway at Preseint's Mills. For further particulars see "Tenders and For Sale Department" of this issue.

Hull, Que.

The city engineer in his report condemned the bridges on the Gatineau.

London, Ont.

Engineer Talbot was instructed to prepare the necessary plans and specifications for reinforced bridge on Governor's road. The new bridge will have a span of 32 feet, a 16-foot driveway and a four-foot walk.

The county council has called for tenders for a steel and concrete bridge over the Aux Sable river in East Williams. Tenders to be opened on August 27th.

Montmagny, Que.

Tenders will be received until August 20th for wharf extension. R. G. Desrochers, secretary, Dept. of Public Works, Ottawa.

Prince Albert, Sask.

Instructions from headquarters, London England (J. G. F. Greville, managing director) are, to proceed at once with the construction of the Hudson Bay & Pacific Railroad. Chief Engineer Atwood.

St. John, N.B.

Surveys are now being made for the terminals at this port for the Transcontinental Railway, and a corps of engineers of the public works department are busy making soundings in Courtenay Bay, which has been selected as the Atlantic terminus.

Stewart, B.C.

The wharf which was erected at this place by the provincial government has been taken over by the Dominion government who will expend \$15,000 upon improvements. Another wharf will be constructed by MacKenzie & Mann in connection with their short line of railway.

St. Eustache, Que.

Tenders addressed to Hector Champagne secretary-treasurer of this village, will be received until August 15th for the construction of an iron bridge over River du Chene, according to plans and specifications prepared by L. A. Vallee.

Toronto, Ont.

Tenders will be received by the Chairman of the Board of Control up to September 6th for the supplying of ties and

rails for the construction of industrial tracks. For further particulars see "Tenders and For Sale Department" of this issue.

The city engineer's draft estimate of the cost of dock at Ashbridge's Bay (600 x 200 x 50), with sheds of corrugated iron construction 500 x 30 x 14 feet, is \$130,000. An additional \$75,000 would be needed to make a channel available for vessels drawing twenty feet of water, and \$5,000 more for derricks. The dock is to be concrete above the water line and a composition of concrete piling and wood sheet piling below water. The docking space would be filled solid and paved. The Board of Control asked for plans and specifications.

Vancouver, B.C.

The Board of Works will call for tenders for an overhead bridge across the C. P. R. tracks at Carrall street. The C. N. R. has made overtures to the government of British Columbia in respect to the securing of aid in the construction of hundreds of miles of branch lines in various parts of the province. In all probability the question will be dealt with at the next session of the legislature early in the spring of 1911.

Wallace, N.S.

Tenders will shortly be called by the Nova Scotia provincial government for the erection of a reinforced steel bridge at Wallace Harbor, N.S. It will be four span of 170 feet.

Winnipeg, Man.

Tenders are being called by the Board of Works until August 10th for painting three bridges over the Assiniboine river. M. Peterson, secretary.

Work has commenced on the Brant street end of the new bridge to span the C.P.R. yards. The material for the superstructure is arriving and the William Newman Company will undertake the erection. The material is being supplied by the Cleveland Bridge and Engineering Company, of Darlingford, Eng. The total length of the bridge will be 2,200 feet, the largest span 340 feet. The bridge will carry a double street car track and reinforced concrete sidewalks.

AWARDED.

Brown Hill, Ont.

The contracts for construction of 55-foot steel bridge near here were awarded as follows: Concrete abutments, Jesse Winger, Edgely, \$1,628 (others tendered at \$2,586 and \$1,836); superstructure, J. Vance New Hamburg, \$1,093 (others tendered at \$1,900, \$1,608, \$1,500 and \$1,514). Bowman & Connor, engineers.

Coaticook, Que.

Contract for 100-foot reinforced concrete arch over the Coaticook river was awarded to Helmer & Winstanley, of Morrisburg, \$5,000. Other bidders were W. J. Welch, Coaticook, Que., \$5,125; the Laurentian Engineering and Construction Company, Montreal, \$6,900.

Digby, N.S.

W. P. McNeil & Company, of New Glasgow, N.S., were awarded the contract for the erection of the Joggins steel bridge at Digby, N.S. It is four span of 118 feet and a draw span of 102 feet.

Edmonton, Alta.

We are informed that the contract for the substructure, high level bridge over North Saskatchewan river has been awarded to John Gunn & Sons, Winnipeg. J. E. Schwitzer, assistant chief engineer, C.P.R.

Natashquan, Que.

The contract for the construction of a wharf here has been awarded to Mr. G. R.

Phillips, of Cornwall, Ont., by the Public Works Dept.

Stewart, B.C.

Gillett & Macdonald, Nelson, B.C., have received the contract for 2,472 feet of approach to the government wharf for \$15,000.

Stettler, Alta.

The Northern Construction Company, of Winnipeg, has the contract for building the C. N. R. line from near Stettler, Alta. to the Brazeau coalfields, to connect with the main line at or near Edson.

Vancouver, B.C.

Vice-president Mann, of the C. N. R. has awarded to C. Johnson the contract for grading the last 20 miles of the C.P.R. Other contracts were awarded to McDonald Bros. and W. P. Tierney. It is expected that the entire 60 miles will be ready for track laying before the end of the year.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

A steam heating plant will be installed at the hospital at a cost of \$7,000.

Beamsville, Ont.

Tenders are called until August 12th for the various trades in the erection of two-room addition to school, Section No. 2. Plans, etc., at Mr. F. O. McLean's, this place, or at the office of the architects, Munro & Mead, Hamilton.

Bladworth, Sask.

Fraser & Hutchinson, Regina, Sask., are the architects for the four-room school, 34 by 60 feet, to be erected here at an estimated cost of \$8,000.

Chatham, N.B.

The Roman Catholics of the North Shore are planning for a large educational institution on the banks of the Miramichi river here.

Dartmouth, N.S.

The school board have selected a site for the new school.

Fortier, Man.

Tenders are being called until August 15th for construction of school here. W. Laurens, secretary-treasurer.

Forest, Ont.

A by-law to issue debentures for \$18,000 to build a new public school here, was defeated.

Goderich, Ont.

It is proposed to erect the Huron county sanatorium here.

Halifax, N.S.

The Halifax City Council Committee have under consideration the erection of a new market building to cover a city block.

H. E. Gates, architect, Halifax, N.S., has prepared plans and specifications for a proposed addition to the Halifax Club House; also for a brick building to be used as an addition to the Victoria General Hospital Building.

London, Ont.

Tenders for roofing main building, Western Fair, will be received by the chairman of No. 2 committee until August 11th. Specifications with city engineer. A. E. Nutter, architect.

There is no likelihood of a joint municipal building being erected here.

It is stated that tenders for the new Colborne street school will be called for at once. City Architect Nutter has the plans.

Lethbridge, Alta.

The ratepayers passed a by-law to spend \$75,000 to build another new school. E. Mack, secretary-treasurer.

Tenders will be received until August 15th for the erection of the Fleetwood School. H. M. & W. A. Whiddington, architects, 211 Sherlock Building.

Ladysmith, B.C.

According to revised plans, the hospital here is estimated to cost not more than \$16,000, including plumbing, etc. Tenders are being called. D. Nicholson is interested.

Moncton, N.B.

A new fire hall has been recommended by the Fire and Light Committee.

Moose Jaw, Sask.

Six tenders for the produce market were received, and they ranged from \$20,200 to \$25,767. For the plumbing and heating of the building two tenders of \$2,700 and \$2,100 were received.

Montreal, Que.

A recreation hall will be built on to the Catholic church at Verdun, as soon as the present operations in connection with the extension of the church proper are completed.

Mr. A. Content, architect, 17 Place d'Armes Hill, is preparing plans and specifications for the erection of a school building for the Catholic School Commissioner in Rosemount Ward, to be known as the Rosemount School.

Mr. Alphonse Venne is preparing plans for the erection of a church building chapel and presbytery for the Parish of St. Joseph, Ste. Narcisse, Que.

New Glasgow, N.S.

H. E. Gates, architect, Halifax, N.S., has prepared plans and specifications for a public school building here. The structure will be of brick.

Nanaimo, B.C.

Preliminary steps have been taken toward rebuilding the Catholic Church and Convent, destroyed by fire several weeks ago.

Niagara Falls, Ont.

A by-law to raise \$15,000 to build an assembly hall and gymnasium for the collegiate institute, together with one to raise two thousand to improve the heating system of the present school building, was voted down by the ratepayers recently. A by-law to raise \$2,500 for the erection of a fire hall at the south end carried.

Tenders addressed to R. O. Desrochers secretary, Dept. of Public Works, Ottawa will be received until August 29th for the construction of an armory at Niagara Falls, Ont. Plans, specifications and form of contract can be seen and forms of tender obtained on application to Mr. S. Gott caretaker, Postoffice Building, Niagara Falls, at the office of Mr. Thos. Hastings Clerk of Works, Postal Station F, Yonge street, Toronto, and at the Department.

New Waterford, N.S.

Tenders were called until August 8th for erection of school here. P. W. Cody, P.S. Board, secretary.

Ottawa, Ont.

The sale is noted of the Bethany Presbyterian property on Wellington street stated to be for commercial buildings. The purchaser is D. H. MacLean. It is expected that a new church will be erected on Parkdale avenue.

Portage la Prairie, Man.

A by-law has been passed to issue \$20,000, 20-year, 5 per cent. school debentures.

St. Lambert, Que.

The St. Lamberts Council are considering the advisability of constructing an incinerator to more effectively handle the question of garbage disposal.

Swift Current, Sask.

Tenders will be received until August 19 for the purchase of \$10,000, 6 per cent. 20-year debentures for school district. W. H. Field, secretary-treasurer.

Sudbury, Ont.

Last year \$25,000 was voted for a new town hall. The council has now decided that that sum will not erect a suitable building, and a bylaw is to be voted on on August 23rd for an additional \$10,000.

Toronto, Ont.

Tenders addressed to A. W. Holmes will be received until August 22nd for the steam heating and plumbing, and electric and acetylene gas illuminating plant, etc. required for St. Augustine's Seminary. Plans, etc., at office of the above, and also at office of A. E. Freeman, consulting engineer, Continental Life Building.

Vancouver, B.C.

Klaw & Erlanger, of New York, are stated to have sent a representative to this city with a view to making preliminary arrangements for the erection of a modern theatre to cost \$500,000.

A new club house is to be built at Middlesboro, near here.

Winnipeg, Man.

An up-to-date club house will be erected on Lake Manitoba, near Oak Point. Plans have been prepared by William Bruce, architect, with whom E. E. Wire, Kennedy Buildings, is associated.

The civic library and baths committee have decided to recommend the erection of at least one public plunge and shower bath. \$50,000 is available. The intention is to develop a system of public both houses throughout the city. Before work is commenced Controller Waugh's report on bath houses in Chicago will be awaited.

Tenders addressed to E. McKenty, 408 Edmonton street, Winnipeg, will be received until August 15th for all trades in the erection of a brick and stone addition to the Manor Hotel. Plans and specifications at office of Frank R. Evans, 506 Somerset Building.

Welland, Ont.

The Ontario Fireman's Association will apply to the provincial government for a site for a home for aged and disabled fire men.

Webb, Sask.

Tenders addressed to Fraser & Hutchinson, architects, Regina, will be received until August 15th for the erection of a brick veneer school building. Plans and specifications may be obtained on application to the architects, or to the secretary treasurer, E. T. Austin, Webb, Sask.

AWARDED.

Montreal, Que.

La Fabrique de St. Jean de la Croix are erecting a presbytery on St. Lawrence Boulevard. General contract awarded to Boileau Freres, Isle Bizard, Que., contractors. Architect, Z. Trudel, 238 St. Andre street.

Commission Scolaire de St. Jean de la Croix are erecting an educational building on St. Dominique street. General contract awarded to V. Guilbault, contractor. Architect, Z. Trudel, 238 St. Andre street.

Contracts for erection of Amphitheatre on Mount Royal in connection with the coming Eucharistic Congress have been awarded as follows: Carpentry, Carriere

Freres; decorative work, Thos. Carley. Estimated cost, \$10,000. Mr. Jos. Venne, architect.

Contracts for erection of decorations for Eucharistic Congress have been awarded as follows: O. St. Denis Lettering Company; T. Dansereaux & Company; A. Mongeau & Company. Mr. Alphonse Venne architect.

The contract for wiring Church of the Ascension, Park avenue, has been awarded to the Sayer Electric Company; heating and plumbing awarded to Pratt & Company. Sparrow & McNeil, general contractors. H. C. Stone, architect.

The general contract for erection of the Garneau School for the Catholic School Commissioners has been awarded to Mr. O. Rondeau. Messrs. Marchand & Haskell architects.

Quebec, Que.

The following tenders were received for Limoilou fire and police station: Napoleon Gignac, \$16,278; Joseph Villeneuve, \$16,228; Jobidon & Gravel, \$16,477.50; A. Guerard, \$15,546 (accepted); Magloire Cauchon, \$15,750; Juchereau & Lamonde, \$17,994. Architect, Mr. Tanguay. For the Stadacona station the following tenders were received, the first price being for a building with tower and the second without tower: Jobidon & Gravel, \$3,836, \$3,436 (accepted); A. Guerard, \$5,550, \$5,100; C. A. Ve-zina, \$5,439, \$4,984; Jos. Villeneuve, \$6,080, \$6,000; Nap. Gignac, \$6,030. Architect Mr. Staveley.

Winnipeg, Man.

J. H. G. Russell has awarded the contract for excavation for the new Westminster church, corner Maryland and Buell streets, to G. H. Vincent. The total cost of the church and school will be about \$150,000. Local stone will be used.

Residences

L'Achigan, Que.

In the recent fire the following residences were destroyed by fire: T. H. Forest, \$6,000; J. Melancon, \$3,500; Mme. Jos. Melancon, \$3,000.

Newboro, Ont.

Mr. Wallace, of Galveston, Texas, has purchased Calm Island, where he will erect a \$30,000 cottage on it.

Victoria, B.C.

G. Gillespie, manager of the Bank of Commerce, will erect a summer residence at Sooke. H. J. Rous Cullin, architect, has prepared plans and tenders have been called.

Vancouver, B.C.

Recent building permits include: A Matheson, 3016 St. Catherine street, two houses, \$3,200; R. Hudson, 1924 Bismarck street, \$2,500; Vancouver School Board brick school, Templeton Drive, \$26,900; Vancouver School Board, Clark Drive brick addition, \$50,000; Leonard Wett brick store building, 895 Granville, \$5,000; Alex. Munro & Sons, four frame dwellings 2528 Woodland drive, \$10,000; A. Chisholm frame stable, 769 Fourteenth east, \$4,000; J. Elliott, 320 Jackson avenue, \$5,000; J. Hardig, 3373 Second avenue, \$3,000; G. Adams, Hastings street, \$2,500; J. R. Reid Twelfth avenue west, \$4,000; M. Parsons 1447 Semlin drive, \$3,500; J. B. Arthur 1315 Eleventh avenue west, \$3,500.

AWARDED.

Montreal, Que.

Mr. J. B. Julien is erecting three dwellings and two stores on Church street. Contract awarded to D. Vallancourt, contract-

or, 197 First avenue; architect, C. Dufort La Patrie Building.

Business Buildings and Industrial Plants

Berlin, Ont.

A by-law to authorize the loan to Daetz Bros. & Company in return for which they will erect a four-storey building, 125 x 60 feet, will be voted on.

Brandon, Man.

The Empire Hotel was destroyed by fire on the 28th ulto. Estimated loss, \$30,000.

Cochrane, Ont.

Fire destroyed nineteen buildings here last week at a loss of \$150,000. Among the losers were Rothschild Bros., Chamandy Bros., and J. Pelangil.

Esquimalt, B.C.

The British Columbia Marine Railway Company is notifying the Ottawa Government that they will submit a tender for the construction of a Canadian cruiser of the British type at Esquimalt. This would mean the installation of a modern plant costing thousands of dollars.

Fort William, Ont.

The Canadian Bank of Commerce will erect a branch building here.

Fort Frances, Ont.

Final arrangements for pulp and paper mills to be erected here have been concluded by Mr. T. Preston, it is stated. The capital is guaranteed by Peabody, Houteling & Company, Chicago, U. S.

Hamilton, Ont.

The Bank of Nova Scotia has purchased a site on King street east for the erection of a new bank building.

L'Achigan, Que.

The Bank of Hochelaga was destroyed by fire on the 1st inst. Loss estimated at \$3,000.

MacLeod, Alta.

The C. P. R. dining hall was destroyed by fire with a loss of \$12,000.

Moose Jaw, Sask.

The departmental store of W. Robinson Company was damaged by fire on the 1st inst. to the extent of about \$75,000.

Montreal, Que.

Tenders are now being received for the installation of plumbing and heating and elevator supplies in the New Yorkshire Insurance Building. Saxe & Archibald, architects.

Damage to the extent of \$10,000 was caused by fire recently to the premises at 869 Mount Royal avenue.

The Herald Printing Company has leased premises at the corner of St. David and St. Antoine streets and will shortly erect a one-storey office and printing building.

The officials of the Montreal Island and Terminal Railway Company have been asked to erect a station and waiting room at the corner of La Salle avenue and Notre Dame street.

Ottawa, Ont.

Messrs. Blackburn & Bryson have decided to erect a 3-storey building instead of two storeys, along Bank street, between Sparks and Wellington. The building will be 120 feet long by 50 feet deep. C. P. Meredith is architect.

The Russel Shale Brick Company has been organized with a capital of \$300,000 and was granted a charter by last week's Canada Gazette. It will erect a large plant at Russell where it has property con-

taining large quantities of shale. The plant will be ready for operation next spring.

The Dominion Explosives, Limited whose plant at Arnprior was wrecked by a recent explosion will rebuild. They have secured the necessary permission from the local municipal council.

Port Moody, B.C.

The B. C. Oil Refinery's plant was destroyed by fire last week at a loss of \$100,000.

Port Arthur, Ont.

J. H. Ashdown, of Winnipeg, has been here looking over various sites with a view to establishing a distributing warehouse.

Qu'Appelle, Sask.

The flour mills here were destroyed by fire on the 15th inst. at an estimated loss of \$20,000. The Imperial Bank is interested.

Quebec, Que.

The tenders for the new ferry buildings being too high, new tenders will be called to include both building and gate.

St. Catharines, Ont.

It is reported that Messrs. McSloy will shortly announce their plans of enlargement.

A by-law to give the Canada Hairecloth Company certain privileges in return for which they will extend their present plant, will be submitted to the ratepayers on August 29th.

Selkirk, Man.

The cold storage plant of the Winnipeg Fish Company was destroyed by fire on the 2nd inst. Total estimated loss, \$60,000.

Saskatoon, Sask.

The Winnipeg Oil Company's warehouse was destroyed by fire on the 29th ulto. Estimated loss, \$10,000.

Tenders for erection of truck warehouse for the Cockshutt Plow Company, were called until August 6th. S. F. Peters, architect, 392 Main street, Winnipeg.

Seaforth, Ont.

The ratepayers have approved a by-law to guarantee the bonds of the Bell Engine & Thresher Company for \$50,000 for 30 years.

St. Lambert, Que.

Tenders are now being received for the construction of a printing office in Brooklyn Park for Mr. Emmerson G. Hart. Mr. Philip J. Turner, F.N.I.B.A., architect.

St. Jacques-L'Achigan, Que.

Twelve buildings were destroyed recently by fire at a loss of \$75,000. The principal losers were the Bank of Hochelaga M. Granger, T. H. Forest and J. Melancon

Toronto, Ont.

The Don Foundry Company's property at Ashbridge's Marsh was destroyed by fire last week at a loss of \$6,000.

The Nasmith Company, Limited, will erect a two-storey factory on the north side of Duchess street, near Sherbourne at a cost of \$60,000.

Hobberlin Bros., clothiers, will erect a new building at the southeast corner of Yonge and Richmond streets.

Vancouver, B.C.

Architect W. T. Whiteway has prepared plans for a modern business structure to be erected on Pender and Beattie streets by World Building, Limited, Vancouver. The construction will be of class A steel frame; reinforced concrete floors; materials, stone, brick and terra cotta. There will be eight storeys and basement to the

main building and a tower ten storeys in height. Estimated cost of building, \$275,000.

The National Apple Show are about to take tenders for an addition to Machinery Hall, where their exhibitions are held.

The B. C. E. R. Company has decided to build a magnificent depot building at a cost of \$250,000.

Victoria, B.C.

Mr. A. I. Todd will have a brick business block built on the southeast corner of Fort and Cook streets, to cost about \$20,000. G. C. Mesher & Company, architects.

MacKenzie & Mann have secured an option on the entire holdings, placed at a million dollars or more, of the Pacific Whaling Company, on this coast. The capital will probably be raised in London. The extension of the operations will mean new industries, glue factories and oil refineries for lubricants, as well as illuminating oils.

West Toronto, Ont.

It is reported that the Molsons Bank intend erecting a bank building on the north side of Dundas street.

Woodstock, Ont.

Negotiations are in progress between this city and a company to be known as the Woodstock Textile Company. In return for privileges a factory will be established, in which, it is stated, \$18,000 worth of machinery will be installed. Mr. Holden, of Franklin, Pa., U.S.A., will be in charge; Aid. A. B. Welford, this city, is interested.

Winnipeg, Man.

The following tendered for construction of Bakery Building: Wallace & Akins, \$37,500; Wm. Garson, \$37,800; John McQuarrin, \$38,600; Johnson & Tusin, \$38,200; Clayton Bros., \$37,650; W. J. Davidson, \$39,000. Contractors, Shepley Construction Company, J. Woodman, architect. Amount of permit, \$70,000.

The C. N. R. will build a depot on the Oak Point branch near Portage avenue. The C. P. R. will also erect a depot on the Gretna branch in St. James, near the avenue.

The C. N. R. have a permit to construct coach shops in the west yard, \$42,000. The contract has been let to the Carter-Halls-Aldinger Company.

It is reported that the firm of Wortman & Ward, whose large factory at London was recently burned out, have bought a tract of land in the western part of Winnipeg and will build a large factory in the fall.

AWARDED.

Brantford, Ont.

Contracts have been awarded as follows for the construction of the Verity Plow Company's buildings: Warehouse, 200 by 60 feet, three storeys and basement, Richards & Pringle; blacksmith shop, 200 by 60 feet, one storey, with slate lantern roof. Eli Riddolls; paint shop, 100 by 58 feet, one storey, Eli Riddolls; core room, 50 by 60 feet, one storey, Richards & Pringle. The buildings will all be of brick. Total cost with necessary machinery, will involve an expenditure of \$60,000.

Campbellton, N.B.

B. Mooney & Sons have obtained the contract for the mason work required in the erection of a brick bank building with cut stone front to be erected according to plans prepared by F. Neil Brodie, architect.

Galt, Ont.

Shurley & Dietrich Company have let the

contract to Sibley & Miller for a two-storey brick warehouse, 80 x 44 feet.

Montreal, Que.

The general contract for the erection of the extensive shops of the Montreal Street Railway Company has been awarded to J. B. Pauze & Company. Marchand & Haskell, architects.

Mr. Walter Livermore, building superintendent, 72 Anderson street, has awarded the following contracts for the alterations and additions to St. Georges' Home: Lagache and Mansfield streets: Masonry and brick, A. E. Wand; carpentry, A. Heaton; plastering, H. Oram; plumbing and heating, W. Ware & Son; painting and glazing, E. T. Houghton.

The contract for supplying glazed terra cotta "Carrara," manufactured by Doulton & Company, Limited, London, for the new building to be erected in Montreal by the Dominion Express, has been awarded to W. Beverley Robinson, their Canadian agent. This is stated to be the largest job in glazed terra cotta in Canada.

Ottawa, Ont.

M. M. O'Connell has secured the plumbing contract for the stores of Dr. J. E. Taggart on the corner of Rideau and Little Sussex. Weeks & Keefer, architects.

F. J. Jagon & Company, Montreal, has been awarded the sub-contract for concrete work on the Rosenthal Building Sparks street, by C. E. Deakin, general contractors.

St. Catharines, Ont.

Messrs. Newman Bros. have been awarded the contract for the erection of a large new building for the McKinnon Dash & Metal Company. The new building will be 300 by 80 feet.

Power Plants, Electricity and Telephones

Blyth, Ont.

The contracts for erection of municipal telephone system have not been let. A. Elder, secretary.

Calgary, Alta.

"See "Waterworks."

London, Ont.

Tenders for erection of transformer substation will be received until August 10th. Plans, etc., at office of City Engineer. A. E. Nutter, architect; P. Pocock, acting chairman, Water Commission.

Moose Jaw, Sask.

The Moose Jaw Electric Railway Company, made up of Ottawa capitalists, has passed a preliminary order with the Loraine Steel Company for 110 tons of steel rails. John B. McRae is consulting engineer. A. Dion, Ottawa, is president of the company. The line will be about six miles long.

Moose Jaw, Sask.

See "Waterworks Awarded."

Nanaimo, B.C.

A by-law in regard to the proposition of the Dominion Stock and Bond Corporation to construct an electric railroad of twenty miles, will be submitted to the ratepayers shortly. G. H. Salmon, manager. Noted in issue of July 20th.

Ottawa, Ont.

Among the building permits taken out during the past week were: Wm. Fields Sweetland avenue, dwelling, \$2,500; N. D. Porter, Somerset street, addition and alterations to dwelling, C. P. Meredith, architect, \$8,500; W. A. and W. J. Lamb, Queen

street, warehouse, C. P. Meredith, architect, T. James, builder, \$9,000; B. P. Dewar, Wilbrod street, dwelling, Horwood Taylor & Horwood, architects, E. McCullough, builder, \$3,000; W. A. Currie, Delaware avenue, W. J. Avery, architect, P. Currie, builder, dwelling, \$4,500.

It is intimated by President D. E. Mann of the C. N. R., that construction work will shortly be commenced on the Lake Superior division of this company's line.

Point Grey, B.C.

The by-law granting the street railway franchise to the B.C.E.R. Company was carried by a small majority.

Seaforth, Ont.

Two by-laws for hydro-electric power were approved by the ratepayers on August 8th.

Toronto, Ont.

See "Public Buildings."

Victoria, B.C.

The city will purchase from the Canadian General Electric Company 60 arc lamps and a new armature and have a generator rewound for the operation of such lamps for the sum of \$3,400.

Vancouver, B.C.

See "Business Buildings."

AWARDED.

Belleville, Ont.

The Canada Bridge Company have begun work on a new bridge to be erected by the county of Hastings and the city of Belleville over the Moira river on the boundary line. The contract price is \$10,500.

Calgary, Alta.

The contract for 26 miles of track for the C. P. R. between Carmangay and Aldersyde, has been awarded to Foley, Welch & Stewart, of Winnipeg. Work will be started at once.

Cornwall, Ont.

The general contract for the erection of a residence for the manager of the Bank of Montreal, has been awarded to G. W. Lester. Messrs. Peden & McLaren, architects, Montreal.

Ladysmith, B.C.

The Hinton Electric Company, Limited of Victoria, has received the contract for the supply of all electrical materials in connection with the installation of the new Tungsten street lighting system here.

Lachine, Que.

The Bishop Construction Company, Limited, have been awarded the contract for 60,000 tons of crushed and dimensioned stone for the C. P. R. St. Lawrence river bridge at Lachine.

Montreal, Que.

The contract for excavation and masonry work, residence at Montreal West, for Mr. J. Stevenson, has been awarded to J. J. Kirkpatrick. Messrs. Peden & McLaren architects.

The following contracts for alterations to a residence on Forden avenue, Westmount, for Mr. John Ogilvy, have been awarded: Excavation and masonry, Alex. M. Ross; carpentering work, E. T. Scott; painting, R. E. Doane; plastering, Watson & Wilson. Mr. Robt. Findlay, architect.

Sub-contract for the roofing of two residences for Mrs. Clelland and Campbell, has been awarded to Sibley & Hunt, roofers Duke street. General contractors, Ward & Baldoak. Architects, MacVicar & Heriot 104 Union avenue.

Sub-contract for the roofing of eight

(Continued on page 29)

Tenders and For Sale Department

Tenders for Bridges

Tenders will be received by the undersigned until SATURDAY, 13TH OF AUGUST, for the concrete work for two Steel Bridges to be erected in the Township of Burford. Plans and specifications may be seen at any time at my office, New Durham, Ont.

PHILIP KELLY,
Township Clerk,
New Durham, Que.

32

City of Moose Jaw Saskatchewan

Sealed tenders will be received by the undersigned City Clerk until 8.30 o'clock p.m. on MONDAY, AUGUST 15TH, 1910.

Supplying materials for and laying 3286 lineal feet of 6-inch and 700 lineal feet of 12-inch Cast Iron Water Main.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw, and also at the office of the Canadian Engineer, Winnipeg.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer. W. F. HEAL, City Clerk.
Moose Jaw, Sask., July 16th, 1910. 32

City of Moose Jaw Saskatchewan

Sealed tenders will be received by the undersigned City Clerk until 8.30 o'clock p.m. on MONDAY, AUGUST 15TH, 1910.

Supply materials for and constructing approximately:

63,000 square feet of Concrete Walks.
9,000 lineal feet of combined Curb and Gutter.

6,000 square feet of Concrete Crossings.
6 miles of Wooden Walks.

Plans and specifications may be seen at the office of the City Engineer, Moose Jaw.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer. W. F. HEAL, City Clerk.
Moose Jaw, Sask., July 28th, 1910. 32

Town of Estevan Province of Saskatchewan

Electric Lighting and Sewerage

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on WEDNESDAY, AUGUST 24TH, 1910, for the following works:

Contract "A"—Pipe-laying on Storm Sewers.
Contract "B"—Power House.
Contract "H"—Two Return Tubular Boilers.
Contract "J"—High Speed Steam Engine.
Contract "K"—Electric Lighting System.
Contract "S"—Sewer Pipe.

Plans and specifications may be seen at the office of the engineers, Winnipeg, and Toronto, and at the Town Hall, Estevan.

J. G. HASTINGS, ESQ., Mayor, Estevan, Sask. L. A. DUNCAN, ESQ., Secretary-treasurer, Estevan, Sask.

CHIPMAN & POWER, Engineers,
Winnipeg and Toronto.

30

Tenders

Toronto General Hospital College Street

Tenders addressed to the Chairman of the Building Committee will be received by the undersigned up till noon

Monday, August 15th, 1910

for all the various trades required in the erection and completion of buildings for the Out-Patient Department and the Emergency Hospital in connection with the General Hospital.

Plans and specifications and all other information may be obtained at the office of the architect.

The lowest or any other tender not necessarily accepted.

DARLING & PEARSON,
32 2 Leader Lane, Toronto. 32
accepted.

Tenders

Tenders will be received by the City Clerk up to 5 p.m., TUESDAY, AUGUST 16TH, 1910, for the construction of a plain Concrete Arch, span fifteen feet, over the raceway at Presant's Mill, Huskisson Street, Guelph, Ont.

Plans and specifications may be seen and forms of tender obtained at the office of the City Engineer.

A marked cheque for \$40.00 must accompany each tender.

The lowest or any tender not necessarily accepted.

32. L. MALCOLM,
Acting City Engineer.

Town of Oshawa

Tenders are called for the construction of 4,000 lineal feet of First Class Heavy Macadam Pavement, 43 feet wide, on King Street and Simcoe Street, and 2,500 feet of Light Macadam, 32 feet wide, on Simcoe Street.

These will be received up till noon of the 18TH DAY OF AUGUST, 1910, at the office of the Town Engineer of Oshawa.

Specifications and forms of tender will be sent on application, and all applications must be made on the forms provided.

Plans and specifications may be seen at the office of the Town Engineer. The lowest or any tender not necessarily accepted.

32 FRANK CHAPPEL,
Town Engineer.

Steel Viaduct on Queen Street East

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon, on TUESDAY, SEPTEMBER 6TH, 1910, for the construction of a steel viaduct on Queen street in the City of Toronto, crossing over the River Don, and the roadways on each side, and over the tracks of the Canadian Pacific, Canadian Northern and Grand Trunk Railways, including the following approximate quantities:

Excavation (ordinary)—5,400 yards.
Excavation (trenches)—2,300 yards.
Filling—24,000 yards.
Concrete reinforced walls and footings—1,570 yards.
Concrete reinforced floor slab—880 yards.
Piling concrete—10,400 lineal feet.
Steel reinforcing rods—113 tons.
Reinforcing fabric—20,000 square feet.
Structural Steel—752 tons.
Paving (wood block)—3,010 square yards.
Paving (macadam)—9,000 square yards.
Also Railing, Waterproofing, etc.

Plans and specifications may be seen, and forms of tender obtained at the office of Bridge Department, City Hall, Toronto, or may be seen at office of "Contract Record," B34, Board of Trade Building, Montreal, Que.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer) not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties, the bond of a guarantee company approved of, as aforesaid.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.
City Hall, Toronto, July 22nd, 1910. 32

Town of Dauphin Province of Manitoba

Water Works and Sewerage Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on THURSDAY, SEPTEMBER 1ST, 1910, for the following:

Contract "A"—Labor, laying about six miles of water pipes and sewers; sub-divided into two sections.

Contract "D"—Furnishing cast iron water pipe and special castings.

Contract "E"—Furnishing gate valves for fire hydrants, etc.

Contract "M"—Labor and materials for ten miles of gravity main; sub-divided into three sections.

Contract "R"—Constructing concrete reservoir.

Contract "S"—Furnishing sewer pipes.

Contract "W"—Furnishing wooden stave pipe

Plans, specifications, etc., may be seen at the Town Hall, Dauphin, or at Engineer's offices, Winnipeg and Toronto.

No tender necessarily accepted.

R. C. SPARLING, Esq., Mayor. J. A. CAMPBELL, ESQ., Chairman.
J. W. JOHNSTON, Esq., Secretary-Treasurer. CHIPMAN & POWER, Engineers.
34

Tenders Wanted

Sealed tenders, marked "Tenders for Bridge," will be received by the undersigned for the erection of a

Reinforced Concrete Bridge

over the Saugeen River on the concession line between lots 57, concession 2 and 3, east of the Garafraxa Road in the Township of Glenelg, in the County of Grey.

Tenders will be received for work complete. Plans and specifications may be seen at the office of I. Traynor, Township Engineer, in Dundalk, or at the residence of the undersigned, lot 50, concession 3, east of Garafraxa Road, Glenelg, on and after Friday, August 5th, 1910. Lowest or any tender not necessarily accepted.

Tenders opened at the Middaugh House, Durham, on MONDAY, AUGUST 15TH, 1910.

WM. WEIR,
Deputy Reeve of Glenelg,
Durham P. O.

32

Tenders for Electric Lighting

Sealed tenders addressed to the undersigned and marked "Tenders for Electric Lighting" will be received at the office of the City Clerk, Charlottetown, Prince Edward Island, until 12 o'clock noon on SATURDAY, THE 10TH DAY OF SEPTEMBER, 1910, for supplying the City of Charlottetown with Electric Light for Street and Commercial purposes. Tenders to state price and illuminating capacity per lamp for street light, and rate per kilowatt hour for commercial lighting.

The lowest or any tender not necessarily accepted.

Further information can be obtained by applying to

W. W. CLARKE,
City Clerk,
Charlottetown, P.E.I., July 20th, 1910. 34



Tenders for Additions and Alterations to the High Level Pumping Station

Bulk tenders, or tenders for the several trades mentioned below, in connection with the above building, will be received by registered post only addressed to the undersigned up to noon, on TUESDAY, THE 16TH AUGUST, 1910,

1. Mason Work.
2. Carpenter.
3. Roofing.
4. Painting.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering, as prescribed by city by-laws, must be strictly complied with, or tenders may not be entertained.

Tenderers will submit with their tender the names of two personal sureties, or the bond of a guarantee company.

The lowest or any tender not necessarily accepted.

G. R. GEARY, (Mayor),
Chairman, Board of Control,
City Hall, Toronto, August, 1910. 35

Tenders for

Ties and Rails

for Construction of Industrial Tracks on East Bank of the Don

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on TUESDAY, SEPTEMBER 6TH, 1910, for the following materials: 20,800 feet of partly worn or re-laying rail; 400 oak ties and 4,800 cedar ties.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved by the City Treasurer), not members of the City Council or officers of the Corporation of the City of Toronto, or, in lieu of said sureties, the bond of a Guarantee Company approved of as aforesaid.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control,
City Hall, Toronto, August 6th, 1910. 33

St. Augustine's Seminary

Tenders will be received by the undersigned until 12 o'clock noon on MONDAY, THE 22ND INST. for the Steam Heating and Plumbing, and Electric and Acetelene Gas Illuminating Plant, etc., required for St. Augustine's Seminary, on the south side of the Kingston road, near Toronto.

Plans and specifications may be seen at the office of the architect, and also at the office of A. E. Freeman, consulting engineer, Continental Life Building, Toronto.

Each tender must be accompanied by a marked cheque equal to five per cent. of the amount of tender, and security to the extent of one-third of the amount of contract will be required for the faithful performance of the contract.

The lowest or any tender not necessarily accepted.

ARTHUR W. HOLMES,
Architect,
10 Bloor Street East, Toronto. 32

Tenders

for

Sewers and Sidewalks

Township of York

Sealed tenders plainly marked on the outside as to contents will be received by the undersigned up to twelve o'clock noon of MONDAY, AUGUST 15TH, 1910, for the construction of the following works in the Township of York:

982 feet Vitriolized Pipe Sewer on Spadina Road northerly from the city limits;

592 feet Vitriolized Pipe Sewer on Walmer Road northerly from city limits;

986 feet Granolithic Sidewalk on Markham Street, northerly from the city limits.

Separate tenders will be required for the works named, but bidders may tender on any one or all of the three.

Plans and specifications may be seen and all necessary information may be obtained at the office of the undersigned, 57 Adelaide Street East, Toronto.

The lowest or any tender will not necessarily be accepted.

BARBER & YOUNG,
York Township Engineers. 32

Miscellaneous

Advertisements under this heading two cents a word per insertion.

FOR SALE.—84 pieces Lackawanna Steel Sheet Piling, 22 feet long, 12 inches wide, three-eighths thick, and one 8 inch x 8 inch Buffalo Forge Company Quick Running Engine, in good condition, immediate delivery here, boat or rail.—WM. LESSLIE, Walkerville, Ont. TF

COMPLETE ARCHITECTURAL DRAWING COURSE, including drawing outfit and text books, International Correspondence School fully paid up, for sale at sacrifice.—Box 123, CONTRACT RECORD, Toronto, Ont. 32

CONTRACTOR'S OUTFIT FOR SALE.—Six Wheeler, No. 3, concrete line plant, nearly new. Owner going into another line of business. Joseph Patterson, Box 114, St. Marys, Ontario. 35

Power Plants, Electricity and Telephones

(Continued from page 27)

houses on Clarke and Montrose avenues for Preble McIntosh, Esq., has been awarded to Sibley & Hout, Duke street. General contractors, D. G. Loomis & Sons, Cote St. Paul.

Messrs. Hogle & Davis, architects, 80 St. Francois Xavier street, have awarded the general contract for the erection of a residence on Park avenue for Dr. W. J. Patterson, to Geo. W. Goodbody, contractor 2300 Waverley street.

Further contracts have been awarded by the Canadian Light & Power Company as follows: Messrs. Babcock & Wilcox, boiler equipment for terminal station at Cote St. Paul; Allis-Chalmers-Bullock, Limited, steam turbine equipment, consisting of 1,875 h.p.; John Inglis Company, contract for steel intake gates for entrance to Beauharnois Canal.

Ottawa, Ont.

The contract for the substructure of the bridge over the Saskatchewan river at the Pas Mission has been let to MacKenzie & Mann, the contract figure being \$100,000. The contract for the superstructure of this bridge, which will constitute the first link of the Hudson Bay Railway, was let some weeks ago to the Canada Foundry Company.

C. J. Burritt, architect, has charge of alterations in the residence of Mr. D'Arcy Scott, on Chapel street. Alex. Christie has the carpentering contract; F. McCullough, the masonry; John Sutherland, the plastering.

David Findley is building a fine stone residence at Carleton Place, which will cost about \$20,000. C. J. Burritt is the architect. Alex. Christie, of Ottawa, has the contract for the carpentering; Patrick McGregor, of Carleton Place, the masonry; the Modern Machine Company, of Ottawa, the galvanized iron work. The other contracts have not been awarded.

Miscellaneous

Calgary, Alta.

The Ambursen Hydraulic Company are submitting to the C. P. R. plans and estimates for the construction of a large irrigation dam at Horseshoe Bend, to cost over half a million dollars.

Hamilton, Ont.

Recent building permits include: Stewart & Witten, alterations to hotel building, Merriek street, for John Stroud, to

cost \$4,000; Stewart & Witton, alterations to store building, corner King and Hughson streets, for Thos. C. Watkins, \$7,000; Wm. Baxter, two brick dwellings, Markland, corner Hess street, to cost \$5,000.

Moncton, N.B.

The city council have decided to expend more than \$12,000 upon increased fire protection. A new fire station will be erected and thirty new hydrants installed. The purchase of a chemical engine is under consideration.

Montreal, Que.

Recent building permits include: A. Boyer, 33 Boucher, house containing four dwellings, \$3,000; R. R. Grises, Guy street, residence, \$2,500; J. Gibbs, 19 Vaillant, house containing two dwellings, \$4,500; J. Parisian, 890 St. Hubert, residence, \$2,500; Leblanc & Latour, 1171 Bordeaux, two houses containing four dwellings, \$8,000; C. Bellehurveau, 566 Visitation street, three houses, \$4,500; O. St. Denis, 2,229 St. Hubert, house containing three dwellings, \$2,500; Com. Scolaire de St. Jean de la Croix, St. Zotique & St. Laurent, church building, \$50,000; Messrs. St. Denis, 1 St. Germain, house containing two dwellings \$6,000; N. Desjardins, St. Lawrence, two house containing six dwellings, \$4,000; W. Lajaunesse & Company, 476 Berri, four houses containing twelve dwellings, \$10,000; Lo Fabrique de St. Jean de la Croix, St. Lawrence Boulevard, residence, \$10,000; G. Guilmette, 750 St. Denis street, two houses, containing six dwellings, \$3,500; A. Mongeau, 1242 Bordeaux, two houses containing eight dwellings, \$5,000; Mrs. D. Kylee, 1742 Hutchison, two houses, containing six dwellings, \$4,500; Mrs. M. Martin, 929 Logan, house containing three dwellings, \$3,000; H. Gousset, 2609 Labelle, three houses containing six dwellings, \$3,600; Mrs. J. D. Viger, L'Assomption avenue, store, \$4,000; P. Casey, 791 St. Denis, five houses containing fifteen dwellings, \$12,500; Desmond Flint Glass Company, 179 Delorimiere avenue, warehouse, \$20,000, house \$4,000; R. Rabeca, 65 Notre Dame east, house containing three dwellings, \$3,000; Dr. W. J. Patterson, Edward Charles and Park avenue, residence, \$6,000; L. O. Grothe, Cartierville avenue, alterations to warehouse, \$7,000; The Talmud Farah of Montreal, 106 Dorchester east, alterations to two houses \$5,000; City Central Real Estate Company alterations to hotel, \$125,000; St. George Society, 495 Lagauchetiere street, alterations to dwelling, \$2,500.

Ottawa, Ont.

Preliminary reports received at the public works department here indicate that surveying parties along the Saskatchewan river, for which a party was sent out some time ago, is going ahead and by the time parliament assemblies there will be available preliminary estimates of the cost of the proposed waterway for grain from Edmonton to Winnipeg. While not officially stated, it is roughly estimated that the work necessary to navigation along the Saskatchewan can be done for about \$15,000,000. This is exclusive of the construction of locks to overcome the Grand Falls. In some places the river is six feet in depth, and in others forty feet. It will require much dredging. It seems to be a sure thing that the waterway will be built and if the estimates are received in time to remove any doubts as to its feasibility a preliminary appropriation is expected next session.

Smiths Falls, Ont.

Tenders addressed to R. M. Anderson, clerk of Bathurst Township, Manion P. O. will be received until August 17th for

Rudsdale Creek improvement. Plans, etc. at office of above or at office of J. H. Moore, C. E.

Toronto, Ont.

Recent building permits include: J. H. Shales, pair semi-detached 2½-sty. brick dwellings, 22-24 Dearbourne, \$5,000; E. A. Kantel, 1-sty. brick warehouse, 189 Church street, \$6,000; A. A. Wright, 2½-sty. brick and stone dwelling, Warren road, \$16,000; W. J. O'Reilly, 8 attached 2½-sty. brick and stone dwellings, Dundas street, \$24,000; Bathurst Street Methodist Church, 2-sty. brick Sunday school, corner Bathurst and Lennox, \$30,000; A. B. Coleman, 3-sty. brick and stone apartment, \$8,000; Harris Abattoir, 3-sty. steel and wood store and cold storage building, St. Lawrence Market, \$7,000; Frank Britton, pair 2-sty. brick dwellings, Greenwood avenue, \$7,000; Weismiller & MacKenzie Bros., pair semi-detached 2-sty. brick dwellings, Pearson avenue, \$5,000; Wm. Hodgkinson, 3 attached 2½-sty. roughcast dwellings, brick fronts, Leslie street, \$5,500; Wm. Hodgkinson, 3 attached 2½-sty. roughcast dwellings, brick fronts, Curzon street, \$5,500; J. A. Simmers, 4-sty. brick office and warehouse, King street east, \$11,000; Danforth Avenue Methodist Church, 2-sty. brick church, corner Danforth and Jackman \$12,000; Free Masons' Hall, 2-sty. brick and stone hall, College street, \$25,000; J. Bodie, pair semi-detached 2½-sty. brick dwellings, Pape avenue, \$6,000; Wm. Rankin, 3 attached 3-sty. brick and stone stores and dwellings, Dundas, \$10,000; R. J. Beamish, 2½-sty. brick and stone dwelling, Roxborough street east, \$6,000; Love Bros., 2 detached 2½-sty. brick and concrete dwellings, 9 and 24 Fairview avenue, \$5,000; Wm. Pendleton, 2 pair 2-sty. rough east dwellings, brick fronts, Greenwood avenue, \$6,000; A. E. Osler, 2½-sty. brick and stone dwelling, Summerhill Gardens \$6,000; H. H. Williams, 2-sty. brick office 36 King street east, \$5,000; H. Blake, 2-sty. brick and stone addition to dwelling, Clarendon avenue, \$25,000; Shurly & Deritt, 2-sty. brick addition to factory, on Bartlett avenue, \$5,200; W. J. Dempster, 3 attached 2-sty. brick dwellings, Perth avenue, \$6,000; A. Duff, 2 pair semi-detached 2-sty. brick dwellings, Columbus, \$6,000; R. C. Vaughan (in trust), 2½-sty. brick dwelling, near Rowanwood avenue on Cluny, \$5,500; Separate School Board, 2-sty. brick addition to school, near Bloor Bathurst, \$9,000; Briggs & Beecroft, 2 detached 2-sty. and attic brick dwelling, near Empress, Jameson, \$5,800; Board of Education, 1-sty. brick addition to school, near Lowther, Huron, \$8,000; Thos. West, 4-sty. brick factory, near Frederiek, Front street east, \$15,000; E. A. Lowe, 3 attached 2-sty. brick dwellings, Symington, \$7,500; E. B. MacKenzie, 2½-sty. brick dwelling near St. Clair, Foxbar road, \$5,000; Mrs. Grafton, 2 pair semi-detached 2-sty. brick dwellings, near Bowden, Dearbourne, \$8,000; S. Percy, 3 attached 3-sty. brick stores and dwellings, corner Moscow and Danforth, \$5,500; Miss Gertrude Abner, pair 2-sty. brick dwellings, 43-45 Endean avenue, \$5,500; T. P. Stewart, 2½-sty. brick dwelling, near St. Clair, Dunvegan \$10,000; Bailey & Leslie, 4 detached 2-sty. and attic brick dwellings, near Edna, Barrett, \$14,000; D. B. Bowerman, 2-sty. and attic brick dwelling, 4 Whitney avenue \$9,000; Standard Sanitary Manufacturing Company, 1-sty. brick power house, Royce and Lansdowne, \$10,000; Mrs. J. A. McGillvray, 2-sty. brick dwelling, near Glen road, Whitney, \$10,000; Alex. Lochare, 2½-sty. brick dwelling, 19 Westminster avenue, \$5,000; C. S. Gray & Sons, 2 detached 2½-storey brick and stone dwelling, near

Garden, Glendale, \$7,000; G. W. Dale, 4 attached 2-sty. brick dwellings, 42-48 Fenwick avenue, \$6,000; H. Thomas, pair semi-detached 2-sty. brick dwellings, Emerson \$4,000; W. H. Walsh, pair semi-detached 2-sty. brick dwellings, 43-45 Endean, \$4,600; W. B. Waters, pair semi-detached 2-sty. and attic brick dwellings, Russett avenue, \$4,000; F. W. J. Hill, 2-sty. brick dwelling, Brick avenue, \$4,000; Jas. Hopbourne, pair semi-detached 2-sty. brick dwellings, 1228-30 Dufferin street, \$4,000; T. Holmes, 2-sty. and attic brick dwelling Foxbar road, \$4,200; J. W. Clare, pair semi-detached 2-sty. brick dwellings, Ossington avenue, \$4,600; Houghton & Breeze, pair semi-detached 2-sty. and attic brick dwellings, 369-371 Grace street, \$4,200; John Hoidge, 2½-sty. brick dwelling, Major street, \$4,000; Mason & Risch Company, 6-sty. reinforced concrete, brick and steel warehouse, 230 Yonge street \$100,000; Austin Construction Company, pair semi-detached, 2-sty. and attic brick dwellings, Binscarth road, \$6,000; J. E. Peterkin, pair semi-detached 2-sty. brick dwellings, Symington, \$4,000; Wm. Cayea, 2 detached 2-sty. and attic brick dwellings Sorauren, \$5,000; H. Watkinson, 3 attached, 2½-sty. brick dwellings, Hook avenue \$7,000; Weismiller & MacKenzie Bros., 3 detached 2-sty. brick dwellings, near Roncesvalles, West Marion, \$9,000; Garfunkel & Goldstein, pair semi-detached 2½-sty. brick dwellings, corner Baldwin and Augusta, \$8,000; D. A. Williams, 2-sty. brick dwelling, Westmintser, \$4,000; C. D. Easton, pair semi-detached 2-sty. brick dwellings, Prospect, \$4,000; A. Bolland, 2 detached 2-sty. brick dwellings, Binscarth road, \$10,800; W. S. Grimshaw, 6 attached 3-sty. brick stores and dwellings, 954-964 College street, \$20,000; W. B. Galbraith, one 2-sty. and one 2½-sty. brick dwelling near Highland, Glen road, \$8,000; H. W. Campbell, 2½-sty. brick dwelling, Annette street, \$4,900; Toronto Auto Garage Company, 2-sty. brick and steel garage, 21 Dupont street, \$20,000; Separate School Board, 2-sty. brick addition to school, Bolton avenue, \$9,000; Hugh McWilliams, 2 pair semi-detached 2-sty. brick dwellings St. Helens avenue, \$11,000; E. Stone, pair semi-detached 2-sty. brick dwellings, 769-771 Shaw street, \$4,000; J. H. Lennox, 2 pair semi-detached 2-sty. brick dwellings near Woodbine, Hartford, \$8,000; J. J. Walsh, 4 detached 2½-sty. brick dwellings 16-22 Star ravenue, \$10,000; Geo. T. Lee 2-sty. brick dwelling, near Conduit, Woodville, \$4,000; R. O. Dickson, pair semi-detached 2-sty. and attic brick dwellings corner Empress and Starr, \$4,400; J. J. Tracy, pair semi-detached 2-sty. brick dwellings, near Bloor, Lansdowne, \$4,600; Mr. Goldstein, pair semi-detached 2½-sty. brick dwellings, 90-92 Esther street, \$4,600; Miss Wilhelm, pair semi-detached 2½-sty. brick dwellings, Carlaw avenue, \$4,000; J. H. Stanford (in trust), 3 pair semi-detached 2-sty. brick dwellings, 1229-1239 Bathurst, \$12,000; Mrs. S. Armitage 2-sty. brick dwelling, Sunnyside and Geofrey, \$4,000; Nasmith Company, Limited 2-sty. brick factory and stables, Duchess street, \$60,000; John Morrison, 4-sty. brick apartments, 603 Jarvis street, \$20,000.

Victoria, B.C.

Recent building permits include: Victoria School Board, repairs to South Park school, \$3,300; S. E. Matthews, dwelling Richardson street, \$4,000; Thomas MacLaughlin, dwelling, Clarence street, \$3,000

Winnipeg, Man.

Tenders will be received by W. H. Field until August 19th for purchase of \$10,000 six per cent., 20-year debentures of the Swift Current school district.

Contract Record

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Toronto August 10, 1910

No. 32

Foreign Plans for Canadian Work

The majority of us are in favor of fair competition and listen very often with little sympathy to the whinings that go up from so many quarters whenever a contract finds its way across the border. At the same time, however, there must have been occasions of late when the murmurings reached us more responsively; when it has seemed that there was a most unfortunate lack of consideration for Canadian building interests.

It is difficult indeed at times to understand why an American architect or engineer is entrusted with the plans for some particularly interesting work. The difficulty lies in reconciling such a course with the facilities we have for turning out good men and with the numbers of good men that are turned out. Readers of this journal are concerned with the question mainly because when a set of plans are prepared by an American architect or engineer; it is almost a foregone conclusion that an American contractor will get the work—not so much on account of favoritism or prejudice as owing to the advantage an American contractor has in interpreting American plans and American specifications. Whether the advantage is as great as is represented by Canadian contractors, it is hard to say, but certain it is that the chances of the Canadian contractor can be discounted 50 per cent. when an American practitioner is employed.

One reads articles both in the daily and in the technical press the prevailing idea of which is that Canadians should be employed by Canadian institutions from motives of loyalty to the country which has yielded produce and riches to those institutions. We cannot see eye-to-

eye in this unless it can be shown clearly that our constructive talent is equal to that of any other country.

To our way of thinking, it is not a case for dickering over patriotism, loyalty to home institutions and so forth. We must succeed on our merits and when it comes down to business, in these days, one can afford to be neither patriotic nor philanthropic. It is the best work for the best figure that is required every time. The question that presents itself to us is whether our engineers, our architects and our contractors are getting a fair chance on the occasional plums offered in the Canadian field or whether they are overlooked on the assumption that they are not properly equipped or not sufficiently trained to carry out important work. From the records of dozens of firms in each of the lines mentioned the alternative falls to the ground. We have men, the brains and the capital to design and execute to the very best advantage any kind of engineering or building problem that may turn up in Canadian territory. And that is saying something. Across the border they are also well equipped, but the advantages are with the men who are already in the field and who by birth and training or by years of association have learned to anticipate to some extent and to plan for these projects.

Patriotism and philanthropy are very beautiful, but they play a small part in business. It is shrewdness, tact, foresight, hard-headed common sense and the ability to recognize value for value that count. To what extent those responsible for the award of a few recent contracts are endowed with these qualities it is hard to estimate. There are some who can learn nothing but by experience and it may be that those referred to will discover before long that they have purchased the jewel "at an infinite rate."

The city of Vancouver is facing the problem of providing a better means of dredging hardpan. Much difficulty has been encountered of late in the construction of sewers on account of the depth of hardpan which has to be blasted. A plant for the dredging of hardpan would cost approximately \$15,000. This plant would do as much work as 100 men and it is believed that sooner or later the city will have to purchase one.

Construction work upon the new Toronto General Hospital will be commenced early this fall and will be continued steadily through the winter. It is confidently expected that the work will be proceeded with throughout the winter without any interruption and that the cut-patient and emergency departments will be ready for occupation by the spring of 1912.

The city engineer of Hull, Que., has issued strict instructions that in future all buildings erected must comply completely with the city by-law regarding fire protection. In future, permission to build will not be given unless the plans and specifications are in conformity with the fire protection clause of the city by-law.

Stave Lake Hydro-Electric Development

Engineering and Constructural Features of the Work—Advantages of the Sluice Dam — Details of Methods and General Progress

Stave Lake is situated about 36 miles due east of Vancouver, B.C., and about 12 or 15 miles north from the Fraser river and the main line of the Canadian Pacific Railway. The lake is some 10 miles long, and its source is mainly the Upper Stave river, flowing in from the north; but other streams of smaller size also contribute to the lake supply. The snow-and-ice sources, at elevations not to be materially denuded of their natural



Stave Lake—Stop Log Dam under construction.

forest growth, nor to be polluted by the progress of civilization for generations to come, if ever, afford permanence of volume and consequently enhanced value to the outflowing Stave river, upon which a hydro-electric power plant is under development at the Falls, some six or seven miles below the lake outlet, and only six miles from Ruskin station on the Canadian Pacific Railway, the point where the Stave empties into the Fraser river.

The scheme decided upon by the engineer was to erect a concrete dam across the westerly channel at the crest of the falls, the structure to contain steel-cased apertures, or bell-mouth inlets, for steel flumes about 250 feet long, to lead downward over the slope or bed of the falls, to a power house to be built across the channel at the foot. The effect of the dam would be entirely to stop the westerly flow, excepting that quantity to be conveyed through the flumes and utilized in driving the turbines. Another part of the scheme provided for a sluice dam, also of concrete construction, to be built across the easterly branch, at a point about 100 feet upstream from a projected line of the intake or westerly dam, the two dams to be united by a concrete wing dam paralleling the general line of the river, and dividing the forebay, from the run of water wasting through the sluice dam.

After removal of a heavy log jam of huge and medium sized logs and trees, accumulated at the entrance of the westerly channel, between the head of the island and the westerly shore, various obstructing rocks were blasted from the river bed and shores, between the temporary dam and the crest of the falls. The purpose was to pre-

vent a recurrence of timber jams, and to enlarge this smaller channel sufficiently to take care of the greatest known summer flow when later on, the temporary dam should be removed and the entire run of the river turned in during stoppage by temporary dam, and enlargement of the easterly channel, and the construction of the massive sluice dam piers in its bed.

The plan provided that the dams be built some 34 feet above river bed elevation, creating, with tail race excavation, from 90 to 95 feet effective head. That elevation of dam also provided for a lake storage of from 6 to 7 feet depth above normal lake level. Reorganization of the company and the enlargement of its financial scope led to increasing the height of dam to an elevation for 100 feet working head, and changing the plan from five units of 6,000 h.p. each, to one of four units of 10,000 h.p. each, in addition to two independent exciter units in either instance. With the enlarged storage capacity at the lake and the greater working head at the power house, the plant when completed will be in a position to market 40,000 h.p. at lowest stage of river flow. The storage of water controlled by the present height of dam amounts to between 12 and 15 square miles of area. Provision has been made for further increasing the elevation of dam and lake storage, to yield at least another 10,000 h.p. when required.

A leading feature in the hydraulic scheme is the sluice dam and its stop-log system. Four concrete piers are erected in the enlarged bed of the easterly branch of the stream. An abutment pier at the easterly shore and the wing dam at the westerly (on the island), together with the piers, form five sluices, varying in depth from 32 to 37 feet, and having uniform width of 22 feet each in the clear. Stop-log checks, of steel, are formed in the piers, abutment and wing dam, 12 inches deep and 18 inches wide, and extending from top to bottom of the sluices. The bottoms of the sluices are of concrete and each has an anchored sill of British Columbia fir embedded to within an inch of its top face. The sills are 24 inches square and extend across the sluices from back



Stave Lake—Up-stream side of Stop Log Dam—Travelling Stop-Log Winch shown on left side.



Stave Lake Sluice Jam—Up-stream side without Stop Logs.

to back of the stop-log checks. The stop-logs are likewise of fir, bolted together in pairs, each log having a depth of 16 inches (32 inches to the pair), and a length of 23 feet 10 inches. The widths vary from 24 inches for those near the sluice bottom, to 16 inches for those near the top.

A pair of travelling winches (shown in view), operated by electric motor, or by hand in case of emergency, move along a track over the piers, from sluice to sluice, and insert or remove the stop-logs as may be required. The winches are capable of manipulating the stop-logs in any one sluiceway, regardless of the depth or swiftness of water flowing through, and lift out or insert the lower stop-logs with the same precision and effectiveness as the upper ones.

The river is subject to sudden fluctuations, the surface elevation rising sometimes as much as twelve feet within 48 hours, and the total variation is over 16 feet between extreme high and extreme low water. The elevation of the lake surface is likewise subject to as great variation, under natural conditions. In designing a dam to give such excessive and quickly required vent and yet capable of controlling the greatest possible proportion of the water, it was clear that some type more economical than the ordinary overflow dam and more certain of action than the common waste-gate style, must be adopted where British Columbia fir trees in their entirety, logs, shingle bolts and debris, are frequently afloat and on the rampage. The simplicity and liberal discharging capacity of a sluice dam to comprise five sluices, each 22 feet wide in the clear, and over 30 feet in depth, and equipped with staunch wooden stop-logs reliable for quick removal and as quick replacement, was deemed the solution of the problem.

The concrete piers for the sluice dam were built in the summer of 1907. They are strongly anchored to their rock foundation, are reinforced with steel and protected with half-inch boiler plate nosings. The intake dam, the power house and excavation of tailrace, as well as construction of a spur line of railway from the C.P.R., are all works now in hand. The steel flumes from the intake dam will be 14½ feet internal diameter, with two independent flumes of smaller diameter for the exciter drives. The headgates of flumes are planned to be of the pivotted type and of steel construction. Stop-logs will also be provided for emergencies.

The purpose of the plant is to generate electric power for transmission to Vancouver, New Westminster, and

other centres, for operating tram lines, industrial plants, and for furnishing light, etc.

The work was commenced and actively carried on for some three years by the Stave Lake Power Company, Limited, but has been taken up by the Western Canada Power Company, of which Mr. C. H. Cahan, of Montreal, is the president, and Mr. John Hendry, vice-president; Mr. R. F. Hayward, general manager and chief engineer, and Mr. Wm. Kennedy, C.E., of Montreal, consulting engineer.

Architectural Use of Concrete

The extensive use, during the past decade, of reinforced concrete in engineering and architectural construction has occasioned much discussion as to the rational architectural handling of this composite material. In a recent issue of the "Architects' and Builders' Journal" (London, Eng.) such a discussion appears containing conclusions with which it is difficult to agree. The contention that Gothic tradition is excluded as a source of inspiration seems unwarranted. If the author of the article referred to confines his assertion to the English conception of Gothic his conclusion becomes narrow as well, for the spirit of mediæval architecture reached Great Britain only in its decadence and, therefore, very inadequately presents its governing motive. In France, Gothic architecture is a true reflection of the struggle of the Christian Church to establish an enduring system of government which should be all-embracing, recognizing as paramount the spiritual, but not forgetting the worldly and spectacular. The buildings it produced are the most mysterious and, except some of the be-jewelled palaces of India, the most spectacular works of existing architectural art. The effect they produce is of infinite aspiration with their towering vertical lines, their vast unobstructed spaces with isolated points of support and lofty vaulted ceilings. The richness of their visible portions is to be ascribed to the tendency of the Middle Ages to individual effort in art. Therefore, they were built of stone which could be readily set in place, richly moulded and carved, and refined and added to, subsequently.

There seems no fundamental reason given the highly organized building system of the Romans with its armies of slaves and supposing as contemporaneous with it the religious ideals of mediæval times, why the Gothic cathedrals could not have been built by the Romans in concrete, in the use of which they were so expert. The result would, of course, have borne a different superficial aspect, but one can imagine nothing that could make the assumption untenable. How much more possible and more desirable then, are the governing principles of Gothic for contemporary inspiration in the architectural treatment of concrete when we have perfected a system taking advantage of the structural and plastic qualities of the material and making good its deficiencies by the addition of another element which possesses the one structural quality absent in concrete, the ability to resist tensile stress.

For reasons not brought out in the foregoing a Gothic cathedral in reinforced concrete might perhaps present undesirable aspects, but the value of Gothic principles in the handling of reinforced concrete in solving contemporary structural and artistic problems seems undisputable.—American Architect.

Great quantities of asphalt are reported to have been discovered in the region about Fort McMurray in northern Alberta.

Installation of Hot Air Furnace Heating

**Recommended Practice for the most Satisfactory Results—
Economy, Durability and other Points in Favor of the System**

The health and comfort—and, we might also say, the peace of mind—or the inmates of a building, depend to a very large extent on the adoption of a proper system for heating and ventilating the structure. This is true of the small house as well as of the large, of the skyscraper as well as the bungalow, and of the concrete house as well as that built of stone or brick or wood or other structural material. An efficient and economical installation for warming the structure equally, and at the same time keeping it constantly furnished with an

and comfortable home at all times, regardless of varying climatic conditions.

Air is a good insulator; and in building outside walls, provision should be made for "dead" air spaces. If of frame construction, the outer wall should be lathed and plastered tightly on the inside. The studding should be sheathed outside and the sheathing carefully covered with a good quality of building paper. A poor grade of paper is useless at any price. This surface should then be tightly and securely covered with shingles, matched siding, or clapboards. In a particularly cold climate, it is well to sheath the inside of the studding and "furr out" before lathing and plastering. Brick walls should in every instance be "furred out" on the

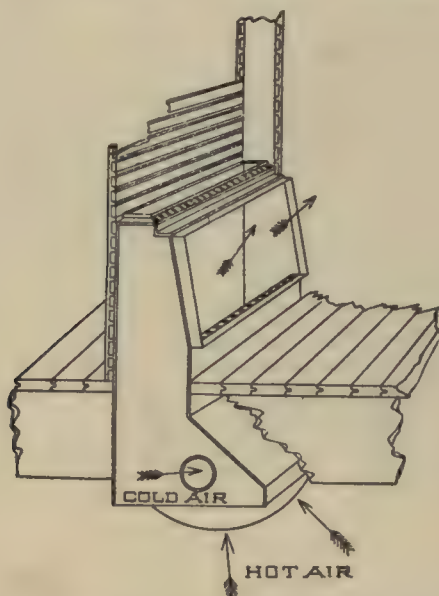


Fig. 1—Wall Prepared for Side Wall Register (Double Pipe)

adequate supply of fresh air—for these two functions are very closely related—is a matter of vital importance. Every home-builder and home-owner, everyone engaged in or interested in building construction, should understand at least the elementary principles involved in the selection and mechanical installation of a good heating and ventilating system.

Time was, and that not so long ago, when the builder gave little or no attention to the proper heating of a structure until every other part of it had been provided for. Now, however, the question "How shall I heat the building?" or "What type of apparatus shall I use?" is considered along with those relating to the other features that enter into the construction of the building, and the heating plant is arranged for as soon as the building plans are matured.

Build Warm

In providing for the installation of a modern heating apparatus, there are some features of building construction which should have the careful attention of the builder. The colder the climate, the greater the necessity for constructing the building in such a manner as will enable it effectively to resist the cold weather. The small additional sum required to make all parts of the structure tight, sound, and capable of resisting and excluding the cold, is, in a comparatively short time, more than refunded in the saving on fuel bills, to say nothing of the satisfaction of having a warm

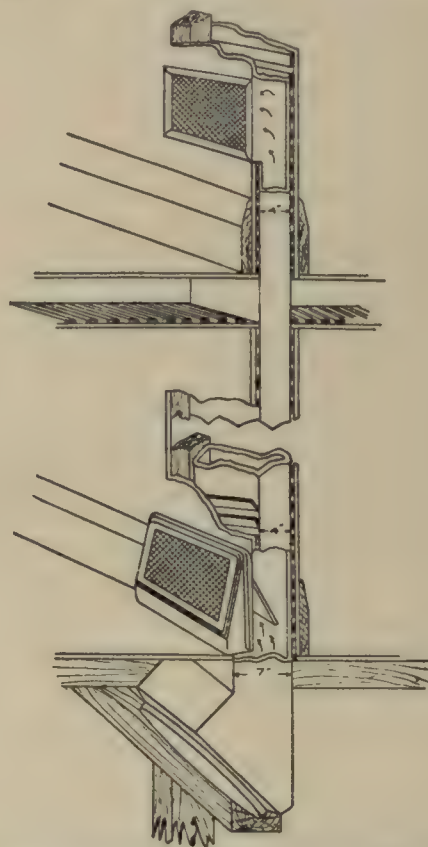


Fig. 1—Stack Supplying First and Second Floor Registers

inside; and in cold climates the use of double windows and storm doors is particularly advisable.

The efficiency and the economical operation of the heating apparatus will depend largely on the accuracy with which the above suggestions have been carried out.

Advantages and Abuse of Hot Air Heating

There are sound and substantial reasons why the warm air furnace has so long retained its supremacy as a heating medium.

The advantage over steam or hot water or stoves is a pure, fresh warmed air (when the fresh air inlet is taken from out of doors) that in a properly constructed apparatus transforms the Arctic temperature without to a June day's balmy atmosphere within. Another great advantage is that no large, unsightly radi-

ators cumber the room, take up valuable space, destroy carpets, spoil floors, and gather quantities of dirt and dust. And lastly, the cost is less than by any other system.

But heating with a warm air furnace has suffered at the hands of its friends as well as of its enemies. The fact that, unlike steam or hot water, it will still work even when poorly installed, or that a cheapened construction, omitting many of the essential features of a good furnace and using inferior material, does not entirely overcome its usefulness instead of being considered as it should be as a favorable argument is actually brought forward to condemn its use.

Cheap competition work incidental to large building operations where several houses or groups of houses are

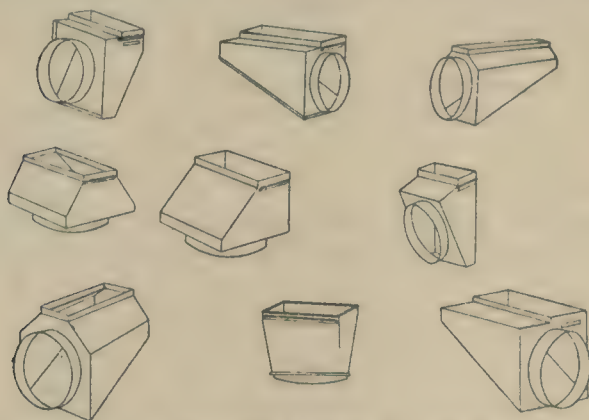


Fig. 3—Correct Forms of "Boots"

erected collectively in rows or in pairs and offered for sale by the builders—"operation work," as it is called—has resulted in the placing of thousands of furnaces too small in capacity to operate properly, and of so cheap a construction as to be practically worthless after a few season's use.

The cold air box may be omitted entirely, or, as is true in a large number of instances, be very poorly constructed, and there will naturally be complaints that the registers are dusty inlets and the system a dirty nuisance, but the fault is not in the system, for it works (heats) in spite of the defective air. While if a warm air furnace of the right size to properly warm the building is correctly installed, the air supplied will be healthful and pleasant. The proper preparation of a building for the installation of a furnace begins with the foundation, as the chimney for the use of the apparatus should be located in such a position that the furnace may be set well towards the north and west sides of the cellar or basement. The furnace should be placed in this position in order to have the shorter warm air pipes serve the colder part of the house, as it is extremely difficult to force warm air towards the north or west through piping of exceptional length.

Under ordinary conditions the furnace should be set not more than six feet distant from the chimney flue. It is far better, however, to double the length of the smoke pipe in order to be able to locate the furnace toward the west or north, than it is to double the length of the hot air pipes, if either one of these two contingencies arises.

Size of Furnace Required

Having determined upon the installation of a furnace, the first thing to consider is the size necessary. For arriving at this conclusion, there are several methods that can be adopted. We shall assume that it is desired to have an apparatus of sufficient capacity to heat all rooms (excepting the kitchen) to 70 degrees

F. in zero weather. An excellent rule formulated by Mr. Charles S. Prizer is as follows:

"Find the cubic feet of space in room by multiplying the length by the width, and this product by the height. To the actual cubic feet of space in the room, add 75 cubic feet for each square foot of glass surface (outside doors to be figured as glass), and 8 cubic feet for each square foot of outside or exposed wall surface. For either a northern or western exposure, add 10 per cent. to the glass surface and 10 per cent. to the wall surface. For either a southern or eastern exposure, deduct 10 per cent. from the exposed glass and wall surface. Should double doors or storm doors be used, count outside doors as exposed wall instead of exposed glass surface. Add together the figures for all rooms to be heated, and the total will be the equivalent cubic feet of space to be provided for by the furnace."

This rule, it will be observed, takes into account the various exposures of each and every room. In the event of the house being located in a section where a temperature of 10 to 12 degrees above zero is the extreme degree of cold weather, 10 per cent. may be deducted from the "equivalent cubic feet." For locations where the extreme degree of cold weather is 10 degrees below zero, add 10 per cent. to the equivalent cubic feet; for 20 degrees below zero, add 15 per cent.; and for 30 degrees below zero, add 20 per cent.

Select a furnace having one square inch of grate area for each 150 equivalent cubic feet of space to be heated.

Location and Size of Registers and Flues

Registers should be located along or in the inner walls of each room. All cellar pipes should have an upward pitch of not less than one inch to the foot, and as much more as possible. There is no exception to this rule. Never mind if the bay window is at the opposite side of the room; get the warmed air into the room with just as short a pipe and as few bends as practicable. Formerly it was considered good practice to use floor registers for all first floor rooms, and wall registers for the rooms above the first floor. However, the recent introduction of the improved side-wall register has changed this former idea. By the use of this type of

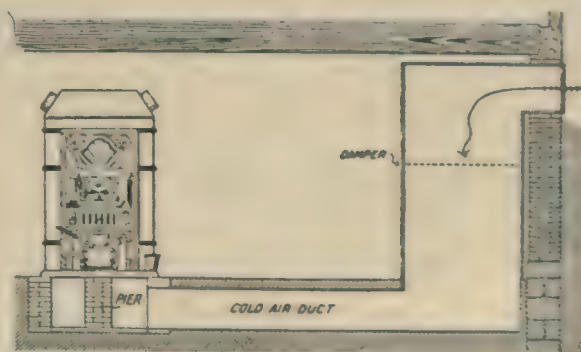


Fig. 4—Arrangement of Cold-Air Reservoir and Duct

register in a 3 or 4-inch wall, opening for a flue at least 7 inches deep is obtained by cutting out 2 inches of the floor. This, altogether with the space of one inch occupied by lath and plaster, gives a flue three inches deeper than the studding, and allows the placing of an effective register for warming first floor rooms. In a similar manner a single flue can also be made to heat a first and second floor room, thus simplifying the piping system and lessening the number of pipes in the cellar.

There is much to be said derogatory to the use of the floor register. It is a dust and dirt collector; it frequently interferes with the desired placing of furniture

and often necessitates the cutting of carpets. All these adverse conditions are obviated by using the side wall register. Fig. 1 shows the wall prepared and the opening cased ready for the insertion of the cast iron register frame. Fig. 2 shows a stack supplying the first and second floor registers. The double "safety" wall piping is used in both these figures. Note that by this arrangement, as cited above, the depth of the flue supplying the first floor is 7 inches. A baffle-plate divides the flow of warm air, furnishing each floor with its proper proportion of heat.

The fitting at the bottom of a stack, or vertical duct, supplying a register, is termed a boot. The round pipe in basement conveying hot air from the furnace is connected to a boot which must be so arranged as to receive the full volume of this round pipe and distribute it to the riser with the least possible amount of friction. A variety of designs are therefore necessary to answer suitably certain requirements, and fig. 3 shows a number of correct forms.

The fitting at the top of a riser or flue is termed a flue head or register box. These are made in a form to supply a single register, or they may be so arranged as to be suitable for supplying registers on opposite sides of the partition.

In the running of all furnace piping, abrupt bends and acute angles should be avoided, so that the heat-carrying pipes may offer the least possible amount of friction or resistance to the flow of warm air through them.

All hot air pipes should be covered with asbestos paper, or, better, with asbestos air-cell covering. Another type of furnace piping, especially desirable for partition piping, being required by law in some cities, is called safety pipe, and is of double construction with an air space between the two layers of metal. A small opening through the outer pipe in the boot admits cellar air.

The accompanying table will give the measurements of registers necessary for supplying certain sizes of rooms, the sizes of the round pipe in the basement conveying warm air from the furnace to the boot. In all cases where two or more rooms are heated from one pipe, this pipe must have sufficient capacity to carry the required amount of warm air for all rooms served by it, according to the information given in the table.

SIZES FOR FURNACE PIPES AND REGISTERS.

Size of Room (Cubic Feet of Space)	Size of Room (Floor Space If 10 Ft. Ceiling)	Size of Round Pipe in Cellar	Size of Register and Register Boxes	Area of Open Space in Register (Bars Removed)
500	6x 8	7 in.	6x 8 in.	35 sq. in.
850	8x10	8 in.	8x10 in.	45 sq. in.
1,000	9x11	8 in.	8x12 in.	55 sq. in.
1,250	10x12½	9 in.	9x12 in.	60 sq. in.
1,650	12x14	9 in.	10x12 in.	70 sq. in.
2,000	12x17	10 in.	10x14 in.	80 sq. in.
2,300	14x17	12 in.	12x15 in.	115 sq. in.
2,600	15x18	12 in.	12x17 in.	120 sq. in.
3,000	15x20	14 in.	14x20 in.	156 sq. in.
4,000	20x20	16 in.	16x24 in.	210 sq. in.
5,400	20x27	18 in.	20x24 in.	270 sq. in.
7,000	20x35	20 in.	21x29 in.	340 sq. in.

No hot air furnace will do its work properly unless provided with an adequate cold air supply. In the cheap form of installation it is invariably noted that the furnace is supplied with basement air through a fretwork base of the furnace. Aside from showing poor practice, this method creates an unhealthful condition. Air from outside the building itself should be used and the neces-

sary supply should, if possible, be admitted from the north or northwest sides. A cellar window may be utilized for the purpose. Just inside the cellar window or other similar suitable opening, the cold air duct should be enlarged to about three times the required capacity. From the bottom of this duct the connection with the furnace may be made, the pipe running either below the floor of the cellar or above it, according to circumstances surrounding the installation. This large duct forms a reservoir for the accumulation of cold air, and this reserve supply prevents prevailing high or variable winds from interfering with the steady flow of air to the furnace. Fig. 4 will illustrate this idea. The outside entrance to the opening should be protected with a coarse wire screen fastened in a permanent manner.

In size, the cold air duct should have three-fourths of the area of all heat pipes leading from the top casing. For example, let us assume a job having:

One 8-inch heat pipe, capacity	50 sq. in.
Two 9-inch heat pipes, capacity	126 sq. in.
Three 10-inch heat pipes, capacity	284 sq. in.

Total 410 sq. in.

Here the total area of the heat pipes is 410 square inches. Three-fourths of this total capacity is 307 square inches; therefore the dimensions of the cold air duct should be 12 times 25 inches or 300 square inches.

Whether the furnace should be set over a pit or whether the air supply should be connected at the ash pit level is a matter of divided opinion. If set over a pit, the heating contractor should make sure that there is no liability of water filling it, as that would shut off the supply of air. He must also see that the connecting duct is carefully laid, and either bricked or cemented on the bottom and sides, with a dust-tight cover. It is also advisable to have a suitable manhole through which one can enter the duct, so as to occasionally clean out any accumulated dust or other refuse.

If a duct above the basement or cellar floor is used, it should by all means connect directly at the back of the furnace. This ensures a more even distribution of the air to all the pipes.

One further word of caution: Do not take the fresh air supply from a point liable in any way to contamination by sewer, drain or stable air. Neither is it wise to take it through an inlet that opens into a narrow passage between two buildings, or between a house and a tight board fence. The winds circulate through such passages with high velocities, and often act on the air within the heater, as the jet of air in an atomizer does upon the liquid in the bottle, simply syphon it out.

A very successful method of warm air heating takes no fresh air from without, but circulates the air within the building by means of one or more ducts leading from the heated rooms back to the base of the furnace.

The enthusiastic advocate of this method cannot emphasize the ventilating features of warm air heating, but he is safe in saying that it is just as sanitary as direct heating by either steam or hot water.

The practice common in many sections of taking the air supply from the cellar cannot be too strongly condemned. No one would think of sleeping or eating in the cellar, yet many thoughtlessly are taking the cellar air with its attendant dust and contamination and, after heating it, using it as the living atmosphere of the occupied apartment.

Doctors and scientific experts all agree that a constant supply of fresh air is absolutely necessary. With a good warm air furnace of ample size and properly located, a constant supply of pure, fresh air is furnished at all times and every room and hall is well heated.

Incompleteness of Plumbing Specifications

There is nothing entering into the construction of the modern building which is more intimately associated with the health and comfort of its inmates than the plumbing. Under this general term is included the drainage from and water supply to the fixtures, the proper arrangement of all traps and vent lines, the heating of the water and the apparatus therefor, the proper installation of all plumbing fixtures, and such mechanical appliances as house and fire pumps, suction and supply tanks, etc.

The plumbing system for a building may be very aptly compared with the circulation and intestinal systems of the human body. The water supply lines are the arteries which carry the life giving fluid to the remotest corners of the structure; the sewers the intestinal canal through which the waste matter is discharged.

Architects' Plans Lack Information

Notwithstanding the important bearing of the plumber's work it is, as a rule, given very little study by the average architect in the preparation of his plans and specifications. He will elaborate most exhaustively on his construction and materials which go to make up the superstructure, making numerous full size detail drawings of doors, windows, interior and exterior trimmings and decorations, but when it comes to the plumbing, the most important of all from the standpoint of health and convenience, he is woefully lax in his instructions to the plumbing contractor. And it is greatly to the credit of the much maligned plumbing trade that such good work is produced with such meagre assistance as the plumber gets from his plans and specifications.

The architect in drawing up his contracts usually stipulates that the plumbing must conform to the drawings and specifications, which would necessarily imply that the drawings and specifications contained all the information that might be necessary for the plumbing contractor to not only give an intelligent figure on the work required, but also to carry out his contract in a manner to ensure the very best results obtainable. But let us turn to those same drawings and specifications, and what do we find? The average building plans show us a toilet room located here, a sink there, lavatories scattered promiscuously, with a few lines on the basement plan to indicate the general direction of the sewer, but nothing more. It is up to the plumber to figure, if he can, how he is to reach the various fixtures with his lines; where to locate his water heater, pumps, tanks, etc.; where to install his risers and vent lines, and how he is to keep out of the way of the steel contractor, the heating contractor, the electrician, the sheet metal contractor, and, in fact, every other artisan on the job; for it seems to be the generally accepted rule that the plumber must give way to all of these more favored trades and crowd his work into impossible out of the way places, working under handicaps which would hardly be tolerated in other lines of building construction.

On the drawings he finds not a line to indicate where his water lines are to go or the size thereof; and as for locating his basement machinery, let him get along with whatever space the other contractors have no use for. The incomplete nature of the drawings is oftentimes to some extent recompensed by a carefully detailed specification, but, unfortunately, the specification is generally indefinite and inadequate, abounding in such terms as "pipes of ample size," "valves satisfactory to architect," "water heater of sufficient capacity," etc., thereby placing upon the plumber almost the entire responsibility

for the designing and proper working of the system, and woe betide him should his judgment be at fault.

Meagre Details Prevent Close Figuring

A case in point came to the writer's notice not long since. A large building involving more than the usual amount of plumbing was designed, and plans were submitted to some half dozen plumbing contractors with a request for bids on the work. Beyond showing the location of the various toilet rooms and the fixtures therein, there was not a line in the drawings to guide the bidder, and, as for specifications, there were absolutely none, each bidder being requested to submit his own specification with his bid. Each of the bidders, after spending a great deal more time in figuring the job than would otherwise have been necessary, submitted his proposition, but all to no purpose, as such a wide variation of ideas was found and such a lack of uniformity in the cost of the work that the designers were compelled to readvertise for bids on a uniform and carefully drawn plumbing plan and specification.

What Plumbing Plans Should Show

The plumbing for a building should be so indicated in the drawings and described in the specifications as to cover everything required, and so clear and concise as to be readily understood by the average plumbing contractor. The positions of all mechanical appliances in connection with the plumbing should be clearly shown upon whatever floor plan such appliance may be located. All runs of piping through basement, together with the size of same, should be concisely indicated in the basement drawing. House traps, bell traps, area drains, sump pits, conductor lines, etc., should be located beyond dispute.

In addition to the plumbing lines shown on the plans there should be prepared a riser diagram showing the serving of each and every fixture on each floor of the building. This riser diagram should show clearly all water lines, waste lines, soil lines, vent lines, fire lines, etc., at each and every floor throughout the building, giving the relative position and arrangement of the waste and vent lines for each fixture with the sizes of all lines plainly designated. Pipes of the various characters can be indicated by different kinds of broken or dotted lines, with a properly arranged index on the drawing, showing the kind of service each line performs.

Where there are groups of fixtures, and where it is desirable to show connections to pumps, house tanks, filters, etc., it is advisable to prepare, on a larger scale than is ordinarily used, a detailed drawing showing the exact arrangement of all piping, together with all fittings, joints, valves, traps, etc., but where the plumbing is ordinary straight and simple work such detailed drawing may be omitted.

The specifications should indicate in the clearest possible manner the quality of the materials to be used and the method of installation. The location, size, depth and general direction of the street sewer, if there be any, should be clearly described, and if there be no street sewer, the final disposition of the sewage should be given in detail.

The location and size of the city water main from which the water supply is to be taken should be plainly stated along with the water pressure at source of supply. This information can be obtained in any well regulated municipality, where it is always kept on file. The specification should list accurately the number of each style of fixtures to be located on each floor of the building and should give such an accurate and detailed description of such fixtures and the trimmings as to leave no doubt as to what is desired.

Builders' Grievances — Real and Unreal

With Special Reference to the former—One-sided Contract Clauses—Insufficient Time Limits—Unreasonable Delay in Settlement of Accounts, etc.

Evidence from time to time turns up as to complaints which the building trade make in regard to the treatment which they either do actually receive, or which they think they are liable to receive, at the hands of architects and building owners, under certain circumstances, in connection with the carrying out of buildings, says a writer in the "Architects' and Builders' Journal." Some of these are very real grievances, injustices which ought not to be countenanced at any time; some of them, we are inclined to think, are to some extent imaginary, in the sense at all events that they are possible rather than probable. It may clear the ground a little if we consider some of the points that have come under our notice from time to time, not solely from the point of view of either architect, builder, or building-owner, but with the endeavor to represent impartially the claims of each.

Difficulty of Finding Good Workmen

The first subject on our notes is not a grievance against any person or persons, but against things in general. It is said that there is an increasing difficulty in finding the means of maintaining an adequate supply of such skilled workmen, and that builders are anxious as to workmen, who have become more and more scarce with the decline of the apprenticeship system. And truly, on this head, it is difficult to find any consoling words, or to offer any suggestions. Technical schools, it is said, do not meet the requirements. There are not enough of them in this country at present, in any case, to supply the demand as far as numbers are concerned; but the experience of employers seems to be that the lads who come out of such institutions as the London County Council training schools, for instance, however their instruction may have fitted them to work out the problems set them in the schools, have not the faculty for turning their hands to actual building work. It would be of interest to know whether this is the same in Germany, where technical schools are more numerous, larger, and possibly better equipped than in England. But we doubt if the best technical school will really make a workman, though it may give him a better general understanding of principles of construction than he would otherwise have. The only real remedy seems to lie in an endeavor to revive the apprenticeship system—an endeavor which, on general grounds, would evidently receive the sympathy and might count on the support of many people, outside of the actual building trade, who are anxious for the well-being of the country and for the adequate practical instruction of boys of the artisan class.

By-laws

The Federated builders claim that it would be advantageous to call them into consultation when by-laws are being revised, and that for want of this by-laws are passed which are inconvenient and oppressive, as well as unpractical. We should be in favor of such societies being asked if they had any suggestions or criticisms to make, mainly in fairness to themselves, since they would be the persons at whom a new set of by-laws would be mostly aimed. But for that very reason they must remember that they are interested parties whom

the new legislation would chiefly affect, and they could hardly expect, therefore, that their judgment could have the same weight as that of persons who were acting solely in the general public interest. Apart from this, the idea is a reasonable one, and we should support it.

Tenders

It is said when the lowest tender is not accepted, builders find it difficult to rid themselves of a suspicion that the tenders have been invited with the object of checking the figures of some favored firm for whom the job was originally intended. That we should regard as one of the wrongs which are "possible, but not probable." There is such a thing as being too suspicious. Corporate bodies are often very stupid, but we do not think they are in general deliberately dishonest; and if they wanted to check the figures of a favored contractor they could do it by a less clumsy and unprincipled method than setting a number of other contractors to work at a sham competition. And provided that it has been clearly advertised that "the lowest tender will not necessarily be accepted," there are occasions when it is wiser not to accept the lowest tender, i.e., when it is so low that it is obvious that the tenderer could not honestly make a profit out of the work. Such a situation is not likely to lead to results satisfactory to anyone concerned. With the complaint that too short a time is often allowed for the satisfactory preparation of an estimate, we are entirely in sympathy; it is a great mistake, and an entirely unnecessary one, to hurry builders over estimates for an important work—a mistake which may lead to trouble and inconvenience afterwards. Builders are also entirely justified in objecting to their lists of priced quantities being opened, except that of the accepted firm. Those are trade secrets which ought to be respected, and if it is an actual fact (as we are informed) that in a Government competition recently such a sealed list was opened contrary to the advertised conditions, it was a most improper proceeding—so much so, that we should imagine it must have been the result of a misunderstanding or forgetfulness of the conditions on the part of some official. Government departments, in this country at all events, are not in the habit of breaking faith with those who deal with them.

Quantities

Much has been said recently on behalf of the builders as to the hardship inflicted on them by the refusal in some cases to supply quantities; and where it is a case of competition tendering we quite concur in the complaint; in fact, it is not only a hardship, but an absurdity, to compel a dozen or a score of people each to do the same work, by which only one of them can profit. But it ought to be pointed out that the duty of the building-owner, through his architect or surveyor, to supply quantities and pay for them, only arises in the case of competition tendering. We have heard it mentioned as a sort of hardship on a builder that he should have to take out his own quantities, even in a case where there was no competition, and where merely one man's estimate was asked for. That surely implies a forgetfulness of the whole history of the subject. The very existence of the profession of quantity-surveyor

arises out of the system of competition tendering; it is employing one man, at a fee, to do what otherwise a number of men would have to do without advantage to any but one of them. But apart from competition tendering, and before that system (a very bad one in many ways) became so general, the quantities were manifestly the builder's own business. It was nothing to the architect or the building-owner how many rods of reduced brick-work, or how many feet run of a stone cornice, there would be in a building; it was for the builder to find out that in order to make his estimate. The competition tendering system makes all the difference, of course; but that was the original position, and it is only in comparatively recent years that the quantities have been supposed to be anyone's concern except the builder's.

Contract Conditions

No one can be surprised that the builders are beginning to grow restive under the drastic conditions often imposed on them in contracts and specifications, which, as it has been expressed, seem often to be drawn up on the "heads-I-win-tails-you-lose" principle. Everything is to be "the best," and the contractor is made responsible for other people's blunders and even for "the act of God or of the King's enemies," as the legal jargon runs. No doubt there are some contractors who require tying up very tight; there are others whose pride is to make a good piece of work, and who ought to be regarded and treated as allies rather than as enemies. Then the hotly debated question comes in of referees in case of dispute. It may be said that where there is a good architect on one side and a good builder on the other, disputes seldom arise; disputes are usually the result of one party or the other not knowing his business or having done something wrong; and the fault is certainly not always on the side of the contractor. The builders complain very strongly as to the injustice of having a dispute settled by the architect or (in the case of municipal work) by the borough surveyor, on the ground that this is putting the decision into the hands of a man who is really retained by one of the parties to the dispute. As far as concerns a salaried engineer or surveyor to a corporation, we quite agree. A professional man in such a position is no doubt a retained advocate: he is officially bound to satisfy his board or council, and may be dismissed if he does not. But an independent architect to a private client is not quite in the same position. The proper, the ideal position of a competent and high minded architect, is to be the natural arbitrator between the building-owner and the builder, and to see that neither gets any wrong; and so far from his being necessarily regarded as a retained upholder of the building-owner, we knew an actual case in which, in regard to a dispute, the client said to the architect: "Of course, you naturally lean to the side of the builder"; a soft impeachment which was denied. But the remark showed that the client did not regard the architect as counsel retained on his side; and we could certainly name not a few architects in whose fairness in settling a disputed point all builders would have confidence. Unfortunately, the high minded and clear headed architects (for the mere ability to see a thing rightly may be wanting in some) have to pay in reputation for the misdeeds or mistakes of the other kind; and builders who have been victimized by high handed and unfair treatment not unnaturally wish to safeguard themselves in future by a general recurrence to or threat of arbitration whenever there is a difference. We regret to know that there have been cases which went far to justify this attitude. But we may nevertheless remind them that the real position of the architect (where he is not holding a salaried office) is that of an arbitrator between client

and builder; that an architect of the best type of ability and character is likely to be as impartial as any outside arbitrator, and knows much more about the work, and that such a man would regard the calling in of an outside arbitrator over his head as an undeserved insult, and would be justified in feeling it as such; and therefore the provision of arbitrators as a necessary condition of contracting ought not to be pushed too far, or regarded as a *sine qua non*. There are some architects who would resent it very much, whatever the institute form of contract may provide; to be sure, they are just the architects who would not be likely to afford any pretext for arbitration.

General

We may group into one paragraph some miscellaneous subjects of complaint on the part of the building trade. One of these is a very serious one; the frequent delay in the settlement of accounts. We have heard of this complaint often, and we have certainly known cases in which it has arisen from unreasonable delay on the part of the architect to certify accounts. That is acting most unfairly to the builder, who has in some instances been most seriously injured by it. The builders also complain of contractors being eliminated by corporations employing direct labor. That is a question of the public interest. If corporations believe that they can save public money by employing direct labor, they will be justified in doing it. As a general rule, however, experience has shown that direct labor has not resulted in a saving to the ratepayers; there are notorious instances in which it has resulted in very considerable loss; and therefore it is not a system to be encouraged. That, however, is the principle on which the question must be decided. In the case of public work, contractors have no right to claim that they should be employed because it is for their advantage. What they must do is to show that it is not to the public advantage; where they can do that they win their case.

The complaint that they should be made liable for the consequences of an outbreak of dry-rot in a building is a matter in which, as recent events have shown, builders are in the same boat with architects. It is now beginning to be recognized that dry-rot is a most insidious building disease which may get into a building without the fault of anyone concerned, and without any obvious reason. There are certain mistakes in construction which are favorable to it, which are even likely to cause it; and those mistakes have been more often the fault of the architect than of the builder, who only carries out the orders of the architect. We may suggest, however, that in cases where the builder's past experience has shown him that dry-rot would be likely to result from the construction employed, he would be doing right in calling the architect's attention to this, though we do not say that he is bound to do so. He cannot be considered legally responsible if he carries out the architect's orders, and no one ought to attempt to make him so.

The heavy liabilities which contractors lie under in respect of accidents to workmen in their employ, and which often bear most hardly and unfairly on them, are the result of legislation, some of which is very unwise, but which it is to be feared there is no chance of getting amended now. Liability for accidents to third parties, that is, to the general public, which has also been a subject of complaint, is only a matter of common law, and is in no way peculiar to building operations.

We have endeavored to consider this chapter of grievances from an entirely impartial point of view, holding a brief neither for architects nor for builders, and sympathizing very strongly with the latter in regard to some of their complaints.

Method of Constructing and Waterproofing a Circular Reinforced Concrete Water Tank*

The city of New Ulm, Mich., has just completed a reinforced concrete reservoir of 1,000,000 gallons capacity, a cylindrical structure 75 feet in diameter with the walls 30 feet high, and covered with a conical concrete roof. The ground on which the reservoir is built consists of hard clay well drained by natural drainage, and upon this clay was spread a layer of stone with an average thickness of 12 inches, the voids of which were filled with a wet, fine grained concrete poured in. This formed the foundation for the floor, which is 10 inches thick, and reinforced near the surface with expanded metal of No. 16 gauge thickness and 3-inch mesh. The floor is bound to the walls by means of 1-inch round steel rods 8 feet long bent so as to extend 4 feet into the floor and 4 feet up into the walls. These were placed 12 inches apart throughout the circumference.

The walls are 20 inches thick at the bottom and taper to 15 inches at the top, with the batter on the outside. They are reinforced with 123 1½-inch and 40 1-inch round steel rods rolled to the required radius and placed horizontally, and by 20 upright supports made of steel angles with lacing bars, which served as supports for the horizontal rods during the time of construction, as well as vertical reinforcement in the walls. The horizontal reinforcement is sufficient to take all the stress without assuming tension in the concrete, or counting on the support of the earth embankment on the outside.

The roof consists of a conical concrete slab 3 inches thick and reinforced with No. 12 gauge, 3-inch mesh expanded metal, and is supported by eight trusses radiating to the wall from the centre pillar. The trusses are bound together with steel I-beams as purlins 5 feet apart. The steel trusses are 6 feet high from c. to c. of chords at the ends which rest on the centre pillar, and taper down to 3 feet at the ends resting on the walls.

Since it was of the utmost importance that the walls and the floor should be water-tight, special care was taken during the construction to grade the aggregate for the concrete. It has been found by experiments that the densest concrete can be made when rounded pebbles varying in size from about ¼-inch to about 2½ inches are used instead of broken stone on account of the ease with which such pebbles will move about in a quaking mixture while it is being worked in place, and adjust their positions so as to form the least amount of voids. For this reason pebbles were screened from a gravel bank and used instead of crushed stone for the walls and upper part of the floor, and the sand used was a mixture of very coarse and ordinary fine sand. To reduce the permeability of the concrete to a minimum, 20 pounds of hydrated lime was used to every barrel of cement, and after the forms were removed the walls were brushed and cleaned with steel brushes, and two coats of cement plastering were applied on the inside. The mortar for the plastering consisted of one part cement, two parts of sand, hydrated lime to the extent of 10 per cent. and Medusa waterproofing compound to the extent of 3 per cent. of the cement used.

The proportion used for the concrete in the walls and the upper 4 inches of the floor was 1:2:4 and this proportion of concrete together with the plastering has apparently made the walls water tight, as no leakage has been noticed up to this time except that a small leak in the bottom shortly after the reservoir was filled, which was due to an imperfect bond at one point between old and new concrete. This, however, did not cause serious trouble.

The forms for the walls were made in sections about 12 feet long by 2½ feet high, and the inside and outside parts were bound together by means of ½-inch rods extending

through the walls, which were removed after the concrete had acquired its initial set. The holes formed by the rods were afterwards filled with a strong cement mortar. Only one round of forms was used, as the contractor found that he could work most economically filling the forms in one day and removing them the next, and set them up for the pouring of concrete again on the third day. When it was necessary to build scaffolding two days were taken to remove and set up the form and build scaffolds.

The bond between old and new concrete was made by brushing the old concrete thoroughly clean and pouring on a neat cement grout just before pouring on the new concrete.

There was a slight increase in the value of the Toronto building permits issued in July as compared with those in July last year. The following is the monthly report:

Jan. 1 to July 31	1909	1910
Value of buildings	\$10,683,480	\$11,793,883
Number of permits	2,952	3,738
New buildings erected	4,247	5,213
Month of July—		
Value of buildings	\$1,854,105	\$1,953,285
Permits issued	707	928

Stone-crushing Costs on the North River Tunnels*

The stone crushing plant played an important part in the economy of the concrete work on the New York North river tunnels. Trap rock excavated from the Weehawken shaft was used. This plant consisted of a No. 6 and a No. 8 Austin crusher, driven by a steam engine of 120 h.p., and turned out about 225 cubic yards of stone per 10-hour day. The crushers and conveyors were driven from a countershaft. The cost of operating the one plant for 24 hours during concrete lining:

LABOR		
2 Engineers	\$3.00	\$6.00
2 Firemen	2.50	5.00
2 Pumpmen	3.00	6.00
1 Foreman, Electrician	6.00	6.00
1 Electrician	3.00	3.00
1 Laborer	2.00	2.00
Total, per day	\$28.00	
Total, for 30 days		\$ 840.00
SUPPLIES		
Coal, 14 tons per day	\$3.15	\$44.10
Oil, 4 gallons per day	.50	2.00
Water		13.00
Other supplies		2.00
Cost per day	\$61.10	
Cost for 30 days		1,833.00
Labor and supplies for 30 days		\$2,673.00

The process of crushing was as follows: The stone from the pile was loaded by hand into scale-boxes, which were lifted by two derricks into a chute above the No. 6 crusher. One derrick had a 34-foot mast and a 65-foot boom, worked by a Lidgerwood steam hoist; the other had a 23-foot mast and a 45-foot boom, and was operated by a General Electric hoist. All stone passed first through the No. 6 crusher, after which it was lifted by a bucket conveyor to a screen, placed about 65 feet higher than the stone bin. The screen was a steel chute, pierced by 2½-inch circular holes, set on a slope

*From a paper by H. F. Bloomquist, City Engineer, New Ulm, Minn.

*From a paper by B. H. M. Hewett, and W. L. Brown in the Proceedings of the American Society of Civil Engineers.

of about 45 degrees. The stone not passing the screen was led down to a No. 3 crusher. The cars in which the stone was removed could be run under the bin and filled by opening a sliding door in the bottom. A track was laid from the bin to connect with the contractor's surface railway in the Weehawken shaft yard, and on this track the stone could be transported either to the Weehawken shaft direct, for use on that side of the river, or to the wharf, where it could be dumped into scows for transportation to New York.

The cars used were 3-cubic-yard side-dump, with flap doors. They were hauled by dinkey locomotives.

The average force employed was:

1 foreman	\$3.00
24 laborers, loading scale boxes for derrick	1.75
4 laborers, feeding crushers	1.75
2 laborers, watching screens to prevent clogging...	1.75
1 engineer, driving steam engine	4.00
2 engineers, on derricks	3.50
1 watchman, watching plant at night.	

The accidents to machinery, inseparable from a stone-crushing plant made it necessary to have three carpenters or machinists on the job continually. The approximate cost of the plant was:

Machinery	\$5,850.00
Lumber	3,305.00
Labor	3,999.00
Total	\$13,154.00

The cost of the crushed stone at Weehawken amounted to about \$0.91 per cubic yard, made up as follows:

Cost of stone	\$0.22
Labor in operation of plant	0.31
Plant supplies	0.11
Plant depreciation	0.27

It cost about eight cents to transfer a load across the river, and five cents from the dock to the shaft on the other side.

The Painting of Cement and Concrete Structures

In painting cement and concrete structures, failure to produce satisfactory results has, in most cases, been due to the painter's lack of knowledge of the oil destroying properties of the alkali in the cement and of the chemicals necessary for the neutralization of these alkalies. Mr. Chas. Mac-nichol, of Washington, D.C., in a paper read before the American Society for Testing Materials, describes a method of treating cement surfaces for painting, which he has now used for several years with success. The method consists in applying to the cement surface, a solution of zinc sulphate and water, mixed in equal parts by weight, and using an ordinary bristle brush. It is applied after the cement is dry. The wall is allowed from 48 to 72 hours for drying and is then, it is stated, as safe to paint as an ordinary plaster wall. The reason why some such treatment should be necessary before applying a paint coating to the surface of concrete is stated as follows: When Portland cement sets, a certain amount of lime is set free in a hydrated condition as calcium hydroxide. This being a strong alkali, tends to saponify the oil in the paint coating, and thus destroy it. The work done by the applications of the zinc sulphate is to destroy the alkalinity, and change the calcium hydroxide into a mixture of calcium sulphate and zinc oxide. Another point of advantage, and a very important one to the painter, is the filling of the pores of the concrete, thus saving a considerable amount of paint which would otherwise be wasted by penetrating too deeply into the wall.

Third Annual Convention R.A.I.C.

The third annual assembly of the Royal Architectural Institute of Canada will be held at Winnipeg in the Assembly Hall of the University of Manitoba on August 25th, 26th and 27th. The headquarters of the members during the meeting will be the Royal Alexandra Hotel. Arrangements have been made with the Grand Trunk Railway for a single fare plus 25 cents as the price of a round trip ticket, providing fifty tickets are sold from points east of Port Arthur. Members should notify the secretary at the earliest opportunity of their invitation to attend. The tickets will be good going by Chicago and St. Paul and returning at any time within one month. The programme for the convention includes the following details:

On Thursday, August 25th, at 9.30 a.m., a meeting of council will be held. At 10.30 a.m. the inaugural session will take place, at which addresses of welcome will be delivered and the president, Mr. F. S. Baker, F.R.I.B.A., will reply. This will be followed by a business session which will include reports of various committees and officers.

At 2.30 p.m. another business session will be commenced at which the following subjects will be taken up: "Federation of the Various Canadian Architectural Bodies"; "Amendments to the Charter"; "The Architecture of the West," by J. Greenfield, M.A.A., F.R.A.I.C.; "Architectural Jurisprudence," by I. Campbell, K.C. At 8 p.m., a reception will be tendered by the president and council of the Manitoba Association of Architects.

On Friday morning, August 26th, a sight-seeing drive will be taken at 9.30 o'clock through Winnipeg and its suburbs. At 2.30 p.m. a business session will be held, of which the following is the programme: "Federation of Foreign Architectural Societies," by A. Chausse, L.R.I.B.A.; an address by Professor P. E. Nobbs, of McGill College; election of honorary and honorary corresponding members; general business; report on election of officers; discussion of next place of meeting; unfinished business. At 4.30 p.m. a meeting of council will be held and at 8 p.m. the annual dinner will take place at the Royal Alexandra Hotel.

On Saturday, August 27th, the members will accept an invitation from the Garson Quarries to inspect their large properties and partake of luncheon. A special train will be provided for this visit. The Winnipeg Builders' Exchange have also invited the members to be their guests in a visit to St. Andrew's Locks.

Notice of motion has been given by one of the members of the Institute that the council be given power to obtain amendments to the charter of the Royal Architectural Institute of Canada, and to take the other steps necessary to alter the constitution of the Royal Architectural Institute, to comply with the request in the joint resolution of all the official provincial associations throughout Canada, to form the R.A.I.C. into a federation of official Canadian architectural bodies. Among the principal amendments will be the changing of the name of the "Royal Architectural Institute of Canada" to the "Royal Institute of Canadian Architects," and providing a class of membership for those members of the Royal Architectural Institute, who are not members of a provincial association, such as for instance "non-registered members."

The local committee of arrangements consists of Messrs. J. H. G. Russell, M.A.A., F.R.A.I.C.; S. Frank Peters, M.A.A., F.T.A.I.C.; S. Hooper, M.A.A., F.R.A.I.C., and W. Percy Over, M.A.A.

Mr. Norton Griffiths, an English member of Parliament, will shortly make an extensive tour through Canada. Mr. Norton Griffiths is one of the most prominent engineers and contractors in England and his firm have the contract for the construction of the Chilean Andean Railway, involving the expenditure of some \$20,000,000.

Economy of Good Stone on Macadam Roads

Interesting Observations of an Irish Road Surveyor—Adaptability of Hard Stone of Uniform Quality—Methods of Keeping Down Cost

There are many varieties of rocks, and each has different qualities varying with the mode of occurrence, the mineral character, the stratigraphical position, and the weathering of the stone.

The quality of a stone used in the surface of a road should be suited to the traffic it is subjected to, i.e., a hard and tough stone should be used on a road over which heavy traffic is carried continuously; for light traffic, a comparatively soft stone, i.e., one of a different mineral character, will generally prove sufficient. If, however, a hard stone abounds in the vicinity of a road it should be used, whether the traffic is heavy or light, i.e., a soft stone should not be brought from a distance to a road subjected to light traffic, for it may thus become as dear as the hard stone, and, apart from the influence of the traffic upon it, will not wear as well or last as long.

The converse of the last statement, however, contains a greater truth—in other words, to a road on which the traffic is heavy, hard stone, though it cost much more when delivered than soft stone, which may occur in the vicinity, should be brought—for it will be found that the greater cost is more apparent than real. In other words, if the period of time through which the stone survives, and the labor expended in cleaning and repairing it are taken into account, it will be found the hard stone is generally, in the end, the cheaper.

The hard stone, however, should be uniform in quality, and (for light traffic) broken to a smaller gauge—say 1½-inch. The temptation to mix stones of different qualities and to send out the metal too large becomes greater, the harder the rock to be broken.

These two faults have sometimes given a bad name to a quarry which contained excellent road material. In Dublin county soft and hard stone are found, the former being, mostly, the carboniferous limestone, which is the formation exposed, generally, over the greater part of the county, as over the whole central plain of Ireland, and containing beds of variable qualities—the latter igneous intrusions through the Silurian slates commonly known as “greenstone,” and metamorphic beds of lower Silurian age, the most serviceable of which, for road purposes, is known as “quartzite.”

Other metamorphosed rocks, such as gneiss, schists, etc., and plutonic rocks, laid bare by denudation, such as granite, are exposed abundantly, but most of them, being friable or easily disintegrated, are almost useless for road purposes.

Unfortunately, the limestone occurs on the north side of the country, which is chiefly agricultural, and where the traffic, the products of agriculture inwards and manure or goods outwards, is heaviest.

For many years most of the main roads in this area have been repaired with limestone from the hardest or crystalline beds, but the experience gained during that period of time has shown the writer that it would be foolish to prolong the experiment, and the sooner a hard stone is brought to these roads the better for them and the users of them.

Take the road between Drumcondra and Santry. This forms portion of the principal highway from Dublin to the north, via Balbriggan and Drogheda, and is the route taken for the carriage into the Dublin markets of the agricultural produce of the northern area of the county as far as Gormanstown.

On the section described, which is the nearest to the city, and on which a tally kept on one occasion showed 115 loads to have passed a given point in three hours, equivalent to about 75 tons per hour, carried on 2½-inch tires (or 8 cwt. per inch of width of tire), limestone from the best beds in Pass quarry, broken to pass a 2½-inch and to be rejected by a 1½-inch ring, has been rolled for the past five years.

At first it was found difficult to get the stone broken properly, though by hand, and the failure of the road to retain an even surface was at first ascribed to irregular breaking. During the past two years this has been improved, with the result that the surface did not become so pitted and bumpy as before.

Under the heavy traffic, however, the excessive wear continued, but more uniformly than before, the disintegrated surface, as thick and greasy mud in wet, and dust in dry, weather, not only causing, while it remained, great dissatisfaction to the public, but great expense in its removal.

The section of the road under consideration is 526 statute perches in length, has an average width of 6 yards, and has cost £500 a year, or nearly £1 a perch, to maintain.

About 1,200 cubic yards of limestone have been rolled in on about three-fourths of the length each year, and two surfacemen are kept constantly at work on it cleaning and patching it.

From the last statement it follows the road is rolled throughout three times in four years. It must be admitted this is excessive, and the cost of maintaining this road is absurdly high. The fault is in the material used, and its use, dictated latterly by the desire to give employment in the district, has been continued too long.

On the writer's application for the current year, a sum of £600 has been allowed for the road, and he has decided to discontinue the use of limestone, substituting 850 cubic yards of broken quartzite from Howth, and 200 cubic yards of quartzite screenings, these costing on the road 7s. 6d. per cubic yard, against 5s. 6d. paid previously for limestone.

It is estimated the quartzite will last three times as long as the limestone, and will require about one-fourth only of the labor in cleaning. There should, therefore, result in the use of this stone on the road a saving of about 60 per cent. after three years, when the whole road will have rolled with the quartzite, if the above assumptions are correct. To the users of the road, too, there will be a distinct gain in the use of the better material, requiring, as it will, to be rolled less often, and causing, therefore, less interruption to the traffic. Add to this, there will be less mud and dust, and, therefore, greater comfort to the public.

The trouble which recently occurred at St. John, N.B., in connection with the laying of pavement on a portion of Main street, has led to the resignation of Inspector James Carleton, who declares that the foundation being laid is 50 per cent. cheaper than the specifications call for. The chief engineer states that the foundation is satisfactory to him and that he has final authority over specifications. A special meeting will be called by the mayor to discuss the whole matter.

Mr. J. R. Cosgrove and Mr. H. Macpherson, the newly appointed engineer and assistant respectively for North Vancouver, B.C., have accepted their appointments.

*From a paper by Wm. Collen, Surveyor of Dublin County, before the Irish Road Congress.

Rules for the Measurement of Slate and Tile Roofing

Differences of opinion are constantly arising in the trade as to the proper manner of measuring slate and tile roofing, and the following customary rules therefor as codified and revised by the Standard System of Measurement in London, England, cannot fail to prove interesting to roofers in this country:

Slating—Net area, after deducting all openings containing four feet superficial or over.

Mansard, vertical, dormer, cheeks, small surfaces under 10 feet superficial, circular, conical, octagonal or turret roofs to be measured separately.

Eaves—A lineal measurement to be taken to the equivalent of 12 inches deep.

If irregular or cut to follow drips of gutters, an extra measurement of 6 inches to be taken.

In the case of all random slating add a further 6 inches. If bedded or pointed, to be charged separately.

Verges—A lineal measurement equivalent to 6 inches wide to be taken at all square verges and secret gutters.

If slate and a half or special wide slates are used, add a further 12 inches.

Top Edge—A lineal measurement equivalent to 6 inches deep to be taken on either side of ridges, under sills of dormers, lanterns, skylights and any openings where top course slates are used.

Square Abutments—A lineal measurement equivalent to 6 inches wide to be taken where slating adjoins sides of all chimney stacks, dormers, skylights, and other openings; also at one end of slope where slating finishes between parapet or party walls.

Circular Cutting—A lineal measurement equivalent to 12 inches wide to be taken.

Raking Cutting—A lineal measurement equivalent to 6 inches wide to be taken at all rakes.

Valleys—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all valleys.

If special wide slates or slate and a half are used, take an additional 12 inches on both sides.

Hips and Angles—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all hips and angles.

If special wide slates or slate and a half wide are used, take an additional 12 inches on both sides.

Mitre Cutting—A lineal measurement to be taken for all mitres (in addition to the usual cutting), whether at hips, valleys, or other places where slates are close cut; to include all necessary oil cement.

Ridge and Hip Coverings—A lineal measurement of all ridges and hips, including setting and pointing in cement.

All splays, cut ends, mitres, intersections and top ends to be numbered and taken separately.

Tiling

Tiling—Net area, after deducting all openings containing 4 feet superficial or over.

Mansards, vertical, dormer, cheeks, small surfaces under 10 feet superficial, circular, conical, octagonal or turret roofs to be measured separately.

Eaves—A lineal measurement equivalent to 8 inches deep. If irregular or cut to follow drips of gutters, an extra measurement of 6 inches to be taken.

If bedded or pointed, to be charged separately.

Verges—A lineal measurement equivalent to 6 inches wide to be taken at all square verges and secret gutters.

If on rake, take an additional 6 inches.

Top Edge—A lineal measurement equivalent to 6 inches deep to be taken on either side of ridges, under sills of dormers, lanterns, skylights and any openings where top courses are used.

Square Abutments—A lineal measurement equivalent to

6 inches wide to be taken where tiling adjoins sides of all chimney stacks, dormers, skylights and other openings; also at one end of slope where tiling finishes between parapet or party walls.

Circular Cutting—A lineal measurement equivalent to 12 inches wide to be taken.

Raking Cutting—A lineal measurement equivalent to 6 inches wide to be taken at all rakes.

Valleys—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all valleys, including all necessary tile and a half.

Bedding and pointing to open valleys to be charged separately.

Valley tiles to be measured extra only, over the usual measurements on both sides.

Hips and Angles—A lineal measurement equivalent to 6 inches wide to be taken on both sides of all hips and angles to include all necessary tile and a half.

Hip and angle tiles to be measured extra only, over the usual measurements on both sides.

Mitre Cutting—A lineal measurement to be taken for all mitres (in addition to the usual cutting), whether at hips, valleys or other places where tiles are close cut, to include all necessary tile and a half.

Ridge and Hip Coverings—A lineal measurement of all ridges and hips, including setting and pointing in cement.

All splays, cut ends, mitres, intersections and top ends to be numbered and taken separately.

Cost of Mixing and Placing Concrete by Hand

The work on a 4-foot circular sewer in Louisville, Ky., was carried on entirely by hand. The sewer was located through a park and near a roadway and materials for the work were placed at convenient points. The invert contained 0.21 cubic yards of concrete and the arch 0.18 cubic yards per lineal foot, and each was built separately. A light mixing board was made, and was shifted along by the gang as the work progressed.

The gang consisted of 17 negroes and a foreman, whose duties consisted of excavation and concreting for the sewer. The successive steps of their work were alternated with another gang which attended to the forms and reinforcement. The length of concrete laid at one operation was 72 feet of either arch or invert and the time required to do the work averaged $3\frac{1}{4}$ hours. The men were divided as follows:

2 men on mortar.
4 men on gravel.
2 men on sand.
4 men on mixing board.
1 man on water and cement.
4 men in trench spading.
1 foreman.

All the men received 20 cents per hour and the foreman received 35 cents per hour. The cost of concreting 72 feet of invert or arch was thus:

17 men at 20 cents per hour, $3\frac{1}{4}$ hours	\$11.05
1 foreman at 35 cents per hour, $3\frac{1}{4}$ hours	1.14

Cost of laying 72 feet of invert or arch \$12.19

This gives for 72 feet of complete sewer a cost of \$24.38, which divided by 28.08 cubic yards, gives a cost of 87 cents per cubic yard. In this work there were about 2.23 pounds of steel reinforcement per lineal foot of sewer. Two men were employed continually to bend the steel and place it in position in the forms.—Engineering-Contractor.

Hon. Mr. Brodeur and Hon. Dr. Pugsley are making an inspection trip of harbors and rivers on the Great Lakes, with a view to ascertaining what further improvements are needed.

Notes on the Failure of Stucco Work

Selection of Material, Mixing and Application—Unsightly Work Attributable Largely to Lack of Proper Ingredients—Remedial Measures

A number of years ago stucco was quite generally used in certain localities, but owing to failures of the material to withstand the action of the elements and to other causes, this type of construction was almost entirely abandoned. During the last few years, however, there has been a very marked tendency by the building public to take up this class of construction again, therefore this word of caution.

We do not want to have the same experience with this type of construction, as the concrete block industry has had, and yet unless due care is used in drawing specifications and in their application, there are going to be a great many failures as in the past. Our architectural friends are very partial to stucco exterior, and if it is properly mixed and applied will come up to their expectations in every way. So much depends on the selection of the material, proper mixing and proper application that only skilled mechanics who are familiar with this class of work should be employed.

The writer has had opportunities to inspect a great many stucco residences in the past few years and is very sorry to say that the greater percentage of them are unsightly, due to cracks, discolorations caused by improper application, and lack of proper ingredients, etc. I wish to illustrate briefly by stating facts regarding two or three of the houses that have come to my attention.

I remember one residence in particular, where there were a great many horizontal cracks in the stucco running almost the entire length of one side of the building. These cracks were about two feet apart and were very pronounced. The whole area of sides and ends was very unsightly. After a very careful investigation it was found that in nearly every instance where cracks had developed that they were at a point where the wire lath was lapped and in many places less than $\frac{1}{4}$ -inch thickness of stucco was over these laps. In some instances by cutting out the cracks it was found that the metal lath was not even tacked solidly in place, and yet stucco work in general was condemned by a number of parties on the results obtained on this one building. It was quite apparent that the trouble was not due to any fault of the material, but in this particular instance was due entirely to the application of the wire lath and stucco. In addition to the large cracks at the laps of the wire lath, there were a number of hair cracks throughout the entire area, which apparently were caused by too much trowelling of the concrete mass, and as was found by investigation there was a coating or frosting of Portland cement on some of the areas and the cracks penetrated just through this frosting. Other areas were entirely smooth and cracks had not developed.

In another case regular lime mortar plaster without any Portland cement was used for the scratch coat. The second and finishing coat consisted of a poor mixture of Portland cement and sand. The finish coat was only about $\frac{1}{4}$ -inch thick. Moisture penetrated through the finish coat and the mortar composing the scratch coat being subjected to continued moisture, disintegrated and the stucco came off in sheets.

The third case was very similar to the second, although wood lath was used instead of wire lath on a small building near the seashore. The scratch coat material consisted of regular interior plaster and the second coat consisted of Portland cement, asbestos rock and asbestos fibre. The second coat was very thin and the damp salt air and moisture penetrated through to the first coat. The lath became

swelled and the stucco came off in sheets. The stucco on this work was condemned and the faults were laid at the door of the asbestos and Portland cement. Upon investigating the matter thoroughly, it was readily proven that the entire trouble was due to the nature of the lath and the materials entering into the first coat.

I have referred to these buildings with a view to cautioning people interested in stucco construction to see that this particular part of the building is given proper attention. In the past stucco has been applied in two coats, the total thickness being about $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch. Past experience is teaching us, however, that 1-inch is by far better and if the material is applied in this thickness, house owners and architects should not have reason to regret its use.

Another point of considerable importance is the color. A uniform color is rather difficult to obtain, on smooth surfaces particularly, but it can be obtained if proper attention is given to the selection and mixing of the ingredients and if the stucco is properly applied. When Portland cement and sand are used it is very essential that the sand should be absolutely free from any organic materials which have a tendency to discolor. It is also of vast importance that the ingredients be mixed very accurately and carefully and that a sufficient amount be mixed at one time to cover certain areas exposed to the same lights and shadows.

For example, the work should not be left in an uncompleted condition half way between windows or half way down the side walls, for just as certain as this is done, there will be a streak showing where the later work was started. If it is necessary to do a certain given area at two operations, care should be used to get the materials properly blended and the new stucco floated or trowelled to correspond exactly to that already done. By using a little care on details of this kind the ultimate results will be much more satisfactory.

Portland cement and sand as a stucco mixture has been used with fair success where work has been carefully supervised, but there has been such a lack of proper attention to the mixing and application that there have been some very bad failures. The use of asbestos rock and fibre to take the place of sand is meeting with considerable success. The asbestos fibres have a tendency to hold the water which is used to mix the concrete mass, longer, thus giving the Portland cement ample opportunity to become properly set and in this way stucco mixtures are possible that are more uniform in color and less liable to crack as the fibre also furnishes additional bond.

There is one point which is frequently lost sight of, that is that it is possible to manufacture or make concrete slabs that are free from cracks and that can be exposed to the elements for an indefinite period without discoloration. Therefore, should cracks develop in a well constructed stucco work it can be invariably traced to settling of the building or the shrinking of the frame. By insisting upon thicker stucco walls the liability of the stucco cracking is reduced to a minimum.

The price of lumber is readily advancing and the desire for fireproof exteriors, especially in the suburban districts as well as artistic effects that may be obtained from stucco are creating a universal demand for this type of construction, and while the initial cost may be slightly more it is such a small part of the total outlay and such an important part of the structure that the best is the cheapest in the end.—Engineering-Contracting.

St. Andrew's Dam, Red River

At St. Andrew's rapids on the Red river, at a point about 15 miles below Winnipeg, a "Curtain" dam and lock have just been completed by the Public Works Department of the Dominion Government, thus making the Red river navigable from Lake Winnipeg to Winnipeg. The dam also furnishes a means for maintaining the level of the Red river at Winnipeg uniform.

This dam is operated entirely by motors and is the first one of its kind to be built on the American continent.

The dam consists of five piers and two abutments supporting a superstructure of six spans. (See fig. 1). From the underside of the superstructure hinged frames are suspended,



Fig. 1—St. Andrew's Dam at Red River—Up Stream Side

and are let down in the spring and raised in the autumn when navigation is over. Fig. 2 shows one of the cranes by means of which the raising and lowering of the frames is accomplished. This crane is operated by two motors, one a 10 h.p., 220-volt crane motor, which raises and lowers the frames,

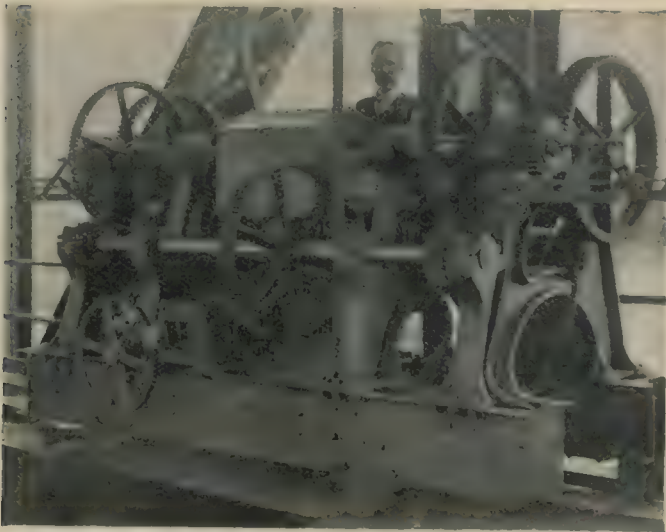


Fig. 2—St. Andrew's Dam—Frame Cranes Electrically Operated

and the other a 2 h.p. motor used to move the crane along the floor of the superstructure.

The level of the water is controlled by "curtains," consisting of a number of wooden battens so connected together and placed on the frames as to be capable of being rolled up or down when the level of the water is to be lowered or raised. These curtains are rolled up or let down by curtains or cranes

of the type shown in fig. 3. The curtain cranes work on a platform supported on the down-stream side of the frames when they are in their lowered position, and they can be run from end to end of the dam, passing through the opening shown in the piers in fig. 4, to the point when the curtain is to be adjusted.

The power for operating the motors and lighting the dam



Fig. 3—St. Andrew's Dam—One of the Curtain Cranes

and canal is derived from a steam plant on the east bank of the river, in which there is a 40 k.w., 250-volt direct current, engine-driven generator. A motor-generator of the same capacity has also been installed to take alternating current from the Winnipeg Electric Railway Company, and generate direct current for a "break-down" service. The electrical equipment was furnished by the Canadian General Electric Com-



Fig. 4—St. Andrew's Dam—Down Stream Side. Lower Gallery and Curtains in Place.—Note Opening in Pier

pany, and the construction of the dam was carried out under the supervision of Mr. A. R. Dufréne, until recently district engineer of the Department of Public Works.

Trade News from Montreal

Unlimited Activity in Building Circles—The Builders' Exchange and Trades Unionism—Business News and Notes

Montreal Office of the "Contract Record."
August 8th, 1910.

Nothing of particular interest has transpired during the past week in connection with the local strike of the masons and bricklayers. The Builders' Exchange has placed itself on record as not being opposed to rational unionism, responsible for its engagements and amenable to the laws of Canada. In pursuance of its avowed policy of "Canada for the Canadians" the executive and the master masons and bricklayers section have opened negotiations with the Canadian Federation of Labor, to establish branches in Montreal covering these lines, and eventually all other lines of the building trades. The Canadian Federation has already a bricklayers' union in Ottawa, and has expressed itself as being entirely in sympathy with the attitude maintained by the Builders' Exchange, viz.:

1. To admit only competent men to its membership and thus to justify the recognition of a minimum wage scale.
2. To work in harmony with the employers through a joint arbitration board.
3. Not to discriminate against "open shop" or to enter into sympathetic strikes with trades other than that under agreement.

Work generally is proceeding at a good rate and from the outlying districts good reports are received which show unlimited activity in building circles.

Sprinkler Tank Inspection

At Inspector Chausse's office information was obtained as follows, concerning the inspection of sprinkler tanks throughout the city: In Montreal there are 127 sprinkler system tanks. Up to date, satisfactory reports have been received covering inspections of 56 of these; 5 inspections are not completed; 13 letters more have been received stating that the owners will have inspections made at once; while there are 53 owners of tanks who have not replied to the Building Inspector's intimation regarding inspection.

Windsor Station Contracts.

What constitutes probably the plum of this year's building work, namely, the contract for the erection of the new Windsor street station for the Canadian Pacific Railway Company, fell to Mr. C. E. Deakin, the well known general contractor. It is, moreover, rumored that the contract was secured on a percentage basis. The entire superstructure of this building when completed will probably cost in the neighborhood of \$1,500,000. Mr. Deakin gets the masonry and general contract, while the Dominion Bridge Company was awarded the contract for erection of the skeleton steel frame. It is expected that this new building will be completed by November, 1911.

Review of Building Situation

Figures just to hand from Building Inspector Chausse's office covering operations up to the end of July more than justify the earlier predictions expressed concerning the showing that would be made in this period. While in the actual numbers of permits issued there was a slight falling off as compared with July of the previous year, in point of value they are almost five times as great, having reached a total of \$3,385,360; an excess of \$2,673,224 over July, 1909.

For the first seven months of the year the summary also shows to advantage, there being an increase of almost \$4,700,000 as compared with this same period in 1909. Already this year permits aggregating in value \$9,522,240 have been issued, while during the whole of last season the total only reached \$7,777,621. It must not be forgotten, of course, that at the Montreal office permits are issued for the former

town of Ville St. Louis and other newly annexed wards. Yet even allowing amply for the influx from these directions, we are undoubtedly enjoying a splendid year in building circles and with a continuation throughout the remaining five months this will prove a banner year.

The detailed figures to date are as follows:

	Permits	Value
July, 1910		
New buildings	178	\$3,182,408
Alterations	67	202,952
July, 1909—		
New buildings	181	562,156
Alterations	76	149,970
Total increase of July, 1910, over July, 1909, \$2,673,224.		
Jan. 1st to July 31st, 1910—		
	Permits	Value
New buildings	1,534	\$8,783,945
Alterations	544	808,295
Jan. 1st to July 31st, 1909—		
New buildings	966	\$4,257,457
Alterations	507	640,834
Increase 1910, \$4,693,949.		

Memorial Tower Completion

The results of the competition held under the auspices of the Royal Architectural Institute of Canada for plans for a memorial tower at Halifax, to commemorate the establishment of legislative government in Canada, have just been announced. In all, twelve designs were received by the judges, Messrs. F. S. Baker and Frank Darling, Toronto, and Prof. Percy Nobbs, McGill University, Montreal. Mr. A. Sharp, Toronto, submitted the winning plans. Mr. W. W. Brown, Halifax, was awarded second prize, and John M. Lyle, Toronto, third prize.

Important Construction on St. James street

The work of demolishing the St. Lawrence Hall block to make room for the big Dominion Express Building is progressing satisfactorily. Messrs. Peter Lyall & Sons, Limited, are the contractors and this firm are also engaged in removing the walls of the structure occupying the site of the new Yorkshire Insurance Building. These two structures are situated opposite to each other on St. James and St. Francois Xavier streets and next year this same company will commence the erection of another large building on another corner of these streets, namely the Transportation Building, which is to be the largest office building in Canada. The construction of these three large buildings at the same time should be very convenient for the contractors and should also transform this section of St. James street into a busy thoroughfare.

Reinforced Concrete Construction

Mr. G. B. Reynolds, Montreal and district engineer and sales agent for the Trussed Concrete Steel Company of Canada, Limited, has recently closed the following contracts: Kellert Building, Montreal, Messrs. Hutchison Wood & Miller, architects, Messrs. Peter Lyall & Sons, Limited, general contractors; Rosenthal Building, Ottawa, Messrs. Weeks & Keefer, architects, Mr. C. E. Deakin, general contractor. The complete structural portions of these two buildings, including floors, beams, columns, etc., to be constructed according to the Kahn system. Diamond White Wear Company at Three Rivers, Messrs. T. Pringle & Son, Limited, architects; Mr. C. E. Deakin, general contractor; Hy Rib metal to be used in construction.

Personal

Mr. A. D. Dame, sales manager of the Expanded Metal & Fireproofing Company, Toronto, spent several days in Montreal last week. During his visit Mr. Dame was in consultation with Mr. J. E. MacDougal, who has charge of the firm's interests in this district.

Mr. J. F. Jago was in Ottawa recently in connection with his contract for the construction of the reinforced concrete

portion of the new Rosenthal Building. We understand that this work has been placed under way and will be rushed along during the remainder of the season.

Notes

At a recent meeting of the Maisonneuve council Messrs. Vickers' Sons & Maxim were granted a twenty years exemption from taxation for their proposed floating dry dock and ship yards which are to be located at Molson's creek. The works will cover 25 acres of the river front on property owned by the Montreal Harbor Commissioners.

Superintendent Janin, of the Waterworks Department, estimates the cost of providing the newly annexed districts with an improved an up-to-date water service at \$250,000. The Board of Control will thoroughly study this question of water supply before taking action.

The civic authorities are taking an active interest in the approaching Eucharistic Congress to be held in Montreal during September, and will assist the committee by erecting extensive decorations along the procession route.

The sum of \$40,000 is being spent by the city executive in the work of effecting improvements throughout the city parks and squares, the amount being distributed principally amongst the larger breathing spaces of the city. In Mount Royal Park the sum of \$8,400 is required, whilst in La-fontaine Park \$4,500 will be utilized.

The Dominion Mosatile Flooring Company, Limited, has been incorporated with a capital of \$100,000; headquarters, Montreal. The incorporators are J. S. Dupont, A. Bourque, T. Daoust, P. St. Pierre and Chas. Lebel.

The Westmount City Council have passed upon a park extension by-law, which scheme includes the laying out of the Gordon and Holt property on the top of the mountain for residential purposes and involves a considerable expenditure.

A Timely Illustration

The Twin City Automobile Club and their friends from Fort William and Port Arthur were the guests of Mr. James Murphy, president of the club, at a banquet which was recently held at Stanley. The members of the club journeyed to the scene of the entertainment in automobiles. The after dinner speeches consisted almost entirely of addresses upon the subject of good roads and much enthusiasm for the cause was displayed. Upon the return trip a rather humorous situation developed. During the banquet the rain fell in torrents and the guests had not proceeded far on their homeward journey before they began to experience serious trouble on the highway. Some of the drivers managed to get through to their destination early in the morning, but many of them were unable to reach town until daybreak the next day. A sea of mud and slush had to be navigated and when the autos reached town they were in a terrible state. The occupants were more enthusiastic than ever upon the necessity for improving the county roads.

The good roads convention which was held at Winnipeg recently was most successful. A number of extremely practical addresses were delivered by various authorities and enthusiasts and at the conclusion of the meeting the following resolutions were adopted:

"That the thanks of the association be tendered to the government for the appointment of Mr. Archibald McGillivray as highway commissioner.

"That a convention be held annually.

"That the government be requested to introduce at the next session of the legislature, legislation to enable municipalities to finance and construct a system of good roads."

Victor Mager moved that the government be asked to take over the construction of roads throughout the province. It was decided to leave this over for the next meeting of the association.

Plumber's Interesting Discovery

The Toronto Star in a recent editorial has the following to say under the heading of "faulty construction": "From time to time the press has sounded an alarm with regard to hastily constructed homes. It has been pointed out that Toronto builders have been guilty of 'rushing up' their houses, installing flimsy floors and 'skimping' their work in many ways. The result is seen in residences only a few years old, where the plaster is falling from the walls, the woodwork shrinking and out of shape, the roofs leaking and the floors becoming uneven. Because the City Architect's department has no right to interfere so long as the foundation and walls are strong, these matters would be difficult of regulation, even had the already overworked staff of inspectors the leisure to attend to them.

"Plumbing, however, involves the public health, and there seems to be no reason why the requirements with regard to it should not be enforced. The 'Plumber and Steamfitter' believes that they are not, and cites the following instance:

" 'A man rented a house and store on Royce avenue. He happened to be a plumber, and on taking possession naturally took a look at the plumbing in his new home. Here is what he found: The hot water pipe from the top of the range boiler was left hanging in the partition, while the pipe from the hot water tap in the sink was connected to the cold water tap in the adjoining house. The cold water pipe connected with the tap in the sink was found with an open tee in the partition behind the baseboard. All bath-room fixtures leaked owing to loose couplings. The gas pipe was not carried to the meter, being left hidden in the partition.' "

"He may consider himself lucky that his gas meter was not connected with the water pipes. He was fortunate in being a renter and not a buyer. Toronto's rapid expansion is a source of civic pride, but it brings with it the temptation to build hastily rather than well."

Mr. Herbert Johnston, the newly appointed town engineer of Berlin, Ont., was born at Meaford, Ont. He graduated in Civil Engineering from the Faculty of Applied Science of Toronto University in 1903. He became an Ontario Land Surveyor in 1905. In 1908, he was admitted as an associate member of the Canadian Society of Civil Engineers.

His first practical experience was with John Rodgers, Esq., O.L.S., Mitchell, Ont., where he spent two years in drainage engineering. In 1903 he entered the employ of Wm. Mahlon Davis, C.E., Berlin, and in 1905, he formed a partnership with Mr. Davis with the firm name of Davis & Johnston. During the last five years the firm have been employed in many engineering works, the most important of which are as follows: Galt sewerage system; Listowel, Preston, Hespeler and Wingham waterworks; Berlin sewage disposal works; Waterloo sewage disposal works and Guelph water supply. On July 1st, Mr. Davis left Berlin to assume the duties of city engineer of Prince Rupert, B.C., and Mr. Johnston was appointed town engineer of Berlin.

A special committee recently appointed by the Winnipeg General Hospital has presented a report recommending that the hospital be placed under municipal control so far as expenditures are concerned and that at the same time it be continued as a voluntary institution, and life governors share with the city in the direction of its affairs. The city is urged to proceed without delay with the erection of new tubercular and isolation hospitals. Improvements are proposed for the outdoor department. The committee state that they do not believe there is any general desire for the construction of a municipal hospital. They urge also that a by-law for the expenditure of \$400,000 for hospital purposes shall be submitted at the next municipal elections.

Good Roads in the Maritime Provinces

The Moncton, N.B., Board of Trade has instructed its delegates of the Maritime Board meeting at Chatham to present a resolution in favor of the provincial governments of the Maritime Provinces taking steps to provide provincial roads between the main centres of the provinces in order that such roads may be made both uniform and permanent. It is recommended that these roads be withdrawn entirely from the operation of the ordinary highway Acts and placed under the control of experts by each province. Another resolution refers to municipal bonded indebtedness. In view of the situation created by the Campbellton fire, the recommendation is made that all future issues of municipal bonds, town, city or county, under authority of the local legislatures, shall be guaranteed by the provincial governments both as to principal and interest. A guarantee fund is suggested, to be provided by each province from the proceeds of the sale of such bonds to meet extraordinary emergencies similar to that resulting from the Campbellton fire.

City Architect Nutter and the Plumbers' Union

City Architect Nutter, of London, Ont., at the suggestion of the city council, has presented a report upon the request of the Plumbers' Union for the appointment of a plumbing inspector. Mr. Nutter went into the question very fully and among other things made the following recommendations:

1. The repeal of the existing by-law and the preparation of a new by-law in keeping with the city's needs and in line with the modern practice of other cities.
 2. The formation of an examining board of plumbers to consist of three members, viz., the building inspector, the city engineer and a master plumber of not less than ten years' experience.
 3. The examination and registration of all master plumbers and journeymen and the issuing of an annual license and a certificate to all qualifying. It is suggested that the examining fee be \$1 and the registration fee as follows: For master plumbers, \$10; journeymen, \$5; annual licenses, for master plumbers, \$5; and journeymen, \$2.
 4. The filing of plans and the issuing of permits for all alterations to existing plumbing and new work. The testing of all work to be made compulsory and a fee of \$1 charged for each examination.
 5. The appointment of an assistant building inspector to act as plumbing inspector and to assist in the inspection of buildings generally.
- The matter was allowed to stand temporarily without any decision being reached by the special committee which had to deal with it.

An Interesting Announcement

Eadie-Douglas, Limited, who are now located in their new premises at 12-14 University street, Montreal, announce the opening of their mechanical and steam department under the management of Mr. G. M. Milligan (late with Manning, Maxwell & Moore, New York). This department will be devoted exclusively to the highest grades of mechanical and steam specialties and supplies and the firm through their connections are able to quote on complete specifications. Among the well known companies represented by the firm in the mechanical and steam specialty line are the following: B. F. Sturtevant Company, manufacturers of fans, blowers, heating and ventilating sets, etc.; Shaw Electric Crane Company; the Platt Iron Works Company, manufacturers of Smith-Vaile pumping machinery, condensers, etc.; Lenher Engineering Company, manufacturers of Taylor gravity underfeed stokers; Direct Separator Company, manufacturers of Sweet's steam and oil separators, exhaust heads, etc.; James Beggs & Company, manufacturers of Blackburn-Smith oil filter and grease extractor; Frank L. Patterson & Company, manufacturers of Berriman feed-water heaters, etc.; the Linton Machine Company, manufacturers of combination feed-water heaters; and Alphons Custodis Chimney Construction Company, manufacturers of radial brick and concrete machinery. Among the other important lines which Eadie-Douglas handle are valves, boiler trimmings, engine room accessories, insulating specialties, etc. The branch offices of the firm are at 65 Victoria street, Toronto; 445 Main street, Winnipeg, and 81 Band street, Ottawa.

The city council of Winnipeg have decided to consider the immediate construction of a municipal gas plant. City Engineer Ruttan has been instructed to submit plans as soon as possible. This step has been taken by the city on account of the trouble which has arisen with the street railway company, which has refused to supply a number of houses with gas unless given permission to erect a gas plant on Ida avenue.

The picnic of the London Builders' Exchange at Port Stanley, Ont., was a most enjoyable affair. About 2,000 people who are associated with the building trades of London went to the Port and a few thousand more joined in the entertainment. Ex-Ald. Donald Ferguson, who was chairman of the committee of arrangements, had much to do with the skilful carrying out of the affair. An interesting programme of sporting events was run off and many other features of interest were provided. An exciting baseball match was indulged in between the representatives of the metal workers and those of all other trades. The combination team succeeded in defeating the metal workers by a score of 9 to 1.



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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brantford, Ont.

Tenders addressed to the chairman of the Board of Works will be received until August 20th for construction of concrete curbs on Cayuga street. Plans and specifications at office of T. Harry Jones, City Engineer.

Fernie, B.C.

A by-law will be submitted to raise \$27,000 for the construction of a sanitary sewer east of the Crow's Nest Southern Railway.

London, Ont.

Tenders for grading Adelaide and Oxford streets, and laying 1,350 feet of land tile, will be received at the City Clerk's office up to August 18th. Plans and specifications at office of Geo. W. Wright, City Engineer.

Tenders will be received up to August 18th, addressed to Chairman No. 2 Committee, for storm water drain on Johnston street. Geo. W. Wright, Deputy City Engineer.

Medicine Hat, Alta.

The city is talking of replacing all wood pipes by iron pipes in waterworks and sewage.

Moose Jaw, Sask.

Tenders addressed to J. H. Trusdale will be received until August 22nd for laying and furnishing material for water mains and sewer pipes. Plans at office of Geo. T. Clark, city engineer.

Montreal, Que.

Tenders addressed to L. N. Senecal, secretary, Board of Commissioners' office, City Hall, will be received until August 17th for the construction of sewers in the under-mentioned streets or sections of streets with the necessary connections according to the sections and specifications on view in the office of the City Surveyor, viz.:—Hutchison street, from Bernard street to Atlantic street (Laurier Ward); Fourth avenue, from Dandurand street to LaPetite Cote road (in Rosemount).

Tenders addressed to L. N. Senecal, secretary, Board of Commissioners, will be received until September 14th for steel pipe, dredging work and concrete pier in connection with the new intake for the Montreal waterworks. The works consist in the furnishing and laying in the bed of the river, of about 3,200 feet of steel pipe, 6 feet in diameter; the construction of a concrete intake pier 1,200 feet from shore, as well as other accessories, and all the dredging and excavating required in the execution of these works; all according to specifications, plans and profiles, which may be examined or obtained at the office of the Superintendent of Water Works, City Hall, Montreal.

New Glasgow, N.S.

The town has completed plans for a gravity system for the town to cost in the

neighborhood of \$200,000. Surveys have been made, profile of line has been completed and the by-law will be submitted to the ratepayers very shortly.

New Westminster, B.C.

Tenders for paving another stretch of Columbia street were opened in the city council last week. The lowest was the Haslam Paving Company, which tendered \$62,800. The Warren Construction Company, Limited, was next with \$63,114; then the R. C. Blome Granitoid Company, with \$64,000, and the M. P. Cotton & Company, Limited, with \$68,152. The tenders were referred to a special meeting of the council.

Outremont, Que.

Tenders addressed to J. Kreuze, secretary-treasurer, will be received until August 17th for construction of 900 yards of concrete slab sidewalk. Specifications on application.

Ottawa, Ont.

The city council are considering the widening of Wellington street in Hintonburg at an estimated cost of \$18,000.

Prince Albert, Sask.

A by-law will be voted on to expend \$12,000 for a filtration plant.

Peterboro, Ont.

R. S. Armstrong, city clerk, will receive tenders up to September 1st for sanitary and storm sewers, air compressors, etc. Chipman & Power, Mail Building, Toronto, are the engineers. For further particulars see "Tenders and For Sale Department" of this issue.

Souris, Man.

The J. L. White Company, of Sioux Falls, S.D., will install a waterworks system here, the by-law having carried.

St. Catharines, Ont.

Engineer Kennedy has submitted a report for the improvement and extension of the waterworks at a cost of \$52,000.

Toronto, Ont.

City Engineer Rust estimates the cost of construction of the pavement on Beverley street, from Queen to College, at \$10,332.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until August 23rd for supply of special castings for electrical pumping equipment of the high level pumping station. Specification at office of City Engineer Rust.

In order to provide drainage for the southern part of West Toronto, City Engineer Rust recommends the construction of a 3-foot main sewer, commencing at Bloor street, south on Keele street to Geoffrey street, and thence by various streets and along Queen, to the intersection of King street, to meet the intercepting sewer at this point. To provide drainage for the district bounded by Bloor street, High Park avenue, Annette street and the western city limits, it will be necessary to lay a sewer on Bloor street, from Glendennan avenue, to connect with the above sewer near the corner of Bloor and Keele streets. Mr. Rust recommends that this be a 5-foot

circular brick or concrete sewer. This will be large enough to carry the combined flow from this section.

Victoria, B.C.

At a recent meeting of the city council tenders for the laying of the foundation curbs and gutters and sidewalks on Yates street between Douglass street and Blanchard street were opened. The city engineer's figures were \$6,923, while the other tenderers were Hugh McDonald at \$14,000, and Thomas Stedham at \$8,824. The city will do the work.

At a recent meeting of the city council tenders for the supply of the necessary parts to replace the defective portions of the pumping engines supplied by the D'Olier Engineering Works for the salt water high pressure system, were received from the John McDougall Company, of Montreal, for \$5,980 and \$6,480, and from J. B. H. Rickaby, Victoria, for \$5,864.19. The tenders were referred to the electric light committee.

Asphalt will be used largely in future street improvements, according to a report submitted by the city engineer which contains the following recommendations:—Manchester road, change from rock surface to asphalt; Richardson street, change from rock surface to asphalt; St. Lawrence, change from rock surface to asphalt, adding curb and gutter in two blocks only; St. Andrews street, change from rock surface to asphalt; Quadra street, between Blanchard and Hillside, change from tar macadam to asphalt; Langford street, change from rock surface to bituminous macadam; Gladstone avenue, change from rock surface to bituminous macadam; McKenzie avenue, change from rock surface to asphalt; Fell street, change from rock surface to bituminous macadam; Rockland avenue, between Vancouver and Moss, change from rock surface to asphalt and add curb and gutter and boulevards between Cook and Vancouver; Harbinger avenue, change from rock surface to asphalt; Fernwood road, change from rock surface to asphalt; Lotbiniere street, change from rock surface to asphalt; Craigflower road and Russell street, change from tar macadam to asphalt and add curb and gutter and sidewalk.

Winnipeg, Man.

The city council has passed local improvements to the extent of \$221,922. Most of this work goes to the city's engineer of construction.

AWARDED.

Collingwood, Ont.

The contract for 3,636 square yards of tar-lithic paving has been awarded to J. Conn, of Windsor, Ont., at \$1.55 per square yard. Westminster, Limited, of Brantford, Ont., submitted a bulk tender of \$7,000. Engineer, Mr. K. S. Macdonell.

Guelph, Ont.

The contract for the construction of 5,715 square yards of bituminous pavement was awarded to J. Conn, at 38 cents per foot; concrete, 63 cents per square yard;

surfacing, Westrumite, 3 inches, \$1.32 per square yard.

Swift Current, Sask.

Contract A, for laying sewer and water mains, etc., was awarded to Laidlaw & Macdonald, of Fort William, Ont., at \$39,179. The following bids were also submitted for contract A: M. A. Pigott, Kenora, Ont., \$49,737; W. Gray & Company, Winnipeg, Man., \$59,000; Broley & Martin, Fernie, B.C., \$71,535; McManus & Son, North Battleford, Sask., \$87,457; H. G. McVean, Moose Jaw, Sask., \$62,673. For contract B, the erection of disposal works, the successful tenderers were Laidlaw & Macdonald at \$8,299; M. A. Pigott tendered at \$11,801, and Broley & Martin at \$11,137. Contracts C and E were not awarded.

Winnipeg, Man.

The tender of Cottineau & Company for building of sidewalks was accepted by the Board of Works at \$1,026.40.

The contract for supplying the city with 2,000 5/8-inch water meters has been awarded to the National Meter Company, of Chicago, for "Empire" meters at \$11.75 each.

Railroads, Bridges and Wharves Brookville, Ont.

Plans and specifications have been prepared under the direction of the Department of Public Works, Ottawa, for the construction of a breakwater which will extend from a point west of the Block House Island, opposite the town, to the western extremity of the old C. P. R. pier. A sum was placed in the estimates last session for this work.

Campbellton, N.B.

Tenders will be called this week for the rebuilding of the roundhouse, repair shops and station offices of the Intercolonial Railway at Campbellton. The Dominion government has set aside \$250,000 for the purpose.

Edmonton, Alta.

An American company, believed to be backed by the J. J. Hill interests, is having surveys made for a line to run from the American boundary to Fort McMurray in the far North. The idea is to have this as a feeder for a fourth transcontinental road, which will be built across Canada to the north of existing lines. It is said that the company will build 100 miles of line before asking the government for the subsidy of \$13,000 a mile granted to all railroad companies in Alberta.

Montreal, Que.

The G. T. R. engineers, under the direction of Chief Engineer H. G. Kelley, are still at work on plans for the elevation of the G. T. R. tracks. There are thirteen level crossings in the city and the expenditure involved is four or five million dollars. Plans for the work were to have been filed with the Railway Commission by August 1st.

New Westminster, B.C.

Approval of their plans for extensive improvements at Gilley's wharf, involving an expenditure of about \$14,000, has been asked by the British Columbia Electric Railway Company. The mayor and board of works will report on the request.

It is stated that the C. N. R. are contemplating the expenditure of \$3,000,000 in New Westminster and vicinity. The plans include the erection of a large docks at Port Mann, an independent track into the city of Vancouver, and the making of a tunnel half a mile or more in length from the end of the Fraser river bridge to the depot.

Oak Bay, B.C.

The Dominion Government have refused to make an appropriation for a new wharf at this place.

Ottawa, Ont.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, will be received until August 22nd for placing stone protection, summit level, Kelland canal. Specifications and forms of contract may be obtained at office of superintending engineer, St. Catharines, Ont.

Tenders for straightening channel at head of Lock No. 2, Welland Canal, will be received until August 22nd by L. K. Jones, secretary, Department of Railways and Canals. Plans and specifications may be seen at office of superintending engineer.

St. Catharines, Ont.

It is stated by the Railway Department that no decision has been reached by the government as to whether the Hudson Bay Railway will be rebuilt by a private company or by the government. It has been suggested that because Mackenzie & Mann are to build the sub-structure of the Saskatchewan bridge, they also will build the railway. It is pointed out, however, that Mackenzie & Mann are general contractors as well as railway builders. They tendered for both the sub-structure and the superstructure and were successful in getting the contract for the former, but not for the latter. They have no arrangement with the government.

The C. P. R. are reported to have the following plans under consideration as regards Ottawa: To electrify the old Prescott line from the Union Station to the Sussex street station; to connect the Sussex street station with the mouth of the proposed tunnel by a surface electric line; to connect the Hull electric line with the line thus formed, which would create an electric belt line.

Port Arthur, Ont.

Tenders will shortly be called for an extension of the breakwater here to cost \$100,000, by the Dominion Government.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until August 31st for the construction of a breakwater at Bare Point, in the harbor of Port Arthur. Plans and specifications can be obtained at the Department, and at the offices of J. G. Sing, District Engineer, Confederation Life Building, Toronto, Ont.; E. B. Temple, District Engineer, Port Arthur, Ont., and J. L. Michaud, District Engineer, Merchants' Bank Building, Montreal.

Pelee Island, Ont.

Tenders for Pelee Island wharf extension will be received until September 12th next by R. C. Desrochers, secretary, Department of Public Works, Ottawa. Plans and specifications may be obtained at the department; at the offices of J. G. Sing, District Engineer, Confederation Life Building, Toronto; H. J. Lamb, District Engineer, London, Ont., and on application to the postmaster at Pelee Island, Ont.

Quebec, P. Q.

The time for receiving tenders for the Quebec bridge has been extended to October 1st. For further particulars see "Tenders and For Sale Department" of this issue.

Regina, Sask.

The route by which the G. T. P. will enter Regina has been given out. The city council is now considering a proposition of the Canadian Northern for joint passenger facilities with the G. T. P., and to make

Regina the chief divisional point for their systems in Saskatchewan, with large shops and freight terminals. The Canadian Northern has already expended upwards of \$300,000 on property for terminals at Regina and the company proposes the early expenditure of at least double that amount, for the establishment of the necessary equipment of its divisional point there.

St. Johns, Que.

The ratepayers have approved the construction of the St. Johns-Iberville bridge.

St. John, N.B.

Plans have been prepared for the new dry dock and ship preparing plant which the Dominion Dry Dock Company proposes to establish at Courtney Bay. The dock will be 1,000 feet long, and the whole plant of the most modern type. This is the company in which Sir Robert Perks, Harland & Wolff, the Canadian Pacific Railway, the Allan Line and the Dominion White Star Line are interested.

Shelburne, N.S.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until September 6th for the construction of a wharf at Shelburne, County of Shelburne, N.S. Plans, specification and forms of contract can be seen, and forms of tender obtained at the Department, and at the offices of Thomas J. Locke, District Engineer, Lockport, N.S.; C. E. W. Dodwell, District Engineer, Halifax, N.S., and on application to the Postmaster at Shelburne.

Spanish Ship Bay, N.S.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until September 6th for rebalasting, raising and extending the "Hartling Wharf" at Spanish Ship Bay. Plans, specifications and form of contract can be seen and forms of tender obtained at the offices of E. G. Millidge, District Engineer, Antigonish, N.S.; C. E. W. Dodwell, District Engineer, Halifax, N.S., and on application to the Postmaster at this place.

St. Leonards, N.B.

The Van Buren-St. Leonards International Bridge Commission will receive tenders at the office of the State Commissioner of Highways, at Augusta, Maine, until September 9th, 1910, for furnishing material and erection of highway bridge over the St. John river, between Van Buren, Maine, and St. Leonards, N.B. The length of bridge will be about 762 feet, between back walls, and about 2,200 cubic yards of masonry will be required. Proposals will be received separately for the masonry and for the superstructure. The masonry must be completed by December 1st, 1910, and the superstructure by April 1st, 1911. Specifications and general plan may be seen at the office of the Chief Engineer, Department of Public Works, Ottawa, Ont.; at the offices of the resident engineers, D. P. Works at Toronto, Ont., Montreal and Quebec, Que., and St. John, N.B.; or they may be obtained for one dollar on application to E. E. Greenwood, Engineer, Srowhegan, Maine.

Victoria, B.C.

The C. N. R. is negotiating with the provincial government with a view to undertaking its Vancouver Island line to Quatsino Sound.

Vancouver, B.C.

It is stated that the C. N. R. have started surveys for Port Mann, their new Pacific terminus.

Advices from Seattle, Wash., quote Jean Wolkenstein, president of the British Co-

lumbia & Alaska Railway Company, as stating that company proposed to build 800 miles of railway traversing the valley between the east and west ranges of British Columbia and extending from Vancouver to the northern British Columbia line. The line, as projected, will extend from Vancouver via Lytton and Fort George and thence north. The company also is contemplating a line into Skagway by way of Telegraph Creek and is now securing the right of way. Surveying parties are now in the field.

Warton, Ont.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until September 13 for an extension to the breakwater in Colpoys Bay. Plans and specifications at the Department at Ottawa, and at the offices of J. G. Sing, District Engineer, Confederation Life Building, Toronto; H. J. Lamb, District Engineer, London, Ont.; and on application to the postmaster at Warton, Ont.

AWARDED.

Berlin, Ont.

Intimation has reached us from the office of the People's Railway that the contract has been awarded between Berlin and Bloomingdale, 3 miles, on the main line to Guelph, to F. W. Maxwell, of Port Hope, to be built by December. The contract has also been let westerly from Berlin to New Hamburg, a distance of about 14 miles to D. B. Campbell, Latchford, Ont., to be completed by December 30th. The Acme Construction Company are doing the grading between Bloomingdale and Guelph. This work was commenced four weeks ago. The grading will be completed between Bloomingdale and New Germany within a week's time, and the balance will be completed by the 15th of December. The distance of grading which is to be completed by December is about 29 miles. The contract has also been awarded for all the concrete work along the line, including the three large piers and two abutments for the Grand river, east of Berlin, to Thos. Robbins, of Galt, to be completed by December 1st. The company will shortly put on a large force of engineers to survey the line from Guelph to Elora, Fergus and Arthur; and also to complete the survey from Guelph to Puslinch Lake. The company also intend to have a great deal of their line operating by July, 1911. In the year 1911, the company will complete 80 miles of railway and make extensions westerly to the lake.

Edmonton, Alta.

John Gunn & Sons, of Winnipeg, received the contract for the construction of the C. P. R. million-dollar high level bridge across the Saskatchewan. This bridge will be 2,800 feet long, and 156 feet wide.

Montreal, Que.

P. Perrigo, Eganville, Ont., has taken a sub-contract for grading 10 miles of road-bed for the G. T. R. in Quebec.

New Glasgow, N.S.

The W. P. McNeill Company, of this town, have been awarded the contract for the erection of a steel bridge of 3-span of 183 feet at Florenceville, N.B.; also one of one-span of 183 feet at Kouchibouque Village, N.B.; also one of one span of 117 feet at Little Bouctouche Mouth, N.B. Work on these will commence immediately.

New Westminster, B.C.

The contract for placing the dyking on the gulf side of Delta municipality in permanent repair has been let to H. V. Tuckett, of Vancouver, and work will commence immediately. The contract calls for 30,

000 yards of gravel at an average price of 85 cents per yard.

Ottawa, Ont.

The Department of Public Works has awarded the following contracts: Dredging in Miramichi Bay, N.B., to J. Poupore, of Montreal, and A. V. Loggie, approximately \$100,000 each; Montmagny dredging, L. Cohen & Son, Montreal, \$8,000; breakwater at Matane, N. Trudel, \$5,500.

The Randolph-MacDonald Company, of Toronto, has been awarded a \$10,000 contract for dredging the Cornwall canal.

The contract for the sub-structure of the bridge over the Saskatchewan river at La Pas, in connection with the Hudson's Bay Railway, has been awarded to Messrs. MacKenzie & Mann. The price is \$100,000. The contract for the iron work was let some time ago to the Canada Foundry Company.

A number of contracts have just been awarded by the Department of Public Works. For dredging in Miramichi Bay, N.B., W. J. Poupore, Montreal, and A. & R. Loggie, each got a contract for \$100,000 approximately. L. Cohen & Son, Montreal, will dredge at Montmagny, the total being about \$8,000, while N. Trudel will build a breakwater at Matane, costing \$5,500.

Port Arthur, Ont.

S. Brown, of Winnipeg, secured contract for big C. N. R. roundhouse and has started work. Solid brick and concrete foundation.

Pincher Creek, Alta.

J. A. McGuire is stated to have been awarded the contract for constructing a railroad from Pincher Creek station to Pincher Creek, and thence through the valley to Cardston.

Sault Ste. Marie, Ont.

P. Furlong, Eganville, Ont., and J. Hicks, Perth, Ont., are reported to have been awarded the contract for building the trestles and laying the steel for 80 miles of line for the Algoma Central.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

The Empire Hotel, which was partially destroyed by fire, will be rebuilt at a cost of \$20,000.

Calgary, Alta.

The Methodist Church are preparing plans for a college here.

W. B. Hall has taken out a permit to erect a solid brick three-storey hotel with concrete basement. Lang & Dowler, architects.

\$61,000 will be spent for new exhibition buildings.

Collingwood, Ont.

At a meeting of the city council a by-law to raise \$10,000 for the erection of a new fire hall came up for consideration but was ultimately left over until plans are secured from Architect Wilson. A by-law will probably be voted on at the municipal elections.

Darlingford, Man.

Tenders addressed to R. E. Fines will be received until August 22nd for the erection of a four-room brick school building. Plans and specifications may be seen with Mr. Fines at Darlingford, or at the office of the architect, Frank Evans, Somerset Buildings, Winnipeg.

Edmonton, Alta.

Tenders addressed to John Stocks, Deputy Minister of Public Works, will be received until August 20th for supply of sash,

doors and stair work for the public buildings of the provincial government. Plans, specifications and forms of tender may be had on application at Engineer's office, Department of Public Works, Edmonton, or at the branch office of the Department of Public Works, Calgary.

Fort William, Ont.

Tenders addressed to Frank Lee, secretary, West Algoma Agricultural Association, will be received until August 19th for the erection of a building on the Joint-Fair site. Plans of Carl Wirth, architect, Room 42, Murray Block.

Hood & Scott, architects, this city, are preparing plans for a new Jewish Synagogue.

A by-law will be submitted to provide for the erection of a city police station and court house building and for improvements to the city building.

Fort George, B.C.

A site has been selected for the new provincial buildings and construction will proceed immediately.

Hamilton, Ont.

The public library board has instructed A. W. Peene, architect, to prepare revised plans for the new Carnegie library.

Hatzic, B.C.

Tenders addressed to F. C. Gamble, Public Works Engineer, Victoria, B.C., will be received until August 31st for the erection of a large two-roomed school building. Plans, specifications, contract and forms of tender may be seen at offices of the Government Agent, New Westminster; R. C. Abbott, Secretary of School Board, Mission City, B.C.; and the Department of Public Works, Victoria, B.C.

Isabella, Man.

Tenders addressed to Wm. Iverach will be received until October 20th for the erection of a Presbyterian church at this place. Building to be completed by November 15 next.

Macleod, Alta.

The town council have received plans for the fair buildings to cost \$10,000.

Maisonnette, Que.

Tenders for the erection of new town hall will be received until August 17th by M. G. Erement, secretary-treasurer of this town. C. Dufort, architect.

Montreal, Que.

Tenders addressed to Ross & MacFarlane, architects, will be received until August 20 for the erection of Y. M. C. A. Building. Plans and specifications upon application to architects. R. C. Holden is chairman of the Y. M. C. A. Building Committee.

It is announced by the Harbor Commission that plans are being prepared for a new office building at the Montreal dock.

Meaford, Ont.

The Public School Board are asking the town council to provide \$3,400 for improving the heating and lighting facilities and furnishing additional sanitary appliances for the public school building.

Marieville, Que.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until August 31st for the construction of a public building at this place. Plans with H. N. Lynburner, Superintendent of Public Buildings, Post Office, Montreal; at the Post Office, Marieville, and at the Department at Ottawa.

Mortlach, Sask.

The Church of England will have a building erected. A. Cooper, secretary.

North Battleford, Sask.

Plans are being prepared for a new three storey hotel here for George Graves.

North Vancouver, B.C.

Tenders addressed to F. C. Gamble, Public Works Engineer, Victoria, B.C., will be received until August 30th for erection of a large two-room school building. Plans, and specifications may be seen at the office of A. Haslam, Provincial Timber Inspector, Vancouver; Mrs. E. J. Campbell, secretary to the North Star School Board, North Vancouver; and the Department of Public Works, Victoria.

Ottawa, Ont.

The Board of Control has endorsed plans for the new No. 4 fire station and tenders will be called for shortly. Architect Weeks.

Alterations costing about \$6,500 will probably be made at the Protestant hospital.

Ponoka, Alta.

Tenders addressed to John Stocks, Deputy Minister of Public Works, Edmonton, Alta., will be received until August 20th for the installation of elevator and laundry equipment at the asylum building. Specifications and forms of tender may be had on application at the Engineer's office, Department of Public Works, Edmonton, or at the branch office of the Department of Public Works, Calgary.

Phoenix, B.C.

The Methodist and Presbyterian churches, library, public school and other buildings, were destroyed last week in a fire which originated at the plant of the Granby Consolidated Mining & Smelting Company.

Regina, Sask.

The Evangelical Lutherans will build an academy to cost \$50,000. The city council gives a grant of \$8,000 in land.

Plans are being prepared by local architects for a fireproof library building to cost \$40,000. J. R. Honeyman is secretary of Library Board.

Ritchot, Man.

A school will be built for the Niverville school district to cost \$3,000.

Stirling, Ont.

Tenders will be received until August 20 for the erection of a five-room annex to high school building. R. F. Houston & Son, architects, Tweed, Ont.

Strathcona, Alta.

A new college for O. M. I. Order of the Catholic Church is to be erected here.

Wilson & Herald are the architects for the new school to cost \$15,000.

Saskatoon, Sask.

The Bank of Hamilton have taken out a permit for a new building; brick and stone. Smith & Wilson, contractors.

St. Boniface, Man.

The Grey Nuns are building an addition, and also plan a new seminary to be built this fall.

Sherbrooke, Que.

The Protestant School Board are considering the erection of a new school house.

Toronto, Ont.

Tenders will be received up to August 19th for the various trades required in the erection of a public school near Victoria Park, for Section 13, Scarborough. Address bids to Mr. A. Essex, secretary-treasurer, corner of Queen and Blantyre avenue,

Balmy Beach. Plans, specifications and all information may be obtained from Munro & Mead, architects, 86 Kingston road.

Victoria, B.C.

The Alexander Club, of Victoria, will erect a new club building in this town. Plans have not yet been drawn, but as soon as they are, tenders will be asked for and the work started forthwith.

The First Baptist Church will erect a temporary structure at the corner of Yates and Quadra streets pending the building of their new \$50,000 church.

Winnipeg, Man.

The plans for the police and fire alarm signal, building were submitted to the city council recently. The estimated cost was \$63,000. Friction between the police and electrical departments was responsible for having the plans sent back to committee. It is purposed now to make the structure four storeys high.

Tenders have been received for the new home for the congregation of Westminster church. The board has not met yet to discuss the tenders, but will probably deliberate on the matter at an early date.

The city has received seven tenders for the construction of two police sub-stations. They have been referred to the building inspector and will probably be let this week.

The Board of Control invites competitive plans from local architects until September 12th for the proposed tubercular hospital. M. Peterson, secretary.

It is proposed to build a new hospital in North Winnipeg at a total cost of \$150,000. The special committee behind the scheme includes Alderman Potter and Dr. Walters.

Competitive plans are to be called for the new tubercular hospital. The building must be capable of housing 100 patients and must be of fireproof construction, to cost not more than \$75,000.

Woodstock, Ont.

Plans for the new proposed city hall, prepared by Chapman & McGriffin, architects, Toronto, have been approved by the special committee of the city council.

Watrous, Sask.

Plans are under way for building three large sanitariums at Manitou Lake.

Wolseley, Sask.

A by-law authorizing the erection of a \$10,000 four-room school was passed recently.

Weston, Ont.

A site has been selected for the erection of a new building for the Weston High School.

AWARDED.**Brantford, Ont.**

The following contracts were awarded in connection with the Ryerson and King Edward schools: Plumbing and gas fitting, T. J. Minnis & Company, \$4,400; heating, T. A. Cowan & Company, \$7,600; electric wiring, F. Webster, \$100.

London, Ont.

The contract for reshingling the roof at the main building at the fair grounds was awarded to the Preston Company, at \$975.

Montreal, Que.

The Catholic School Board have taken out a permit for the erection of a new school on Visitation street, to cost \$105,000.

North Vancouver, B.C.

E. Dowie has the contract for a new school to cost \$2,575.

Outlook, Sask.

Alex. Johnston secured the contract for the Outlook school at \$17,500.

St. Joseph, Que.

The School Commissioners of the town of St. Joseph have awarded the contract for the erection of their new school to Liniere Vachon, at \$15,000.

Saskatoon, Sask.

Ramsdale & Robinson secured the contract for the new Methodist church.

Toronto, Ont.

Tenders will be received until August 19 for the various trades required in the erection of a public school near Victoria Park, for section 13, Scarborough, marked Tender for School, and addressed to Mr. A. Essex, secretary-treasurer, corner of Queen and Blantyre, Balmy Beach. Plans, specifications and all information may be obtained from Munro & Mead, architects, 86 Kingston road.

Virden, Man.

Geo. Harris was awarded the contract for building the new Parish Hall. Virden brick will be used.

The contract for the erection of a collegiate institute was awarded to W. T. Mauser, a local man, at \$18,765. Other tenders were: Geo. Harris, Virden, \$20,237, and W. H. Piggott & Son, Kenora, at \$24,400.

Vancouver, B.C.

The Masons of Grandview have decided to erect a temple and have purchased a site at the corner of Salsbury drive and First avenue, where it is intended to erect a public hall with commodious lodge rooms.

Winnipeg, Man.

The contract for the brick, masonry and structural steel work of the new children's hospital building was awarded to W. J. Davidson. The new building will be fireproof and will cost \$60,000.

Waskada, Man.

D. McLean secured the contract to erect the new municipal building.

Residences**Brandon, Man.**

J. Wyman has secured permits to erect two residences to cost \$3,800 each.

Grenfell, Sask.

Hohn's livery stable and residence and the blacksmith shop owned by Fleming Bros., were destroyed by fire last week at a loss of \$8,000.

Saskatoon, Sask.

F. A. Blain will erect a \$9,000 residence, solid brick and stone.

Victoria, B.C.

Plans have been awarded to Mr. W. Rochfort by a local syndicate for the erection of a large apartment block on the southeast corner of Vancouver and Coutte streets. It is the intention of the syndicate to start construction work as soon as possible.

Mr. W. S. Drewery, this city, will build a new residence at a cost of \$6,000.

Wainwright, Alta.

E. T. Stimpson, architect, is preparing plans for a residence for Councillor Logan.

Winnipeg, Man.

P. C. Samwell is completing plans for a three-storey apartment block to be built on Broadway for Kirkpatrick & Smith.

Business Buildings and Industrial Plants

Arnprior, Ont.

The Dominion Explosives, Limited, contemplate rebuilding their works at Sand Point, which were destroyed by fire last month.

Brandon, Man.

The C.T.P. has taken out a building permit to construct new freight offices on Leabella street. The cost is \$7,000. A permit has also been issued to the city for additions to the city offices on Rice street, also at a cost of \$7,000.

The contract for the C.N.R. hotel here will be let this week.

Brantford, Ont.

The Verity Plow Company will make extensions to its local works at an outlay of \$60,000.

Bryanston, Ont.

A. J. Burnett's general store was destroyed by fire last week at a loss of \$10,000.

Brockville, Ont.

The Merrill Block, occupied by S. H. Post, C. E. Johnston & Co., and others, was damaged by fire to the extent of \$8,000.

Calgary, Alta.

The Land & Agricultural Company of Canada are to build a large office building at Vernon, B.C. T. E. Crowell, of Vernon, has the contract. It will be of reinforced concrete.

Fort Frances, Ont.

The sawmills of the Fort Frances Lumber Company were destroyed by fire last week at a loss of \$60,000.

Fort William, Ont.

According to a recent dispatch from this city, a contract for a large coal handling plant for the Fort William Coal Dock Company, of this city, has been let, and construction will be commenced at once. The first unit of the plant, which will be completed in less than two months, will cost about \$170,000. The unloading capacity will be 4,000 tons in ten hours.

Hood & Scott, architects, this city, have plans for a \$15,000 apartment block for John Garrity, real estate agent, this city.

Galt, Ont.

A committee comprised of Mayor McLellan, C. J. Shurly, David Anderson, A. J. Oliver, and others, has been appointed to consider ways and means for the erection of a consumptive sanatorium in the county of Waterloo.

Montreal, Que.

It is reported that two prominent English firms will shortly locate branches in Montreal. The George Anderson Company, manufacturers of cranes and stove machinery, will build a large factory here at once, and expect to occupy it by May 1st next. They also expect to build shops in some western Ontario town. The second concern is the Cleveland Bridge & Engineering Company of Darlington, England, which will locate shops in Montreal. This firm has tendered for the Quebec bridge, and in the event of securing the contract will establish large plants at both Montreal and Quebec.

Tenders for office building on the wharf at section 15 will be received until August 30th by David Seath, secretary-treasurer of the Harbor Commission. Separate tenders for plumbing and heating. Plans of F. W. Cowie, chief engineer, Harbor Commissioner's office, city.

The city building department has granted

of permits for the construction of three factories in the city representing a total expenditure of \$41,500. The Canada Sugar Refining Company is building a new factory on St. Patrick street at a cost of \$18,000; the Pipper Light and Power Company is constructing a similar building on St. Remi street, St. Henri, also at a cost of \$18,000, and James Robertson has a permit to put up a factory on Shannon street costing \$5,500.

At an early date extensive alterations will be started on the premises of the Shedden Forwarding Company, at Victoria Square.

Norway Bay, Que.

An Arnprior despatch states that a company composed of Ottawa, Renfrew and Arnprior capitalists has been formed with the intention of erecting a large hotel at this point.

Niagara Falls, Ont.

The Hawes-von Gal Hat Co., of Danbury, Conn., is reported to have decided to establish a Canadian branch and will erect a factory at Clifton avenue and Queen street, Niagara Falls.

Owen Sound, Ont.

J. A. Minchener, of Stratford, Ont., proposes to establish a furniture factory in this town. A by-law to raise a loan of \$20,000 will be submitted to the ratepayers on August 27th.

Peterborough, Ont.

The Peterborough Canoe Company will enlarge their plant at an estimated cost of \$10,000.

Port Arthur, Ont.

The secretary of the Board of Trade states that six factories costing over \$700,000 will be put up this year here.

Rainy River, Ont.

The Rainy River Lumber Company's lumber sheds and contents were burned down on August 9th at a loss of \$100,000.

Regina, Sask.

Local tenders have been received by the city engineer for erection of an office building, cottage and greenhouse. L. A. Johnston, city engineer.

Pat Burns, of Calgary, is to have a large abattoir and pork packing plant erected in Regina. Plans will not be ready until the fall.

St. Croix, Que.

The Church of Our Lady of the Sacred Heart was struck by lightning and destroyed by fire at a loss of \$25,000.

Truro, N.S.

Mr. Geldert, grocer, sustained loss by fire on house and shop to the extent of \$2,000.

Toronto, Ont.

The City Architect has issued permits for the construction of a four-storey store and office building at the corner of Yonge and Richmond streets to cost \$72,000, and for a \$20,000 residence on Roxborough street for Mr. W. P. Murray.

Robins, Limited, have purchased the corner of Richmond and Victoria streets, and will erect an office building thereon.

S. F. McKinnon & Company are planning the erection of a large warehouse.

W. J. McGuire, Limited, have withdrawn their tender for heating the palm house at the Allan Gardens.

The Penfold Varnish Company were refused permission to build a factory on Macaulay avenue.

Vancouver, B.C.

The directors of the Strathcona Institute have \$25,000 on hand towards the erection of their new building and hope to commence operations at an early date.

Victoria, B.C.

Work will commence at once on the erection of the new business block which Mr. A. E. Todd will erect at the corner of Cook and Fort streets. The structure will be one storey in height with basement and will be occupied by nine stores. Adjoining will be erected a green house. The cost of the building will be \$20,000. G. C. Mesher & Company are the architects and contractors.

In connection with a report that the Swift Packing Company, of Chicago, was about to commence operations in this city, Mr. J. Y. Griffin, who represents Swifts in Vancouver, states that he is unaware of any such intention on the part of the big meat packing establishment. In connection with the report it is stated on good authority that Swifts have secured options on desirable sites for offices and warehouses.

Welland, Ont.

The Hamilton Tube Company and the Chapman-Holden Knitting Company, both of Hamilton, are considering the establishment of plants in this city.

Winnipeg, Man.

Competitive plans are to be called for the erection of a tubercular hospital for this city. \$75,000 has been voted for this building.

J. D. McArthur, contractor for the National Transcontinental Railway, it is stated, will build a warehouse costing \$51,000, on McDermott avenue, between King and Princess streets.

It is reported that J. B. Brown, printer, will build a business block on Vaughan street, near Portage avenue.

Regina, Sask.

The King Edward block at St. James' was destroyed by fire last week at a loss of \$10,000. The losers are N. McDonald, A. J. McDonald and others.

Christ Church site, corner of King and Henry streets, has been sold, and a Montreal firm have secured the site through E. M. Counsell, their agent here. A large warehouse, covering the entire space, will be erected.

Tenders for construction of new elevators will be received by the Engineering Department of the Manitoba Elevator Commission up to August 20th. Plans, specifications and form of tender may be obtained at the office of the Commission, 279 Garry street.

According to a Winnipeg despatch, a palatial hotel two hundred feet square, of nearly five hundred rooms, to cost nearly two millions, will be built at once by the G. T. P. in Winnipeg. President Hayes made the announcement, adding that representatives of Ross & MacFarlane, the Montreal architects, are now in Winnipeg preparing the plans. Work is to be commenced as soon as the frost is out of the ground next spring.

Semens & Ebel have commenced work on their casket factory to be located on Ross avenue. It will be four storeys high and the estimated cost is \$40,000. Jas. Chisholm & Son, architects.

Woodstock, Ont.

It is reported that the Hutchison Fibre Board Folding Box Company, Limited, of

(Continued on page 28)

Tenders and For Sale Department

Department of Railways and Canals

QUEBEC BRIDGE

Tenders for Superstructure

Notice to Contractors

Extension of Time for Receiving Tenders

The time for receiving tenders for the superstructure for the Quebec Bridge advertised to be received up to the 1ST OF SEPTEMBER, 1910, is hereby extended for one month, viz.: up to the first of October, 1910.

By Order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 9th August, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 35

Tenders

for

Electric Lighting

Sealed tenders addressed to the undersigned and marked "Tenders for Electric Lighting" will be received at the office of the City Clerk, Charlottetown, Prince Edward Island, until 12 o'clock noon on SATURDAY, THE 10TH DAY OF SEPTEMBER, 1910, for supplying the City of Charlottetown with Electric Light for Street and Commercial purposes. Tenders to state price and illuminating capacity per lamp for street light, and rate per kilowatt hour for commercial lighting.

The lowest or any tender not necessarily accepted.

Further information can be obtained by applying to the office of the CONTRACT RECORD, 504 Confederation Life Building, Toronto, or to

W. W. CLARKE,
City Clerk.

Charlottetown, P.E.I., July 20th, 1910. 34

Tenders Wanted

Tenders will be received by the undersigned until noon of SATURDAY, THE THIRD DAY OF SEPTEMBER, 1910, for the construction of the Drainage Work in the Township of Mountain, in the County of Dundas, known as the Van Camp Creek Drain. The profile of the said drainage work and the plans and specifications in connection therewith may be seen during business hours at the office of the undersigned clerk.

Tenderers will be required to state the price per cubic yard for which they will undertake the work of excavation and also the bulk sum for which they will construct the work (farm and road bridges excepted). Each tenderer must deposit with his order a certified cheque payable to the order of the Corporation of the Township of Mountain for five per cent. of the amount of his tender, which will be returned in case the proposal of the party tendering is not accepted, or in case of the acceptance of the proposition, if the tenderer within five days after being notified so to do by the township's solicitor, refuses or neglects to enter into an agreement for the construction of the work with two sufficient sureties.

Forms of tender may be obtained at the office of the Township Clerk.

Dated this 8th day of August, A.D. 1910.

HUGH MARTIN,
Township Clerk.

Hallville, Ont. 33

Town of Dauphin

Province of Manitoba

Water Works and Sewerage

Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on THURSDAY, SEPTEMBER 1ST, 1910, for the following:

Contract "A"—Labor, laying about six miles of water pipes and sewers; sub-divided into two sections.

Contract "D"—Furnishing cast iron water pipe and special castings.

Contract "E"—Furnishing gate valves for fire hydrants, etc.

Contract "M"—Labor and materials for ten miles of gravity main; sub-divided into three sections.

Contract "R"—Constructing concrete reservoir.

Contract "S"—Furnishing sewer pipes.

Contract "W"—Furnishing wooden stave pipe.

Plans, specifications, etc., may be seen at the Town Hall, Dauphin, or at Engineer's offices, Winnipeg and Toronto.

No tender necessarily accepted.

R. C. SPARLING, Esq., Mayor.
J. W. JOHNSTON, Esq., Secretary-Treasurer.
J. A. CAMPBELL, Esq., Chairman.
CHIPMAN & POWER, Engineers.



City of Peterboro

Province of Ontario

Notice to Contractors

Sealed tenders will be received by the City Clerk until 8 p.m. on THURSDAY, SEPTEMBER 1ST, 1910, for the following works:

Contract "A"—1. Laying 2,000 feet Sanitary Sewer.

2. Laying 4,200 feet Storm Drains.

Contract "G"—Electrically operated Air Compressor and Ejectors.

Contract "P"—Sewage Pumping Station.

Contract "S"—Tile Sewer Pipes 30-inch to 8-inch.

Plans and specifications, etc., may be seen at the City Engineer's office, Peterboro, or at the office of Consulting Engineers, Toronto.

ROBERT HICKS, Esq.,
Board of Works.

T. A. S. HAY, Esq., C.E.,
City Engineer.

R. S. ARMSTRONG, Esq.,
City Clerk.

CHIPMAN & POWER,
Engineers, Toronto.

Miscellaneous

Advertisements under this heading two cents a word per insertion.

CONTRACTOR'S OUTFIT FOR SALE—Six Wheeler, No. 8, concrete line plant, nearly new. Owner going into another line of business. Joseph Patterson, Box 114, St. Marys, Ontario. 35

Hydro-Electric Power Commission of Ontario

Tenders for Port Credit Transformer Station

Tenders will be received up to 5 p.m. MONDAY, AUGUST 29TH, 1910, for the construction of a Transformer Station Building near Port Credit, according to drawings and specifications to be obtained at the offices of the Commission, Continental Life Building, Toronto, on or after Tuesday, August 16th, 1910.

Separate tenders for structural steel work will receive consideration.

A certified cheque for five per cent. of the amount tendered must accompany each tender.

The lowest or any tender not necessarily accepted.

Tenders must be sealed and addressed to Hon. Adam Beck, Chairman, Hydro-Electric Power Commission, Continental Life Building, Toronto, and marked "Tender for Port Credit Transformer Station."

Newspapers inserting this advertisement without authority will not be paid for same. 33

Town of Estevan Province of Saskatchewan

Electric Lighting and Sewerage

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on WEDNESDAY, AUGUST 24TH, 1910, for the following works:

Contract "A"—Pipe-laying on Storm Sewers.
Contract "B"—Power House.
Contract "H"—Two Return Tubular Boilers.
Contract "J"—High Speed Steam Engine.
Contract "K"—Electric Lighting System.
Contract "S"—Sewer Pipe.

Plans and specifications may be seen at the office of the engineers, Winnipeg, and Toronto, and at the Town Hall, Estevan.

J. G. HASTINGS, ESQ., L. A. DUNCAN, ESQ.,
Mayor, Estevan, Sask. Secretary-treasurer,
Estevan, Sask.

CHIPMAN & POWER, Engineers,
Winnipeg and Toronto.

33

Business Buildings and Industrial Plants

(Continued from page 27)

Muskegon, Mich., will locate here, the city furnishing factory and site.

Negotiations are said to be nearing completion for the establishment of a steel manufacturing concern here.

The publicity committee report that an American concern will establish a branch here to be known as the Canadian Linderman Machine Company with a capitalization of \$105,000.

Windsor, Ont.

The ratepayers have approved the by-law to exempt from taxation the Windsor Shirt Company for its new plant here.

Wynyard, Sask.

The Northern Elevator Company have secured a site here and will build at once. Another elevator company is also locating a site.

The Toronto Type Foundry have secured a site on which to erect a \$10,000 solid brick building.

Wadena, Sask.

Richardson & Company are erecting an elevator here. The British North Ameri-

can Elevator Company will also build at once.

AWARDED.

Brandon, Man.

The contract for a seven-storey hotel for the Canadian Northern here was awarded to Thomas Kelly & Sons, Winnipeg.

Wm. Bell secured the contract to erect the Cockshutt Plow Company's warehouse, 85 x 120 feet, to cost \$25,800. Another building may also be erected this fall. J. Inkster is manager.

Halifax, N.S.

The Halifax Cold Storage Company have awarded a contract for erection of a new warehouse building on Lower Water street to L. B. Fader, and H. R. Silver & Company, and are having a storehouse erected on Upper Water street.

Winnipeg, Man.

J. H. G. Russell, architect, McArthur Building, has awarded contracts aggregating \$45,000 for a new four-storey brick factory of mill construction for Stabart Sons & Company, Winnipeg, as follows:—Wm. Carter, masonry, plastering, carpentry, sheet metal work and roofing; Charles E. Gate & Sons, plumbing and heating; Taylor Painting Company, painting.

Victoria, B.C.

The Westholme Lumber Company, of this city, have obtained the contract at \$51,000 for the erection of the Ladies' Club building to be erected by the Alexandra House Committee. D. C. Frame, architect.

Power Plants, Electricity and Telephones

Blyth, Ont.

We are informed that the Blyth electric light plant was taken over by the Molson Bank, of London, Ont., June 1st, and is for sale, together with a sawmill.

Brockville, Ont.

The Brockville Light & Power Department has rejected the bids for the construction of the new power house adjoining the pumping station for the purpose of combining the two plants, owing to the bids being too high, and will do the work by day labor.

Bracebridge, Ont.

The towns of Bracebridge and Huntsville, Ont., have sent representatives to confer with Hon. Frank Cochrane, Minister of Lands, Forests and Mines, in reference to the High Falls water power. The town of Bracebridge has a lease to High Falls water power with development privileges, but, according to the municipality of Huntsville, has neglected to utilize its privilege, and the town of Huntsville is anxious to obtain the right to develop the power. The government has promised to look into the matter.

Cobalt, Ont.

A. Ferland, Charles A. Richardson, W. C. Chambers, A. J. Burdett and W. A. Gordon have been granted permission by the Government to build a railway into Porcupine as a feeder to the Temiskaming & Northern Ontario Railroad. The proposed railway will be about 40 miles in length and will be operated by electricity. Power will be obtained from High Falls on the Mattagami river, for which surveys are now being made.

Charlottetown, P.E.I.

Sealed tenders will be received at the office of W. W. Clarke, city clerk, Charlottetown, until September 10th for supplying electricity for lighting the streets of

Charlottetown and for commercial purposes. Bidders are to state price and illuminating capacity per lamp for street lamps and rate per k.w. hour for commercial lighting. For further information apply to the city clerk.

Edmonton, Alta.

Plans have been submitted by City Engineer Latourne for the east end extensions of the street railway system. It is understood that bids will be called for immediately.

Lanark, Ont.

It is reported that T. B. Caldwell, of Lanark, has purchased the water power at Playfair, Ont., which he proposes to develop and transmit to Lanark to operate his factory. It is estimated that 500 h.p. can be developed.

Moosomin, Man.

Tenders addressed to J. E. Easton will be received until August 23rd for building 34 miles of telephone line.

Ottawa, Ont.

The Ottawa Electric Light, Heat & Power Company has been granted a permit to construct a sub-station on Slater street, at a cost of \$18,000.

St. Catharines, Ont.

The ratepayers on July 29th voted in favor of the by-law granting the Ontario Power Company, of Niagara Falls, Ont., a franchise to furnish electricity in St. Catharines.

Toronto, Ont.

Tenders will be received up to August 29th for the construction of a transformer station building, near Port Credit, according to drawings and specifications to be obtained at the offices of the Commission, Continental Life Building, Toronto. Separate tenders for structural steel work will receive consideration. Tenders must be addressed to Hon. Adam Beck, Chairman of Hydro-Electric Power Commission, Continental Life Building, Toronto.

Winnipeg, Man.

Tenders addressed to the Chairman of the Board of Control and marked on the envelope "City of Winnipeg Electrical Distribution System, Tender for Cable," will be received by M. Peterson, secretary of Board of Control, until September 1st for the manufacture, delivery and installation 46,000 feet of thirteen thousand volt, three-core cable. Copies of the specifications and form of tender may be obtained at the power engineer's office, Carnegie Library building, Winnipeg. These specifications may also be examined at the offices of Messrs. Smith, Kerry & Chace, Confederation Life Building, Toronto.

AWARDED.

Belleville, Ont.

The contract for the electric plant for the city pump house has been awarded to the Canadian General Electric Company at \$2,660.

Galt, Ont.

The town council, in addition to awarding the contract for the step-down transformers for hydro-electric power to the Packard Electrical Company, have also placed an order with the same company for all of the service transformers to be used in distributing the power in Galt. The step-down transformers are composed of three 150 k.w. units. The service transformers total about 500 k.w., made up of 60 units, varying in size from three 20 k.w.

London, Ont.

The city has awarded the contract to the Packard Electric Company for all the ser-

vice transformers required for distribution of hydro-electric power in London.

New Hamburg, Ont.

The Packard Electrical Company have been awarded the contract for the step-down transformers for hydro-electric power for this town. The step-down transformers are composed of three 75 k.w. units. The service transformers total about 200 kilowatts make up of 13 units varying in size from three 20 k.w.. E. B. Merrill is consulting engineer.

Stratford, Ont.

The municipality of Stratford is reported to have placed an order with the John Forman Company, of Montreal, Que., for 800 75-watt tungsten street lamps.

Sherbrooke, Que.

The Sherbrooke Street Railway Company has awarded the contract for the construction of its power house in Sherbrooke to the Bishop Construction Company, of Montreal, Que. The Jenckes Machine Company, Limited, of Sherbrooke, has the contract for furnishing hydraulic machinery, and the Canadian General Electric Company for electrical equipment. About 1,250 horsepower will be developed. Ross & Holgate, of Montreal, Que., are consulting engineers.

Vancouver, B.C.

The Electrical Construction Company has received the contract for the installing of ornamental street lighting, at \$15,940. The contract for lamp standards was let to the Ross and Howard Iron Works, at \$45 each. Other bidders for material, etc., were: The Hinton Electrical Company, at \$17,625; Cope & Son, \$21,875; for lamp standards, The Vancouver Engineering Works, Limited, at \$49 each.

Miscellaneous

Hamilton, Ont.

Recent building permits include: Ed. New, two brick dwellings, Sophia street, near King, \$2,500; F. J. Rastrick & Sons, brick dwelling, Aberdeen avenue and Hess street, for Mrs. John Calder, \$3,800.

Montreal, Que.

Tenders addressed to L. N. Senecal, secretary, Board of Commissioners, will be received until September 12th for supply of steam fire engine. Full particulars and specifications upon application.

North Vancouver, B.C.

Voting took place last week on six by-laws. Of these three were for the purpose of enabling the city to raise loans for the purchase of school sites, the fourth to raise \$31,120 for park and other purposes, the fifth to obtain powers to dispose of an unsuitable school site, and the sixth to obtain a loan of \$26,000 to carry out sewerage work on Lonsdale avenue. All the by-laws were approved of, except that relating to Lonsdale sewerage, which was defeated.

Ottawa, Ont.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until September 12th for the construction of a one yard dipper dredge for Prince Edward Island. Plans, specifications, and form of contract can be obtained at the Department, and at the offices of C. E. W. Dodwell, District Engineer, Halifax, N.S.; E. T. P. Shewen, District Engineer, St. John, N.B.; J. B. Hegon, District Engineer, Charlottetown, P.E.I.; J. G. Sing, District Engineer, Confederation Life Building, Toronto, Ont., and J. I. Michaud, District Engineer, Merchants Bank Building, St. James street, Montreal, Que.

Recent building permits include: W. A. and J. B. Lamb, brick addition to warehouse, Queen street, \$9,000; B. P. Dewar, brick addition to dwelling, Wilbrod street, \$3,000; Wm. Fields, brick veneer dwelling, Sweetland avenue, \$2,500; N. D. Porter, alterations and solid brick addition to dwelling, Somerset street, \$8,500.

Toronto, Ont.

Recent building permits include: Austin Construction Co., pair semi-detached 2-sty. and attic brick dwellings, Binscarth road, \$6,000; J. E. Peterkin, pair semi-detached 2-sty. brick dwellings, Symington, \$4,000; Wm. Cayea, 2 detached 2-sty. brick dwellings, 115-117 Sorauren, \$5,000; H. Watkinson, 3 attached 2½-sty. brick dwellings, Hook avenue, \$7,000; Weismiller & MacKenzie Bros., 3 detached 2-sty. brick dwellings, near Roncesvalles, West Marion, \$9,000; Garfunkel & Goldstein, pair semi-detached 2½-sty. brick dwellings, corner Baldwin and Augusta, \$8,000; D. A. Williams, 2-sty. brick dwelling, Westminster, \$4,000; C. D. Easton, pair semi-detached 2-sty. brick dwellings, Prospect, \$4,000; A. Bollard, 2 detached 2-sty. brick dwellings, Binscarth road, \$10,800; W. S. Grimshaw, 6 attached 3-sty. brick stores and dwellings, 954-964 College street, \$20,000; W. B. Galbraith, one 2-sty. and one 2½-sty. brick dwellings, near Highland, Glen road, \$8,000; H. W. Campbell, 2½-sty. brick dwelling, Annette street, \$4,900; Toronto Auto Garage & Motor Co., 2-sty. brick and steel garage, 21 Dupont street, \$20,000; Separate School Board, 2-sty. brick addition to school, Bolton avenue, \$9,000; Hugh McWilliams, 2 pair semi-detached 2-sty. brick dwellings, St. Helens avenue, \$11,000; L. Stone, pair semi-detached 2-sty. brick dwellings, Shaw street, \$4,000; J. H. Lennox, 2 pair semi-detached 2-sty. brick dwellings, Hartford, \$8,000; J. J. Walsh, 4 detached 2½-sty. brick dwellings, Starr avenue, \$10,000; Geo. T. Lea, 2-sty. brick dwelling, near Conduit, Woodville, \$4,000; R. O. Dickson, pair semi-detached 2-storey and attic brick dwellings, corner Empress and Starr, \$4,400; J. J. Tracy, pair semi-detached 2-sty. brick dwellings, near Bloor, Lansdowne, \$4,600; Mr. Goldstein, pair semi-detached 2½-sty. brick dwellings, Esther street, \$4,600; Miss Wilhelm, pair semi-detached 2½-sty. brick dwelling, Carlaw avenue, \$4,000; J. H. Stanford (in trust), 3 pair semi-detached 2-sty. brick dwellings, Bathurst, \$12,000; Mrs. S. Armitage, 2-sty. brick dwelling, Sunnyside & Geoffrey, \$4,000; Nasmith Co., Ltd., 2-sty. brick factory and stables, Duchess street, John Morrison, 4-sty. brick apartments, Jarvis street, \$20,000; Ambrose Kent, alterations to store, near Yonge, on Richmond street, \$5,000; Dr. Hamill, 3 attached 2-sty. and attic brick dwellings, near Medcalfe, Salisbury, \$6,000; H. L. Hees, 2-sty. and attic brick dwelling, near Lowther, St. George, \$17,000; R. Millichamp, 2½-sty. brick dwelling, corner Dunvegan and Heath, \$9,600; Robert Simpson Co., 3-sty. concrete and steel waggon storage and harness shop, Dalhousie street, \$53,000; J. Gibson, pair semi-detached 2-sty. brick dwellings, near Wallace, Lansdowne, \$4,500; Elliott Mfg. Co., 1-sty. brick and steel warehouse, Cherry street south, \$5,000; Ideal Women's Ware Co., additional storey to factory, King street west, \$15,000; Canada Linseed Oil Co., 3-sty. brick and concrete oil mills, Sorauren avenue, \$35,000; Davis & Moore, pair semi-detached 2-sty. brick dwelling, Perth avenue, \$4,500; Wm. Priest, 3 pair semi-detached 2-sty. and one detached 2-sty. brick dwellings, near Wallace, Symington, \$10,000; Michie & Co., 2-sty. brick stable, 40 Hayter street, \$12,500; H. W. Macdonald, 3-sty. brick bank, store

and lodge rooms, corner Bloor and St. Clarens avenue, \$14,000; Nelson & Temple, pair semi-detached 2½-sty. brick dwellings, corner Dewson & Havelock, \$4,500; J. B. Reid, 2½-sty. brick dwelling, corner Elm and Sherbourne, \$10,000; Dr. J. D. Webster, 2½-sty. brick dwelling, 907 College street, \$9,000; Roberts Bros., pair semi-detached 2½-sty. brick dwellings, near Wallace, on Symington, \$4,500; R. H. Graham, 3 attached 2-sty. brick stores and dwellings, 1227, 1229 and 1231 Bloor street west, \$6,600; P. Shulman, alterations and additions to pair stores, near Bathurst, Queen, \$6,500; W. P. Murray, 2½-sty. brick dwelling, near Whitney avenue, East Roxboro, \$20,000; Hoberlin Bros., 4-sty. brick office and show rooms, corner Yonge and Richmond, \$72,000; Albert Breckon, pair semi-detached 2-sty. brick dwelling, near Queen, Booth, \$5,000; F. H. B. Lyon, 2½-sty. brick dwelling, near Beech, Balsam, \$5,000; F. W. J. Hill, 3 attached 2-sty. brick dwellings, near Hickson, Brock, \$6,000.

Victoria, B.C.

Recent building permits include: Miss M. Jones, dwelling on Rockland avenue, to cost \$6,750; Ernest McDonald, dwelling on Fisguard street, to cost \$2,850; A. E. Fodd, for the erection of a block on the corner of Cook and Fort street, \$20,000.

Vancouver, B.C.

Recent building permits include:—Seventh Avenue Methodist Church, 1826 Seventh avenue east, \$5,000; All Saints' Church, 128 Victoria drive, \$2,900; Vancouver Breweries, addition to Waverley hotel, \$8,500; C. P. R., 1725 Eleventh avenue west, \$3,550; P. Torrance, 926 Fourteenth avenue west, \$3,000; G. Simpson, 1924 Charles street, \$2,500; addition to the school corner of Broadway and Clark drive, \$50,000; new school, corner Charles street, \$26,000; L. Wett, 895 Granville street, \$5,000; A. Munro & Son, 2528 Woodland, four houses, \$10,000; J. B. Arthur, dwelling, \$3,500; W. Parsons, frame house, \$3,500; National Theatre Co., Hastings street, \$15,000; A. Knight, 2835 Spruce street, \$5,000; J. Tarleton, 757 Tenth avenue east, \$2,500; A. Farmer, 2139 Victoria drive, 3 houses \$6,000; A. Knight, 2847 Spruce street, \$6,000.

Winnipeg, Man.

The Board of Control are considering the erection of a municipal gas plant. Plans are being prepared by the City Engineer. The by-law authorizing the expenditure of \$600,000 for civic gas works has already been passed.

Extensions to the city's high pressure protection system costing over \$200,000 will be carried out. The city will also start a salvage corps for fire work. This initial cost will be \$24,258.

AWARDED.

Minneapolis, Minn.

For spillway and intake structures for a dam the Minnedosa Power Company awarded a contract to A. Stewart & Company, Winnipeg, at \$15,000. Other prices were: \$24,355 and \$19,500.

Ottawa, Ont.

The Northern Electric & Manufacturing Company, Montreal, have been awarded contract for supply of five Gamewell Standard "Excelsior" fire alarm boxes at \$100 a box, f.o.b. Ottawa.

Walkerton, Ont.

For supplying cement to the town the lowest bid was from S. W. Vogan at \$1.75 per barrel delivered. He was awarded the contract. C. J. Schnurr tendered at \$1.77 and J. J. Zettler at \$1.77½.

Contract Record

ESTABLISHED 1886

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Municipal Progress, Advance Information

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W. A. MOUNTSTEPHEN, Representative

SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto August 17, 1910

No. 33

Building Progress Well Maintained

Despite the approach of fall and the uncertainty felt in some quarters regarding the crop outcome, building activities are well maintained and there is a good volume of work projected. From some points, notably in western Canada, a lull in new work is reported. When we have received more reliable particulars about the crop, however, and the general public has a clearer idea of what the situation really is, it is quite possible that there will be a reaction, in the wake of which will follow many new projects. Supply dealers have had little to complain of this season. Across the border there was quite a depression following the early news of serious crop damage, but there was practically no reflex here.

The question was recently raised in a western city as to the right of the city engineer to bid upon city work, to be performed by day labor, as a means of restricting bids of contractors to reasonable amounts. Contractors in such competition would probably not raise very much objection to the additional bidder, if the same restrictions were laid upon the engineer that are laid upon them. If his bid had to be guaranteed to come within the figure and to be secured by a bond, as the regular contractors must do, the competition would not prove so very objectionable.

A circular issued by an insurance company calls attention to the danger to brick and stone buildings, by using wooden cornices, declaring that many have been burned from fires which communicated along the wooden cornices. It states that metal cornices are far more lasting and cost but little more than wood, while terra cotta cornice work is exceedingly decorative and can be secured effectively in the wall and become as enduring as the structure itself.

Is the Architect or Builder Responsible?

A somewhat curious accident was the cause of the death of a laborer in London recently, and the principal facts were elucidated at the Coroner's Court later. It appeared that a new building was to be erected on a site partially covered by an existing house that had been built many years ago. The architect, in designing the new building, found than an existing gable wall coincided with a required wall in the new premises. It was arranged, therefore, that the demolition should not be complete, but that the wall in question should, as far as necessary, be left standing and utilized in the new work. No doubt a saving of expense entered largely into the reasons for the proposal. The work proceeded in accordance with this arrangement, and at the time of the accident the condition was that the building had been demolished, except the wall, some 8 feet or 9 feet high. On one side of the wall the ground remained clear and on the other some tons of ballast were stored. During the shifting of this, a considerable portion ran down the slope of the heap and rested 2 feet or 3 feet deep against the lower part of the wall. The lateral pressure proved too much for the wall's stability, and it fell over, killing a man in so doing.

In commenting upon this a London building paper says: An examination made of the material of which the wall was composed showed that the mortar was much decayed and the bricks, a common stock, were not properly bedded. On one side the pointing had been removed, and on the other a plaster surface prevented a close examination of its condition. These circumstances afforded an opportunity for the rotten state of the wall to escape notice. It is questionable, however, if such should have been the case. Before any portion of an old building is incorporated in a new, it would appear to be a *sine qua non* that its strength should approximate to that of the structure to be erected. During the demolition of the other and principal part of the building it should have been possible to ascertain to a great extent the general condition, and unless the part pulled down was much more sound than that left, an unlikely event, knowledge should have been gained to warrant a total demolition. Further, it is not impossible to a practical man to easily find where unsound work exists. There was no evidence that this had been done. The jury brought in a verdict of "Accidental death," and added no rider. Beyond this we have no intention of going, but the question will necessarily arise who should be responsible in such procedure as here illustrated, independently as to whether or not an accident is the result. An architect wishes, no doubt, to carry out his work as reasonably as possible, but his knowledge must be such that his plans and specifications involve the use of nothing defective.

A builder's point of view, if he contracts at competitive prices, is somewhat different. If he sees that a mistake, or potential causes for mistakes, are given to him in the conditions under which he tenders, it may be to his advantage to keep silent until the contract is signed. An error afterwards discovered is often an opportunity to increase profits; such cases have been known. But the concealment of a mistake until dangers arise can have no justification, and a builder would show up badly if such a fact could be definitely proved. A foreman, again, should undoubtedly draw attention to such an occurrence immediately it becomes known to him, and any neglect to do so would throw upon him a responsibility from which he would have a difficulty to free himself. These three should be sufficient to enable errors to be discovered, but it is probable that the di-

vision of authority enables detection of a fault to escape, each relying upon the other. It is a pity that this should be so, but it is difficult to devise a means of altering and improving the system.

Time Limits in Contracting and Responsibility for Errors

Editor, "Contract Record":

In your editorial on the above subject published July 13th last, you touched upon some very vital matters. but the remedying of such evils as you discuss is a very big task. An engineer or an architect should certainly study the interests of fair competition and allow ample time both for figuring on the work and for its completion. It is manifestly unfair for them to set an inadequate time limit and then blame the contractors for subsequent mistakes. Of course it can very well be argued that the contractor, also, agrees to the time. That is quite true, but after all the contractor simply signs what the other man writes, in reference both to time and the material to be used. He is not altogether a free agent in the matter, as the only alternative to signing is to hand over the work to one's competitor.

While admitting the gravity of the situation, I do not see any way of improving the state of affairs unless it be by the unification of contracting interests — the formation of a sort of "combine" to work for the protection of reasonable rights and privileges and to protect the contractor in such cases as you mention.

My signature need occasion no surprise. I am too busy and the weather is too hot to get mixed up in any controversy, but I shall follow the expressions of your readers with much interest, for I consider the matters under discussion really live issues.

"CONTRACTOR."

Competition as a Means of Promoting Efficiency

Efficiency is promoted by competition. Any man having sap works best and plays hardest where a rival is in the field, be the stake money, fame or the favor of a maid. It is a common and a perfectly logical thing to make use of this fact in engineering production. Pitting man against man or gang against gang promotes efficiency by introducing into everyday tasks the elements of rivalry and reward for victory. There is no gainsaying the truth of this. It is not true, however, that it is enough merely to bring about rivalry. The competition must be wisely directed or it may result in more evil than good.

We are led to make the above statements by the story of an engineer who had to take over a construction work on which the pitting of foreman against foreman and gang against gang even to the extreme of working on racial and religious prejudices had been made a star feature of the management. The engineer found a very pretty mess on his hands. Rivalry had run wild. It had become in the minds of the men and to a very great degree in the minds of their foreman, the vital thing that the "Irish" had beaten the "Dagos" or vice versa, rather than that a good 24 hours' progress had been made. Trickery had developed: Mike's gang felt elated when it could leave the work in such shape that Giuseppe's gang which followed must spend so much time in clearing the way that its output fell short of its rival. The gossip of the bunk house was not of records and output, but of the fulness and snap of Giuseppe's maledictions and in speculation on the probable nature of his "come back." The trouble was over-

come only by discharging half of the men and reading the riot act to the other half. Naturally the engineer disparages competition.

Doubtless the case is an extreme one, but also one not at all improbable of occurrence. It illustrates the important point that the introduction of competition in engineering production, while strong for good, may become strong for evil. In shovelling earth into wagons or unloading rails from cars, pitting gang against gang in competition is a simple matter, but in, say, tunnel work, where the effective work of one shift depends on the honest and efficient performance of its task by the preceding shift there must be stern and wise direction of competition or its value ceases. Conditions will determine the best manner of this direction; its necessity is the point we make here. It may frequently be the part of wisdom to eliminate all tendency to rivalry. Because this happens we may not condemn all rivalry at all times. Just as certainly as there are cases where its wisdom is doubtful, so are there cases where it is a powerfully effective means for increasing performance. —Engineering-Contracting.

Fire Test on a Mushroom System Building

As the most important point that concrete exponents bring forth after proving the economy of construction, is the fact that reinforced concrete is the only fireproof building material commercially used, the results of a test applied by the building department of Denver are rather interesting:

The slab selected was a 7½-inch slab, in the Railway Exchange building. The panel size is 14x20 feet, reinforced with ¾-inch round rods, running four ways, 8 inches on centre, the Turner mushroom system of reinforcing being used. The slab was poured on February 18th, and the test took place April 28th, giving the concrete an age of 69 days. The panel was loaded with 60,800 pounds of cement, or approximately 225 pounds per square foot. The deflection under this load was exactly 1/8-inch. A fire was then started by igniting two cords of very dry pine wood and five gallons of kerosene. This was allowed to burn about 18 minutes, when the deflection was increased by one inch. The fire was then extinguished and cold water sprayed on the under side of the slab, causing about nine square feet of spall to a maximum depth of one inch.

The test load was removed and four hours after the test a recovery of one-half-inch was recorded. By nine a.m., May 6th, only 3/8-inch deflection remained.

The conclusions to be drawn from this test are that while the test was absurdly severe the concrete was practically unharmed, as the slight spalling was merely on the surface and was due to the great extremes of heat on material which had not had time to properly cure. The rocks forming part of the aggregate were clearly broken, showing the adhesion of the cement was perfect.

It is expected that the contracts for the construction of all the ships of the Canadian naval service will be awarded in October or November and that the keels will be laid within a year from then. The intervening time will be required to get the building yards in readiness. The notice recently sent out to firms proposing to tender, asking them to submit their names to the department at Ottawa, has elicited replies from three Canadian and two British firms. It is not improbable that there will be an alliance between certain Canadian and British interests in that connection.

Advantages of Brick in House Building

Frame Construction less Durable and Ultimately more Expensive—Architectural and other Merits of Brick—Improvement in Recent Years*

In modern building conditions brick construction is in many instances as cheap as wooden frame houses, and in nearly all cases the difference is so slight that brick is preferable. Another point in favor of using brick for house building is the much greater durability of this material, its cheaper cost of repair and up-keep and the superior fireproof qualities. The cost of lumber has steadily advanced in the past ten years, and at the present rate it will soon become almost prohibitive as a common building material.

As a result of these conditions the use of brick on a larger scale than ever must become an important factor in the building trades of the future. Builders and architects formerly confined their attention for brick construction chiefly to town and city houses, but to-day there is a steadily increasing demand for country brick houses. Manufacturers of brick have helped along this movement by improving the variety and quality of their product, so that a greater architectural variation can be obtained. Architects dealt chiefly in wood because it was the cheapest material, and they were more accustomed to making designs for wood. But the day of shoddy architecture for country houses has passed, and our homes are made more dignified and solid by leaving out the flaring ornaments which wood produced.

Variety and Fashion in Building

A plain square colonial brick house, with two or more varieties and colors of brick produces to-day the most harmonious effects in country architecture. The white faced, buff and red brick give sufficient color to the walls to break any monotony that might seem apparent with only one variety. Furthermore, the different sizes of the brick enable architects to create more pleasing designs than ever before.

The style in building material changes with the change of fashion and demand. The present high price of lumber has stimulated builders and manufacturers to exploit many new materials to meet the new conditions. It is this more than anything else that has given terra cotta fireproofing block their present popularity, and by the same token glazed brick and tile are rapidly increasing in use. Variety is needed in building material, and there is room for all of these manufactured products.

But we are beginning to build much better and more permanent houses than formerly. The country was first built up with cheap wooden houses, and the temporary nature of many of these has called for the complete rebuilding in recent years of whole towns and cities. The disappearance of the frame houses in our cities is but an indication of the movement. Next they will disappear in the country, and houses of more substantial material will take their place.

Some recent comparisons of houses of brick and frame have been made to show that a man could build a substantial home of brick for almost the same price as of wood. The contracting builder is frequently confronted by the question of cost of these two types of houses. The owner prefers a house of brick which will last longer and prove more serviceable in the long run, but he is not always willing to put the extra money in it.

Yet the relative difference between the cost of a

brick, brick veneer and frame house is so slight that when we consider the other features the advantage is greatly in favor of the more substantial structure. Take the matter of repairs alone. A frame house requires painting every third year in even high and dry climates, and along the coasts the rule is about every second year. Indeed when exposed to strong salt air, parts of the building must be painted every year in order to protect the wood from premature decay. The cost of painting an ordinary house runs from \$60 to \$150, according to the cost of labor and quality of materials. In spite of such close attention to the painting, parts of the frame exposed to dampness, such as steps, piazza posts, sills and foundation beams will require renewing frequently. A carpenter would charge on the average \$50 a year to make such annual repairs. In other words, one must invest annually from \$75 to \$150 to keep a wooden structure in good condition. Against this what do we have for the brick house? There is practically nothing to do to protect the brick, and if properly laid there should be no renewal of the brick for decades. Within five years the extra cost of upkeep of the frame house will be more than double the difference in the cost of the two types of houses.

Economy of Best Material

In building of brick it pays to use the higher grade products, and then to give special attention to the foundation. An insecure foundation will make the walls bulge and crack, and then your brick house is doomed to early decay. Half the trouble with brick houses comes from improperly constructed foundations.

Brick manufacturers are interested in making houses constructed with their material popular and also in influencing builders and architects to make the best of their opportunities. The public is often in ignorance of the actual value of different building materials and accepts without question the recommendations of architects and contractors. A great many would prefer brick or semi-brick houses for their country homes, but they are deterred from it because of the idea that brick cost so much more than lumber. While this was true a quarter of a century ago, it does not hold to-day. Conditions have changed, and the public needs to be educated to an appreciation of the change. Who can do this better than organized manufacturers of brick, working through the architects and builders? Induce the latter to present the advantages of the brick dwelling, and the gain will be enormous.

We are building better and more substantial houses to-day, and few put up a structure with the idea of temporary use. The need is therefore for good building material and for permanent homes.

A brick manufacturing plant costing about \$40,000 will be constructed at Nanaimo, B.C. The plant will have a capacity of turning out 25,000 bricks per day.

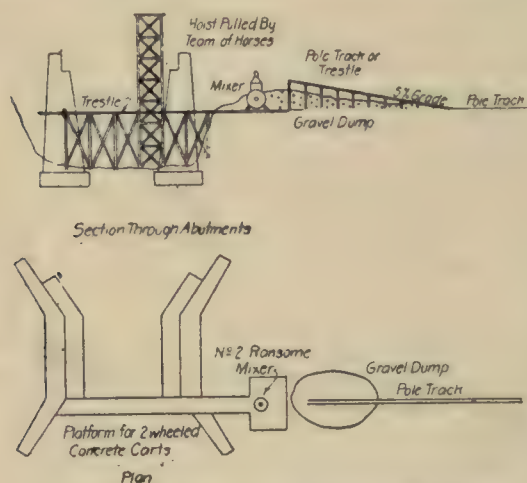
An exploring party which has just returned to Edmonton from the Peace river country estimates that there are 28 cubic miles of asphalt in the vicinity of Fort McMurray, just waiting to be taken up. It is to be found in great mounds along the Athabasca.

*By courtesy of the Building Brick Association of America.

Cost of Constructing Concrete Abutments

Interesting Details of Work on the Transcontinental Railway in Quebec—Methods Employed—Lay-out of Construction Plant

The following costs relate to the construction of two wing wall abutments on the Transcontinental Railway, at Machent Pouce, County Montmaguy, Que. The accompanying sketch indicates the layout of the construction plant. The abutments contain 2,480 cubic yards of concrete in which rubble stone are embedded. There are 720 cubic yards of stone or practically 30 per cent. of the volume. The gravel was obtained from a pit which was opened up for this work and was hauled 1,600 feet on a pole line track and stored in a pile behind the mixer. The pit had to be stripped from overlying earth, and this work was done by men and wheelbarrows. The rubble stone was obtained from the bed of the stream, piled on the bank and hauled 1,000 feet on pole line to a storage pile. From the mixer, the concrete was hauled in two-wheel carts on runways on trestle as indicated; about 500 cubic yards of stone and concrete were handled



Lay-out for Building Concrete Abutments

by hoist operated by horses. The figures given have been computed from data furnished Engineering-Contracting by R. M. Thompson, the engineer in charge of the work.

The total amount of gravel was 1,160 cubic yards, or 1 cubic yard per cubic yard of plain concrete. The cost of obtaining this gravel was as follows:

Item	Total	Per Cu. Yd.
Looking for gravel	\$ 82.19	\$0.047
1,600 feet pole track at 11 cents	252.10	0.143
Stripping top soil	257.20	0.146
Loading cars	497.82	0.283
Hauling 1,600 pole track car	336.90	0.191
171 feet trestle at \$1	171.26	0.097
Total	\$1,597.47	\$0.907

The cost of gravel apportioned to the total 2,480 cubic yards of rubble concrete was, from these figures, \$0.644 per cubic yard of concrete in place.

The cost of trestles and scaffolding was as follows:

Item	Total	M. Ft.
Trestle No. 2 (399 lin. ft.):		
21,500 ft. B.M., labor only	\$305.60	\$14.23
2,856 ft. B.M., 2-inch plank	33.07	12.00
Total	\$338.67	

This gives a cost of 77 cents per lineal foot of trestle laid down:

Item	Total	Per M. Ft.
Trestle No. 3 (114 lin. ft.):		
4,238 feet B.M., labor only	\$51.40	\$12.13
2,000 feet B.M., 2-inch planking	24.00	12.00
Total	\$75.40	

This gives a cost of 45 cents per lineal foot of trestle laid down:

Item	Total	M. Ft.
Trestle No. 3A (22 lin. ft.):		
1,608 feet B.M., labor only	\$74.90	\$11.77
1,472 feet B.M., 2-inch planking	17.64	12.00
Total	\$92.54	

This gives a cost of 77 cents per lineal foot of trestle laid down:

Item	Total	M. Ft.
Trestle 4 and 4A (136 lin. ft.):		
6,362 feet B.M., labor only	\$74.90	\$11.77
2,396 feet 2-inch planking	28.80	12.00
Total	\$103.70	

This gives a cost of 55 cents per lineal foot of trestle laid down. Summarizing the cost of trestling and adding the cost of scaffolding, we have:

Trestle 2	\$338.67
Trestle 3	75.40
Trestle 3A	92.54
Trestles 4 and 4A	103.70
Total trestles	\$610.31
Scaffolding	43.83

Total trestle and scaffolding \$654.14

The cost of mixing and placing the concrete was as follows:

Item	Total	Cu. Yd.
Cement	\$3,784.00	\$1.53
Cement cartage		0.65
Cement shed		0.10
Hauling 2,062 bags at 6.1 cents	132.40	0.053
Wheeling shed to mixer	61.40	0.024
Loading and wheeling gravel to mixer ..	193.02	0.077
Foreman on concrete	135.13	0.054
Engineer on mixer	124.74	0.050
Man at hopper	48.00	0.019
Man discharging mixer	61.07	0.024
Wheeling concrete to bridge	166.77	0.067
Helping to tip carts	33.95	0.013
Spreading concrete	196.40	0.079

Total \$2.74

The cost of getting timber and setting up the mixer was as follows:

Item	Total	Cu. Yd.
Cutting 30 cords at \$1.95	\$58.67	\$0.023
Carting 30 cords at \$4.55	135.60	0.054
Setting up mixer	146.11	0.059
Total	\$340.38	\$0.136

The cost of collecting, hauling and placing 720 cubic yards of rubble stone was as follows:

Item	Total	Per	Per
		cu. yd.	cu. yd.
Cutting bush (½ acre)	\$ 30.62	\$0.043	\$0.012
1,000 ft. pole track at 13½ cts.	135.10	0.190	0.055
Collecting and putting on bank..	360.00	0.500	0.145
Loading onto stone boats	215.60	0.299	0.087
Hauling on pole track	175.00	0.243	0.070
Carrying from pile to wall	233.64	0.324	0.094
Total	\$1,149.96	\$1.599	\$0.463

Some 500 cubic yards of concrete and stone were placed by means of a hoist as before stated. The cost was as follows:

Cost of Hoist:	Total	Per
		Cu. Yd.
Labor constructing	\$137.82	.....
Timber	60.75	.....
Total	\$198.57	\$0.395
Cost of Hoisting 500 cubic yards:		
Labor and team	47.85	0.095
Grand total	\$246.42	\$0.490

The cost of forms, including materials and erection, was as follows, for 2,480 cubic yard of concrete:

Item	Total	Per
		Cu. Yd.
Carting 38,000 feet B.M., at \$2.17 per M.	\$ 82.45	\$0.033
38,000 feet B.M. timber at \$11 per M..	418.00	0.169
Labor	584.55	0.230
Taking down forms and clearing up....	213.28	0.086
Total	\$1,298.28	\$0.518

The following miscellaneous items of cost complete the work:

Item	Total	Per
		Cu. Yd.
Sundries	\$136.49	\$0.151
Tools and plant	252.07	0.101
Total	\$388.56	\$0.151

Summarizing the above items of cost we have the following unit costs for 2,480 cubic yards of rubble concrete in the abutments:

Item	Per
	Cu. Yd.
Gravel	\$0.644
Trestles and scaffolding	0.264
Mixing and placing	2.740
Setting up mixer	0.136
Rubble stone in place	0.463
Hoist	0.100
Forms	0.518
Miscellaneous	0.151
Total	\$5.216

Prince Edward county, Ontario, wishes to spend an additional \$50,000 on good roads and will apply to the Government for the customary one-third of that amount. Prince Edward is one of the foremost counties in the province so far as good roads are concerned.

City Engineer Rust, of Toronto, estimates that if the roads radiating from Toronto are improved according to the recently adopted plan it will cost annually at least \$18,000 to keep them in repair. The problem is how this bill will be footed.

Proper Types of Roads*

By J.C. Wonders, State Highway Commissioner of Ohio

Road building is largely a local problem, and the proper type of road to build is that which will make the best use of the material at hand to produce a satisfactory road surface, and at an expense not exceeding the money available.

In the earliest extensive road improvements in Ohio the problem was solved by using gravel for the wearing surface, and this early work was practically confined to the region where an abundance of gravel could be found. This region was principally in the central and southern part of the west half of the state, and embraced about one-third of its area. I have known of some instances where gravel was shipped by rail for road work, but it was too expensive, considering the type of construction, and the practice was never extensive. A large amount of this work was built, probably fifteen to twenty thousand miles.

At the time of their construction these roads were undoubtedly the proper type, as the cost of the work came within the means of the farmers who paid for them. These roads in the best form of their construction, when new and in good repair, provided an admirable surface for public travel, and at present there are many of them which can hardly be excelled by the more modern construction.

The majority of these roads present in their present condition one of the most important problems of to-day's road work. On account of lack of sufficient repairs a large part of the mileage is practically worn out. Owing to the exhaustion of the gravel supply in a considerable part of this territory, the re-surfacing of many of these roads has been done with crushed stone, and, where properly done, using the old gravel road for the bottom course, very excellent results have been obtained.

In the present condition of the development of road-building, the best known type of construction in the gravel-road country would be the placing of a crushed-stone top layer on the road, leaving the old gravel to provide the bottom course. The old road should be graded to conform to the desired cross-section for the new road. Mud holes should be cleaned out and filled with gravel. The surface should be rolled and watered to produce a solid foundation. The macadam top course can be water-bound, or have a bituminous binder if the necessary funds for such construction are available.

Satisfactory Binder Needed

It is to be hoped that the development of bituminous binders will produce a binder that will hold gravel equally as well as it holds broken stone. If a successful binder of this kind is produced, and these old roads can be given a new top course of about four inches of bituminous-bound gravel, with a surface resembling an asphalt road, a most desirable result will have been accomplished.

Considering the number of investigators now at work on this problem, its solution is one of early possibility. If this method is successfully developed, it will furnish the most desirable type for the gravel region of the State.

In the eastern part of the State, extending from Lake Erie to the Ohio river, embracing about one-third of the State's area, fire-clays and shales suitable for the manufacture of paving brick, can be found in a majority of the counties. Gravel is not plentiful, and is usually of poor quality; limestone, where found, is usually of a good quality for road building, but seldom is in sufficient depth to be profitably quarried. In this region the brick-paved road provides the best construction that has been

*Paper read at meeting of Ohio Engineering Society, Columbus, Ohio

devised. A well constructed brick road on a concrete base and grout-filled, under ordinary travel should last for more than fifty years.

The cross section, like the road covering, becomes, only in a more limited sense, a local problem. In level regions, with slight grades, it is imperative to raise the grade above the surrounding country, and to do this it is necessary to take the fill from the side-ditches, requiring them to be made wide and deep. The bottom of the ditch should be placed from eight to ten feet from the edge of the berms. The ditch should be cut with straight slope from its bottom to the edge of the berms. This will permit a mowing machine to be run down the slope to the bottom of the ditch, an arrangement that materially reduces the cost of keeping the road clear of weeds and brush.

The bottom of the ditch should be made parallel to the centre line of the road, and the slope of the sides of the roadbed will vary with the changes in the depth of the ditch. The back slope should be one and one-half horizontal to one vertical. The two slopes join at the bottom and will make the cross-section of the ditch "V" shaped. My first work on this style of cross-section was more than 25 years ago, and I have had the opportunity to observe the excellence of these ditches after they have sodded over, and the ease with which they are maintained.

In a hilly country, with frequent cuts, this style of cross-section is not advisable, as a wide ditch adds to the width of the cuts, and consequently to the expense of construction. For this class of work, a ditch four feet wide from the shoulder of the grade to bottom line of the ditch is recommended, excepting that where rock cuts are encountered, the ditch can be made still narrower with economy.

For a macadam or gravel road it is most desirable to have the improved road surface in the centre of the cross-section of the grade. For brick roads, excellent results are obtained by placing the pavement on one side of the centre line and providing an earth driveway on the opposite side. Many miles of this style of road that are giving excellent satisfaction have been built by the authorities of Cuyahoga County. An objection to the earth side-track for macadam or gravel roads is the tendency to carry mud from the side-track onto the improved road, and it is likely to pick up the stone and make holes. Also, the surface of this type of road is usually so agreeable to travel on that there is not the demand for the side-track that there is in case of the brick road.

A Renaissance in Brickwork

Just now we are at the beginning of a period not only of extraordinary activity in all the creative arts, but also of a Renaissance in industrial art conditions, says "The Craftsman." In common with other nations, but to a greater degree, this country has been suffering from that "blight of perfection" which had birth in the Victorian era and which spread for over a generation through all phases of existence not only in England but in America. This blight was particularly serious throughout the artistic world, preventing individual expression of beauty all along the lines of the fine and industrial arts. And, because of our progress in science in America, and hence greater productivity of machinery, the blight increased until art achievement in every direction was positively paralyzed. Our pictures and our sculpture became the slickest (to use a good old Yankee word), most highly polished exhibition of trivial imitation; our houses inside and out were overfinished and overfurnished and

without personal interest; our clothes were all an over-fine imitation of something which we thought better; our woods were varnished and veneered out of all beauty and naturalness; our brick were painted, or hidden under smooth cement, and so on through every last ramification of our artificial, highly polished, disingenuous civilization.

Now, at last, we are reacting from this. In common with other nations we are discovering that we have been in the grip of a strange aberration, worshipping false and foolish gods; that there is no such thing as a perfection of beauty; that in truth there is only ever-increasing beauty, as there is an ever fresh, varying expression of individual understanding of art.

In truth, the life of art and its varying expressions depend only upon the extent to which the people of a nation have opened their minds to the inevitable inspiration of their surroundings, and have added to understanding the trained eye and the technical hand.

What we have been calling perfection, then, through these last few decades, was merely a degradation of the imagination, a blindness of the eyes, and a forgetting that individuality was the very cornerstone of art achievement. But to-day again that quality known as texture, which expresses the varying individuality and interest of the creator, which has been always in the past vital to beauty, is becoming a final standard in industrial achievement. And so when we speak of the Renaissance in brickwork, we mean that here in America, at least, we are again considering brickwork as an art, and brick as a material with which to emphasize those pleasant sensations of color, line and proportion known as artistic effects; and we are ceasing to think of it as an uninteresting product of clay, a sort of artificial stone, to be used where the builder could not afford granite or marble or some other real material, a dull, commonplace, poor relation, to be thought of only as a substitute, not in itself desirable where impressiveness and beauty were being sought.

Now, back in the Victorian period some such careless definition of brick and its uses might have been accepted without comment, and yet even then had any of us stopped to review the actual history of it as it can be read in museums, in ruins and in Oriental and Continental architecture, we would have realized the possibilities of brick, for in those early days builders knew its value and used it nobly and lastingly. Possibly it has been a study of those conditions which has brought about this Renaissance of brickwork, and which has inspired our manufacturers to create a new enterprise and to develop a modern brick which should rank as a culmination of the history which begins back in some of the most noble architecture of Egypt.

H. F., Montreal, desires a comparative statement of building operations at Brandon, Man., for 1909 and 1910. We are glad to be able to furnish this information. The particulars came to hand too late for inclusion in the table published in our issue of July 20th. Value of permits issued July, 1909, \$20,480; July, 1910, \$19,960; Jan. 1st to July 31st, 1909, \$224,615; Jan. 1st to July 31st, 1910, \$419,010.

A large piece of Roman pavement was recently unearthed in England by some workmen while engaged in repairing the floor and foundation of Winchester Cathedral. The pavement was found to be in an excellent state of preservation, being intact, and presenting very little evidence of disintegration. It was about 14 square feet in area and was discovered at a depth of 9 feet.



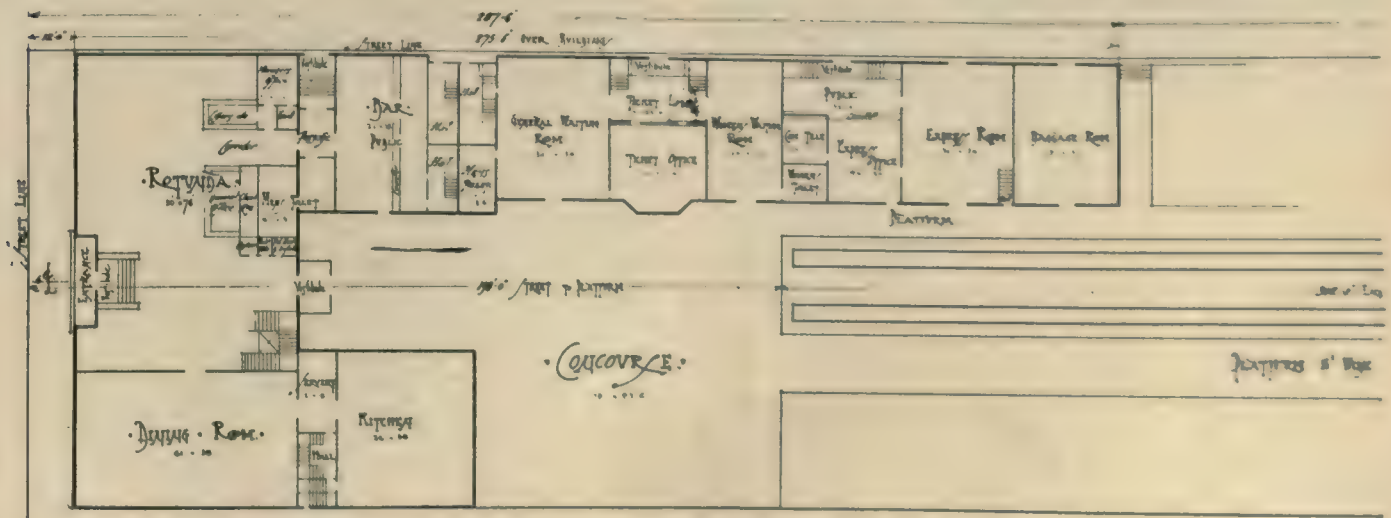
Canadian Northern Hotel, Brandon

The new C.N.R. hotel at Brandon, Man., is to have a frontage on Princess street of 120 feet by 100 feet on Ninth avenue. South of the hotel and adjoining it will be a station, 190 feet long by 36 feet wide, two storeys and basement. The station will be built of stone and brick in classical style. Provision is made on the ground floor for large general waiting rooms, ladies' waiting room, ticket lobby, express office, telegraph office and express and baggage room. The first floor will contain the general staff offices. These are reached from a separate entrance on Ninth avenue. Passing through the station the concourse is reached, with three stub end tracks for passenger service. The concourse extends to the rear of the hotel with an entrance into the main rotunda.

The hotel will be 90 feet high, seven storeys and basement. In the basement will be located the billiard room, barber shop, public baths, lavatories, store rooms and machinery room. Provision is also made for a fu-

ture grill room and cafe. On the ground floor adjoining the station is the bar-room, which will be finished in fumed oak with red tile floors. The rotunda occupies all of the corner of the hotel and fronts on the two streets. It will be 76 feet x 62 feet and in it will be located the office, manager's office, check room and news stand. To the west of it is the dining room, 39 x 63 feet, which will be panelled in mahogany. This room is free from columns so as to give an unobstructed floor for assemblies. To the rear of the dining room is the kitchen, about 35 x 39 feet, pantries, etc. The drawing room on the first floor is 32 x 48 feet. Off this is a writing room. The bedrooms are arranged both single and en suite, about half of them being the latter, and supplied with bathrooms. On the top floor are the servants' quarters and ten large sample rooms. The latter will be well lighted and ventilated. Two elevators are provided in the building for passenger service and one for handling freight.

The building will be heated by steam secured from



Section of Ground Plan, Canadian Northern Hotel, and Station, Brandon, Man.

the Brandon Electric Light Company's plant. A ventilating system is to be installed, also a refrigerating system for the kitchen, larders and bar-room. The building will be lighted throughout with electricity and will have an independent pump for fire protection purposes.

The building will be of steel cage construction with

reinforced concrete floors. The exterior walls will be of stone and brick. The floors of waiting rooms and ticket lobby, also of the rotunda, billiard room, etc., in the hotel, will be of tile. Plans were prepared by Messrs. Pratt & Ross, architects and engineers, Winnipeg, under the direction of Mr. M. H. McLeod, general manager of the Canadian Northern Railway.

The Prevention of Building Accidents

Stability of Scaffolding the Chief Consideration—Adequate Width for Platforms, Runs and Gangways—The Evils of "Deceptive Safety"

Speaking generally, it may be taken for granted that a large proportion of the accidents which happen are due to weak or unstable scaffolding, or portions of scaffolding not properly protected. The question of strength and stability is a most important one, but no definite rule can be suggested to prevent dangers arising from these causes. Their prevention should at all times be a matter for proper consideration by those responsible for the work. So many factors have to be considered that each case must be judged on its individual needs.

Accidents can be practically divided into two classes: those where the workmen fall, and those due to falling material. Many builders imagine that a fall to be considered really dangerous must be from a considerable height. This is erroneous; a fall of from 10 feet to 15 feet is as dangerous as any, for in this distance the unfortunate sufferer nearly always pitches upon his head, and fractured skulls have usually fatal results. A body falling a greater distance often turns in its flight, and in consequence a man may escape with broken limbs, which, although severe, afford a greater chance of recovery. It is easy to argue that workmen should be alive to their surroundings, but if this alertness was practicable, very few accidents of any kind would ever happen; and where a man is continuously surrounded by dangerous conditions, it is impossible.

Danger of Insecure Guard Rails

For the prevention of falls, fencing should always be resorted to around working platforms, well-holes of staircases, and openings in floors and similar places. This need not be of an expensive character; there is, as a rule, plenty of loose timber on a building which can be used for such purposes without detriment to its value. Care should be exercised that the fencing is properly fixed, for instances are known where fatalities have occurred through insecure guard rails. There is no doubt that workmen feel safer if apparently well protected, and place reliance upon the means taken. If, then, the fencing is only a sham, the risk is merely accentuated. To put up a guard rail loosely is a fraud; an atmosphere of deceptive safety is created, and any workman trusting to it finds himself rudely enlightened. The best position for the rail is about 3 feet 6 inches above the platform level. It is general with some builders to use boards on edge, three or four in number. This is extremely satisfactory, but care should be taken that the highest board is about the height mentioned.

Well-holes in floors are particularly dangerous, for if material is being hoisted through them they cannot be covered, but rails can be provided in almost any case. The same may be said of staircase wells. A temporary handrail is easily fixed, but boards laid from landing to landing, if of the half-space variety, serve a useful pur-

pose. Any such well, if over 18 inches in width, should be considered dangerous.

Ladders, again, are a source of danger. They should have a level footing, and be well secured at their highest point of rest. Also they should rise at least 6 feet above the place they give access to, otherwise the climber may miss the usual hand-hold, and fall. If this is impossible, a short piece of rope nailed across the top ends of the ladder will give notice in climbing that the full height is reached. The rope being pliable is more useful than a piece of timber, which may catch in a man's clothes and throw him. No ladder should be used with defective rungs. It is not easy to renew a rung without taking the ladder sides apart. Consequently, when a rung wears out, it is often replaced by an iron bolt. This in itself is dangerous, as it affords but an insecure footing to wearers of nailed boots. The ladders with square rungs nailed on to the sides should be viewed with great suspicion, as there is a great likelihood of defective timbers being used. This type is greatly improved if the rungs are housed into the sides.

Scaffolding Platforms and Other Sources of Trouble

Scaffolding platforms should be of sufficient width for the work in hand. This is generally provided for bricklayers and masons, but plumbers and painters are often badly served in this respect. Block scaffolds, that is scaffolds built up on loose brick piers, drain pipes, etc., are most dangerous, and should be prohibited. Very little vibration would cause a collapse; and bracing, often imperative, is impossible in such cases. Scaffolds should be complete, even to the guard rails, before work takes place upon them. As the plant arrives on the building all scaffolding should be carefully examined, and no confidence should be placed on timbers because they are new. Serious defects are at times found in such timbers. Dark interiors of buildings should be lighted. Artificial light can be readily obtained, and should be used.

Crates in which bricks are carried often cause danger by the bricks falling. There is an impression in the building trade that when the crate or skip is slung, the two sides exert a compressive stress on the load, and hold it in position. In practice this does not always hold good, and for this reason it is wise to provide the skip with four sides, two of which may be made removable to facilitate loading. Baskets should not be slung from their handles only, unless they are specially strengthened by the insertion of wire ropes or iron rods. Handles may pull out, and when much used they also get cut through. If there is any danger of this, the fall or chain should be carried round the bottom. Baskets strengthened as suggested by wire ropes, etc., are now on the market, and can be obtained at a trifling extra



Postum Cereal Company's Plant at Windsor, Ont.—Architects: Watt, Jacques & Williamson.

expense. As a set-off against this, they are repairable. The life of an ordinary basket is not long; perhaps a fortnight of constant use will see the end of it. If the handles, because of their extra support, are still in good order, it will be found economical to repair the body of the basket.

An accidental jar in hoisting may detach an ordinary hook unless it is "rung"; that is, carried through the handle and hooked into part of the chain higher up, but on the whole the spring hook is safer. Platform boards should be well and truly laid. An ordinary 12-foot board will tilt under the weight of an ordinary man if the weight is applied on a projection of over 6 inches beyond a support. This distance should never be exceeded, unless the board is lapped. All laps should occur over a support such as a putlog. If not, what is known as a trap is formed through which a man may fall. This is perhaps the most common danger on a building, and one for which most mechanics keep a sharp lookout. If the boards are butted, the putlogs carrying them at the ends should not be more than 12 inches apart, then, if the projections are equal, no danger need be feared.

Runs and gangways should be of adequate width, especially when at a height. Also when of more than one board in width, they should be so supported by straps that no undue and unequal sagging can take place. The greatest danger from sagging arises when the top surface of one board is pressed below the bottom surface of the one adjoining, for then the sole of a man's boot may be trapped, causing a trip.

Dust and Tar Spraying

The dust nuisance has for some years been the subject of experiment in Bristol, England, and Mr. E. D. Arnaud, the Canadian trade commissioner for Bristol, has written an interesting letter to the Department of Trade and Commerce, Ottawa, on the subject of dust treatment on macadam roads.

Bristol has found that tar spraying is the most satisfactory, economical and effective method of treating the nuisance. The system, tried first in 1907, has now spread to all the important towns in England and to many of the continental cities, superseding the watering cart. Mr. Arnaud furnishes figures of the comparative cost of street watering and tar spraying, showing that during the years 1904-5 and 6, under the watering cart system the average quantity of water used was 37,110,776 gallons per annum, but during the three years of 1907-8 and 9, during which tar spraying has been adopted, the average quantity of water used per annum has been only 27,149,466 gallons. This saving has been effected although the length of the macadam roads maintained

by the corporation has been increased during the period specified by 22½ miles. The fact is that, including the expenditure of the tar treatment and the increased mileage, the cost of dust prevention during the past three years has not been more than the watering expenses in the three previous years, as well as being far more effective. Not only does a dressing of tar on the surface of a macadam road prevent the nuisance arising from the clouds of dust, but the same process prevents waste of road material caused by mud and the action of sun and wind.

Industrial Building at Windsor, Ont.

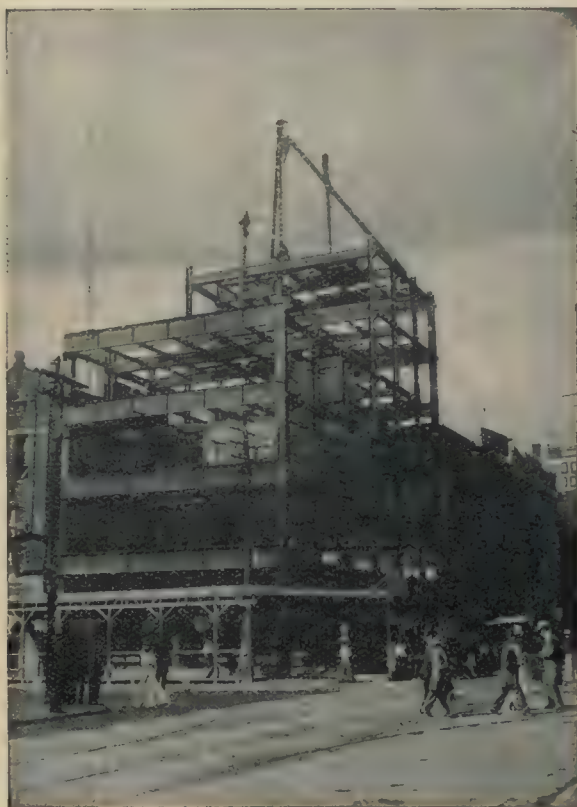
The accompanying illustration shows the latest of the buildings which have recently been constructed at Windsor, Ont., for the Postum Cereal Company, at a cost of \$100,000. Six buildings in all have been erected



Testing Reinforced Concrete Floors at the Postum Plant, Windsor.

and the last and largest of these was completed in 80 days from the time the ground was broken. The buildings are all of brick and reinforced concrete. The illustration showing a test of the reinforced concrete floors gives a fair idea of their strength. The test was made by the Michigan Technical Laboratory before the building was used. All the floors were built to carry a live load of 350 tons per square foot. Kahn bars were used for reinforcement. The general contract for the buildings was in charge of Euclide Jacques, and the sub-contractors were: Mason work, Thompson Bros.; reinforced concrete, Chas. Scott; plumbing, Thos. Blackburn; roofing and glazing, T. W. Brooks & Son. The architects were Messrs. Watt, Jacques & Williamson, Jordan & Griffith Building, Windsor, Ont.

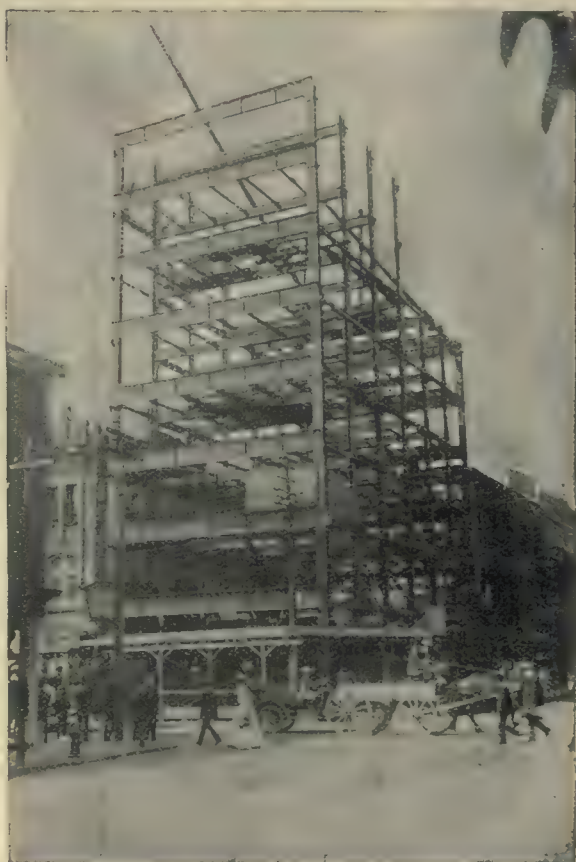
Progress of Erection on the Kent Building, Toronto



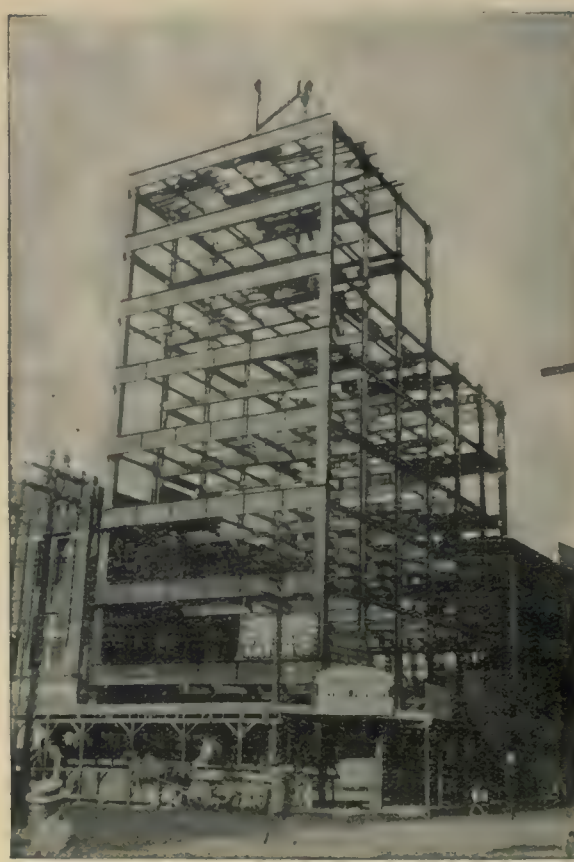
July 27th—A Good Record at an Early Stage.



August 4th—Completion of Steel Work.



July 28th—Compare with Above View.



July 29th—Looking to the Finish.

Expeditious Work on the Kent Building, Toronto

The record made by the Canada Foundry Company—ten storeys in ten days—in the erection of the steel work for the Ambrose Kent building at the corner of Yonge and Richmond streets, Toronto, is highly creditable to the contractors, and it is also of interest as showing the great advances that have been made during recent years in this class of construction.

The erection department of the Canada Foundry Company, Limited, commenced work on the 19th ult., and calculated to have the framework of this ten-storey building, comprising 650 tons of steel, erected complete within ten days. Owing to one or two unavoidable delays, however, the time involved in the work was twelve days. The corner columns are built in two-storey sections, five of these being placed to reach the top of the tenth storey. These columns weigh 10,850 pounds each, so that the complete ten-storey columns weigh 54,250 pounds. This weight is carried on concrete caissons that extend 25 feet deep to bed rock. The building is 40 feet x 80 feet and occupies one of Toronto's busiest corners. The heavy surface traffic on both facing streets had to be contended with, and nothing short of a complete organization could have handled the unloading and erection of this massive structure with such gratifying results. Owing to the walled-in situation of this building, only one stiff-legged derrick was employed on the erection, but even with this unfavorable condition, more than 54 tons of material were handled daily.

Song of the Ironworker

Well, gentlemen — swell gentlemen — in your frowzy dowsy clubs,

Take note o' me an' Bill McGhee, an' twenty other dubs, Who's stuck agin the sky line, like flies agin a wall—

Ho, think o' me an' Bill McGhee, an' watch us as we crawl

Around the bars, between the stars, an' up the shafts o' day;

You hear the gang when the hammers clang, an' the bullgines hoist away!

"Ho, give us a job to fix the moon; to tinker the golden stair!

Give us a chance an' see us prance along a path o' air! We'll hang for hours by our teeth to the flowers that grow in the turquoise bed,

An' rifle a seine through the silver rain for the tears that the angels shed!"

—A. D. Runyon, in N. Y. American.

New Record in Caisson Sinking

A pneumatic caisson sinking record has just been made in the foundations for the Municipal Building, New York, according to the Engineering Record. A caisson for one of the column piers was sunk through sand to rock at a depth of 112 feet 1 inch below water level without accident or casualty of any kind. The caisson is of concrete with a reinforced cutting edge, and supports a concrete shaft 10 feet 9 inches in diameter, cast before sinking. The construction of the caisson was commenced April 15th, and the bottom was passed May 16th. While under the maximum pressure of 47 pounds, the work was executed by 20 five-men shifts working about 40 minutes each, with a very long time for decompression and an interval of 4 hours between the two shifts each man worked daily. The men were under very strict physical and medical supervision, improved

sanitary and hospital appliances were on hand and a competent physician was in constant attendance, and not even a single case of the bends occurred. This is believed to be the deepest pneumatic caisson ever sunk, and is expected to be the maximum for this building, which will have 106 caissons, over half of which have been sunk.

Trade Commissioner Mussens, of Leeds, England, has forwarded to the department at Ottawa a report on Canadian made rails. He states that the British authorities, on the advice of the Indian Government, which insisted upon a higher grade of railway materials, obtained quantities of rails from the United States and Canada. The tests so far are in favor of the Canadian product.

At the recent session of the consulting engineers of the National Board of Fire Underwriters and the executive committee of the National Fire Protection Association several collapses of sprinkler tanks were considered and plans were made for barring from the support of tanks all material subject to disintegration by the weather. It is possible also that the amount of water required in gravity tanks may be reduced.

The leaning tower of Pisa, according to the findings of a Royal Commission appointed to investigate its present conditions, instead of being supported upon a massive foundation, rests upon a ring-shaped masonry base having an inner diameter of 24 feet 3½ inches, exactly equal to that of the inside of the tower. In 1829 the tower, which is about 177 feet high, is said to have been 14 feet 5 inches out of plumb; since that time its inclination, the commission reports, has been increased by an additional 0.0055 foot per foot of its height. An earthquake in 1834 caused a deflection of about 5 inches.

To measure the heat generated by the hardening of Portland cement tests are being made in the Panama Canal zone by embedding in the walls of the locks built at Gatun, six resistance thermometers. At different stages in the settling of the cement readings of the temperature are to be taken. The temperature increases rapidly from the time the concrete begins to crystallize until it reaches its final set. From the settling point the increase is slow but usually continues during the hardening process, which may last several years. The results of these experiments will be likely to prove of great interest and may throw some light on expansion and contraction which is the bugbear of all cement users.

English spraying machines were used in 1909 by the Massachusetts State Highway Commission in applying tar coatings to road surfaces. They are made to heat tar with a coil supplied with steam from a traction engine or road roller, and spread it upon the road in a thin and even coat. The tar, according to the commission's last annual report, is kept under pressure by pumps geared to the wheels of the truck, so that a pressure is developed by the movement of the tar-spraying machine itself. The hot tar is spread through a number of small nipples which throw a fine spray; a hood over the nipples prevents the tar from being blown to one side by the wind. When a heavy grade of oil is used and applied hot at the rate of one-half gallon per square yard the cost is said to have varied between 6 and 11 cents per square yard, including the cost of material, labor and the surface covering of sand, gravel or stone screenings.

Work on the National Transcontinental Railway

In the course of an interview at Quebec recently, S. N. Parent, chairman of the commissioners, said the line between Moncton and Winnipeg would be completed by the end of 1912, and that while waiting for the completion of the Quebec bridge a car ferry would be used to take trains across the river. The plans for the construction of terminals in Quebec would be prepared as soon as the contract with the city for the purchase of the Champlain market site had been signed. A Quebec dispatch says that the deeds transferring this property will be signed Sept. 1. Mr. Parent further stated in his interview that Cap Blanc and all the houses along the river front between Champlain market and Sillery would have to disappear; the Marine Department shops would also have to go, and these would probably be rebuilt at Sillery.

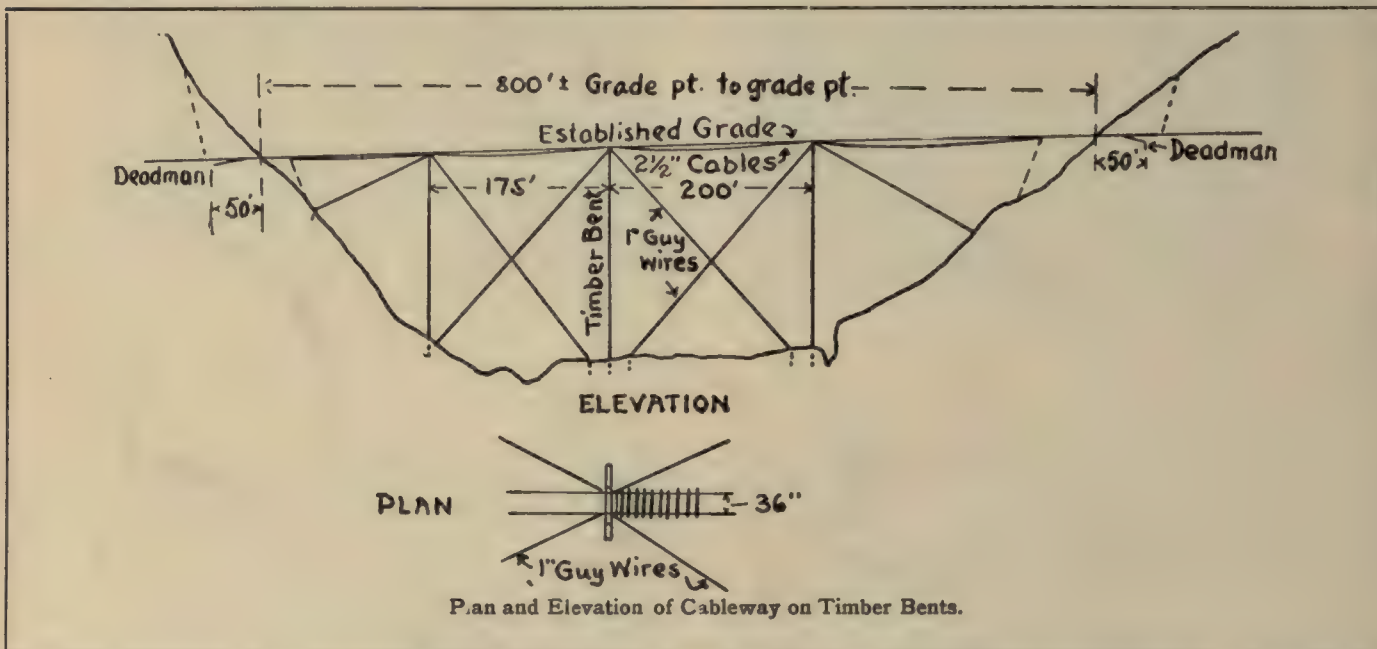
Referring to the work done on Division B., which extends from the New Brunswick boundary to 330 miles west of Quebec, a total of 507 miles, Division Engineer A. E. Doucet said that with the exception of a few breaks, such as the bridge over the Jacques Cartier river, and the yards

economically employed where the ratio of length and embankment to height is 25, or more, to 1.

The second method is to build a trestle and make the fill by dumping from it. Building trestles is more or less expensive, and, if the material to compose the embankment contains a considerable proportion of large rock or boulders, there is always the danger of carrying away a bent or otherwise seriously injuring the structure.

Several years ago, I was one of the engineers on a piece of heavy railroad work in the south where the embankments were high and were made by trestling. One of the embankments to be made contained about 115,000 cubic yards, reached a maximum height of 57 feet, and was slightly over 800 feet long, from grade point to grade point. To build a trestle would have cost between \$6,000.00 and \$8,000.00, and, as the material to make the fill was mostly rock, the chances were very great that a part of the structure would be carried away before the completion of the work. To avoid the necessity of constructing a trestle, the following scheme was adopted:

The cuts at both ends of the embankment were opened up in the usual manner with carts for about 60 feet, as indicated by the dotted lines in fig. 1. At points, approximately



at Cap Rouge, track has been laid for 188 miles from west of the Quebec bridge site to the St. Maurice river; and from eight miles east of Waymontachene as far west as the Hudson's Bay post. Grading has been completed for 78 miles west of that point, and it is expected that by the end of the season track will be laid to the crossing of the Gatineau river, about 235 miles west of Quebec. All grading has been completed south of the St. Lawrence to the New Brunswick boundary, and a considerable mileage of track has been laid. The work of bridge construction and filling is being proceeded with, and as soon as this is finished track laying will be completed. Of the total of 507 miles in the division there are only 60 miles upon which grading has not been done.

A Substitute for a Timber Trestle*

Usually two methods are employed in making embankments where locomotives and dump cars, either narrow or standard gauge, are used.

The first method is to lay the track on the ground, and by dumping alternately to right and left, jack up the track until the required height is reached. This method is most

economically employed where the ratio of length and embankment to height is 25, or more, to 1. At points about equally dividing the fill, three timber bents were erected, as shown in fig. 1. These bents were made from timber cut on the right of way. Their construction is shown in fig. 2. Caps were about 8 x 8 inches x 6 feet and sills about 10 x 10 inches. As this timber was cut on the ground, the dimensions varied slightly.

In erecting, the tops of the caps were brought to the established grade line, and the sills were sunk in a trench 3 or 4 feet deep, which was backfilled with rock or earth. This steadied the bents and prevented their kicking out at the foot. From the caps, 1-inch guy wires were run out at angles of about 45 degrees, in order to clear the dumping of material as far as possible, and fastened to deadmen. The main cables were then fastened to the caps by wire lashings and the ties placed on them, every third or fourth tie being lashed to the cables. The rail was then laid on the ties, brought to gauge and spiked up. Ties and rail were laid far enough ahead to accommodate the length of train used.

The method of operation was as follows: A train of loaded cars was backed on to the approach fill, and, at the point where the cables left the fill, were dumped, the first car on one side, the second on the other side, alternate cars on al-

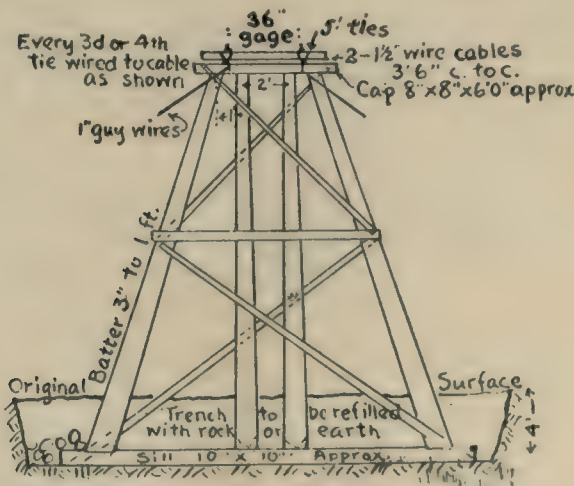
* From a paper presented by J. L. Ingle, jr., before the American Society of Engineering Contractors.

ternate sides, until the entire train was unloaded. The train was then run back on the approach fill and the cars righted. Dumping the cars on alternate sides balanced the weight on the cables, prevented the overturning of the train and made the fill about equal on both sides of the track. All cars were dumped before their loaded weight came on the cables, only empty cars being supported thereon. Little or no shovelling of material was required, most of it sliding to the bottom of the fill, and what little remained was generally used in jacking up the track. As the bents were approached, more or less care was exercised to prevent their being injured, but no more so than on any other trestle.

The work was carried forward in this manner until the ravine had been spanned, after which it was widened out in the usual way.

In building the trestle it was assumed that the deflection of the cables at the centre of a bay would be about 5 per cent. of the span, but, by jacking up the track as the embankment was made, the deflection was reduced to about 3 per cent. When dumping at the centre of a 200-foot span this gave about 6 per cent. grade for a dinkey engine to start an empty train on, and was not prohibitive.

The plan described left very little material in the dump, saved the main cables, guys, and caps, and was much more



A Typical Timber Bent for Use Under Timbers.

quickly and cheaply carried out than would have been the erection of an all timber trestle.

I left for other work before the completion of this fill and so have no exact data as to cost. Figuring maintenance at the same rate as during my connection with the work, and barring accidents, the cost should have amounted to about 3 cents per cubic yard of embankment.

I believe this method is cheaper than a cable-way erected on tower bents, unless your span length is excessive. It would cost too much to erect a tower cable-way across a short ravine of 400, 500, or 600 feet. The span on which we worked the method described was 800 feet long. At that time this tower scheme had not been put on the market.

We hauled the cable-way as taut as we could with a block and fall. We made the height of the cap to grade. I would advocate a little more, but not much. We found when we came to the middle of the span, that there was only a 3 per cent. grade, i.e., 6 feet in 200; and if you have your bents slightly above grade, you will be fairly well up to grade at the spans.

I would advocate cutting down the bents before filling over them. You must exercise care in backing your cars on to any trestle, and only ordinary precaution is needed in working with this cable-way bridge.

A Reinforced Concrete Low-head Water Tank and Its Waterproofing

The city of New Ulm, Minn., has just completed a reinforced concrete reservoir of 1,000,000 gallons capacity, a cylindrical structure 75 feet in diameter with the walls 30 feet high, and covered with a conical concrete roof. Since it was of the utmost importance that the walls and floor should be water tight, special care was taken during the construction to grade the aggregate for the concrete. It has been found by experiments that the densest concrete can be made when rounded pebbles varying in size from about $\frac{1}{4}$ -inch to about $2\frac{1}{2}$ inches are used instead of broken stone on account of the ease with which such pebbles will move about in a quaking mixture while it is being worked in place, and adjust their positions so as to form the least amount of voids. For this reason pebbles were screened from a gravel bank and used instead of crushed stone for the walls and upper part of the floor, and the sand used was a mixture of very coarse and ordinary fine sand. To reduce the permeability of the concrete to a minimum, 20 pounds of hydrated lime was used in every barrel of cement, and after the forms were removed the walls were brushed and cleaned with steel brushes, and two coats of cement plastering were applied on the inside. The mortar for the plastering consisted of one part cement, two parts of sand, hydrated lime to the extent of 10 per cent. and Medusa waterproofing compound to the extent of 3 per cent. of the cement used. The proportion used for the concrete in the walls and the upper 4 inches of the floor was 1:2:4 and this proportion of concrete together with the plastering has apparently made the walls water tight, as no leakage has been noticed up to this time except a small leak in the bottom shortly after the reservoir was filled, which was due to an imperfect bond at one point between the old and new concrete. This, however, did not cause serious trouble.

City Engineer Rust reports that good progress is being made on the Toronto filtration plant, where a force of 300 men is now employed.

The 17th annual convention of the American Society of Municipal Improvements will be held at Erie, Pa., August 11-16. For particular address the secretary, Mr. P. Filwell, 239 West 39th street, New York City.

The fourth annual exhibition of the Chicago Cement Show will be held under the management of the Cement Products Exhibition Company, Chicago, Feb. 15-23, 1911. The New York Cement Show is being held in Madison Square Gardens under the same management, December 14-20 next.

Hon. Thomas Taylor, Minister of Public Works for British Columbia, is making a tour of inspection of trunk roads throughout the province. The Minister has been taking notes of what is needed in this regard, the trunk roads having lately been taken over by the Department. Mr. Taylor looks forward to the time—and at no distant date—when there will be good automobile roads from Vancouver to Winnipeg and still further east.

Owing to the fact that the space behind the wall was filled in with earth before the concrete had set properly, the large wall which was erected to form the west side of the new boiler house for the new wing at the Parliament Buildings, Toronto, collapsed, and it will take two or three months to build a new wall. It took three months to build the section which fell, it being 100 feet long and 25 feet high. Huge blocks of solid concrete were strewn over the excavation for the new boiler room, which is to be 20 feet below the present level.

Bituminous Gravel Surface in Road Work

Satisfactory Results Obtained from Surfacing with a Mixture of Sandy Gravel and Asphaltic Oil—Details of Cost and Specifications

By A. W. DEAN, Chief Engineer, Massachusetts Highway Commission.

In many sections of Massachusetts, there is a lack of good local material for the construction of road surfaces, and at the same time a plentiful supply of gravel that will not compact if used for road surfacing without the addition of some binding material; but when such binding material is added and the gravel is rolled and bound together, it has excellent wearing quality.

During the year 1909, the experiments were tried of using this sandy gravel, mixed with the proper amount of asphaltic oil, and the results of these experiments have been much more satisfactory than was expected by the commission when it was first decided to make the experiments. In the first experiment, gravel and heavy asphaltic oil were mixed hot and applied to the road, the thickness of the application being about 2 inches after rolling. At the same time a short section was constructed by applying hot asphaltic oil to the surface of a gravel road that had previously been shaped and compacted, and the result seemed to warrant a more extensive trial of this method, consequently, a section of road in the city of Marlboro was selected and the road built entirely by this method. The road was first graded and drained by the same methods that are in universal use by the commission in construction of State roads, after which a layer of sandy gravel was laid and rolled. On this layer of gravel was spread hot asphaltic oil, using about $\frac{1}{4}$ -gallon to the square yard. Immediately thereafter, about 1 inch of sand was spread evenly and the road was then thoroughly rolled. This road was built in the fall of 1909, and is to-day in just as good condition as when first constructed, and it has not yet been necessary to expend any money in repairs of any kind. It presents a smooth, hard surface, showing no ruts or depressions.

The cost of this surfacing, including the heavy oil and sand in place, but not including any drainage or grading, was from \$1,800 to \$2,000 per mile, the bituminous surface being constructed 15 feet wide. The following are the specifications for the construction of the surface and also for the oil used:

Gravel Surfacing and Bituminous Wearing Course

Section 10.—On the sub-grade prepared as hereinbefore specified selected gravel shall be placed to the depth of 5 inches at the centre and 4 inches at the sides as measured after rolling. The gravel shall be a quality satisfactory to the engineer, and shall contain no stone greater than 3 inches in its longest dimension.

The gravel shall be spread from a dumping board, and care shall be taken while spreading to rake forward and distribute the largest stones so that they will be at the bottom of the gravel course and will be evenly distributed. This course shall be thoroughly watered and rolled to the satisfaction of the engineer with a steam roller weighing not less than ten tons.

Any depressions that appear during or after rolling shall be filled with gravel and re-rolled so that the entire surface shall conform to the cross sections.

In case oil cannot be applied to the surface of the gravel after it has been thus shaped, the contractor shall, before applying the oil, re-roll the surface and shall if so directed by the engineer sprinkle the surface before applying the oil thereto.

The width of the gravel surface shall be 15 feet.

Gravel pits shall be cross sectioned and quantities estimated in the pit.

Gravel found within the limits of the road excavation is to be paid for as excavation only.

On the surface thus prepared the bituminous binder shall be applied for a width of 15 feet, using about $\frac{1}{4}$ -gallon of the binder to the square yard. It shall be heated to the tem-

perature hereinafter stated and distributed evenly by means of such machine as shall be approved by the engineer, such machine to be so designed as to enable its operator to control the flow and distribute the material uniformly, leaving no streaks or spots, and also to enable the operator to "cut out" any portion of the roadway and to avoid any surplus deposit of the binder on the roadway or elsewhere.

If the engineer shall so direct, the bituminous binder shall also be further distributed by means of soft brooms or other device.

As soon as may be after the application of the bituminous binder, as above specified, a thin layer of sand shall be distributed evenly thereon to such a depth that after rolling to the satisfaction of the engineer no surplus binder shall appear upon the surface of the roadway, and so that there shall be a wearing course of the sand combined with the bituminous binder approximating $\frac{1}{2}$ -inch in depth.

As soon as the sand has been spread the surface shall be sprinkled and rolled.

The completed surface shall conform to the profile and cross section and shall be smooth and free from hollows or depressions. If at any time before the acceptance of the work spots or streaks appear, indicating a deficiency or surplus of bituminous binder or of sand, the surface shall be again treated with binder or sand, or both, as the case may be, and thoroughly rolled.

The bituminous binder shall consist of asphaltic oil conforming in all respects to the requirements of section 10b of these specifications, and when applied to the road it shall have a temperature of approximately 180 degrees F.

The gravel in the lower 5 inches is to be paid for as borrow as specified and the oil and sand as bituminous surfacing.

Asphaltic Oil

The oil submitted shall be of uniform color, appearance, general character and viscosity and must fulfill the following requirements:

- (a) It shall not froth when heated to 100 deg. C.
- (b) It shall have a specific gravity of at least 0.97.
- (c) It shall not contain more than 0.5 per cent. of dirt or adventitious mineral matter.
- (d) It shall contain not more than 1 per cent. of matter insoluble in carbon bisulphide.
- (e) It shall be of such viscosity that 60 c.c. measured at room temperature (78 deg. F or 26 deg. C.) shall when at 100 deg. C. be not less than 250 seconds nor more than 500 seconds in passing the Lawrence viscosimeter or 200 c.c. measured and tested at the same temperatures shall be not less than 900 seconds nor more than 1,800 seconds in passing the Engler viscosimeter.
- (f) When 20 grams are heated in a flat bottom dish 3 inches in diameter for 24 hours in a well ventilated oven kept at a temperature of 250 deg. C., the loss in weight shall not be greater than 15 per cent.
- (g) When subjected to a number of heatings at 250 deg. C. in a well ventilated oven with intermediate separations of asphaltene and of matter insoluble in carbon bisulphide until the final petroleum ether extract is not more than 10 per cent. by weight of the original sample, it shall show the following results, assuming also that this final 10 per cent. has the same composition as the 90 per cent. of the material examined: The total loss shall be not more than 35 per cent. by weight, the amount of asphaltene in the original sample shall not be greater than 6 per cent. by weight, and the amount of asphaltene formed by this treatment plus that in the original samples shall be at least 58 per cent. by weight of the original sample. The amount of matter insoluble in carbon bisulphide as a result of this treatment, shall be not greater than 5 per cent.

The contractors of Victoria, B.C., consider that they have a serious grievance against the city on account of the policy adopted in connection with the construction of public works under the contract system. The principal objection

is against the appointment of inspectors who know nothing about their work. It is claimed that sidewalk inspectors should be men with a practical knowledge of cement work. The matter has been taken up vigorously by a number of contractors, who have decided not to tender on this class of work unless they are assured that practical inspectors will be appointed. As a result of having inspectors who are not acquainted with the work, contractors are often delayed because they have to follow out the instructions of the inspectors. If the work is being done under a guarantee to have it completed within a certain time, this frequently results in anxiety and sometimes in loss to the contractors.

The Edmonton-Strathcona Bridge

The new bridge that will span the North Saskatchewan river, connecting the cities of Strathcona and Edmonton, will have a total length of 2,687 feet from face to face of ballast walls. It will be approached from the Strathcona end on a curve of 6 degrees 7 minutes, near Legal avenue, and cross Soullier and Angier avenues, and will be carried on 29 sets of pedestals to the Edmonton shore, where it will cross the Canadian Northern Railway, Saskatchewan avenue, Hardisty avenue, McKay avenue and Victoria avenue, the Edmonton approach being on a 2 degrees curve, a total of 1,888 feet, 7 inches, being on a tangent.

The approaches to the bridge will provide for the C.P.R. tracks, with one track for the street railway on either side, a 23-foot roadway with an 8-foot sidewalk on either side. About half way between Soullier and Angier avenues the roadway and sidewalks will be carried to a lower level, and carried across the river beneath the floor of the bridge carrying the steam and street railway tracks, near Saskatchewan avenue. Concrete pedestals will be built in groups of four, with foundations carried to hard pan, piles to be used only if necessary, to carry the superstructure over the land. Upon these pedestals will be erected steel work of the same character as that used in the Bell river bridge, to carry the double deck, rail level at the highest point being 140 feet above ground. This portion of the bridge is on the Strathcona side, and the superstructure will consist of seven spans of 49 feet 5 inches, alternating with six spans of 97 feet 8 inches, and one of 99 feet exclusive of the approach spans.

The river will be crossed on three spans, carried on concrete piers, two of 291 feet 10½ inches and one of 293 feet 3 inches. The foundations of the four piers carrying these spans are to be carried down to a solid foundation, concrete piles to be used if necessary, and are to be constructed so as to carry nine tons to the square foot. The two centre piers are to be protected against ice, etc., in the usual way.

Two spans on the Edmonton side on pedestals will carry the bridge over the Hudson Bay reserve and the C.N.R. right of way. The height of the floor of the railway deck will be 14 feet clear from the roadway, which will be 23 feet clear, the sidewalks being carried on a bracket work. The railway track deck will be 35 feet wide.

Building operations at Merrit, B.C., are reported to be very lively. A score of residences and four good sized business blocks are in course of construction. There is great demand for railway laborers at Merritt. Contractors on the Kettle Valley line are prepared to maintain a staff of 1,000 if they can get them.

The Portland cement deposits on the United Empire Company's property on One-Mile Creek, near Princeton, B.C., are being investigated by John George, who has arranged for the purchase of 80 acres from the United Empire Company. If present indications hold out, the proposition gives promise of developing into an important industry.

Port Arthur's Good Progress

Evidences of Steady Growth in all Sections Two Millions to be Expended by Various Industrial Concerns

Port Arthur, Aug. 12th, 1910.

There is no spasmodic boom going on in this city, but a steady, legitimate growth. The stores and houses which are being built this year will find a market long before they are completed. The buildings are all of a substantial character. The stores which are being built in the business section are of spacious and handsome structure and the houses are in keeping with the beautiful residential site which the hillside affords.

From a conservative estimate of the outlook of Port Arthur's industrial development, the present building total of nearly half a million will be materially increased before the end of the year. There will be a big demand for workmen's houses, semi-detached, of about six rooms, which will rent for about \$10 per month.

The corporation of the city have made a strong advance by permanently paving the business section this summer. At the present time 1,000 men are employed on the streets, and before the summer is over this section of the city, especially, will present a very modern and business-like appearance. As a matter of fact, the roadways throughout the residential district are all good, having a splendid natural drainage over and above the drainage system of the city.

There is now under construction the plant of the Western Dry Dock & Shipbuilding Company, who will spend \$1,250,000. There are two other concerns under contract to start building operations very shortly, who will spend close onto \$750,000 in building alone. The building permits for these will materials improve the outlook for the industrial development of Port Arthur.—N. G. Neill.

York County Will Have Good Roads

The good roads movement was considerably strengthened last week at Toronto when a committee composed of representatives from the Board of Control, the Board of Trade, and York County Council came to a definite agreement on the proper course to be pursued in constructing a system of good roads throughout the county of York. Among the resolutions was the following:

"That the city of Toronto and the county of York strongly recommend the voting of a grant of \$100,000 each to be set apart for the purpose of improving the highways mentioned hereafter, so that the work can be commenced at the earliest possible date."

The roads to be improved are as follows: Yonge street, 13 miles; Kingston road, 9 miles; Kennedy road, 23½ miles; Lake Shore road, 5¼ miles; Dundas road, 5¼ miles; Vaughan road, 14 miles; Weston road, 17 miles; Don Mills road, 6¼ miles; east from Yonge street on Markham town line, 12¼ miles; Malton road, 5 miles; total, 111½ miles. The cost will be about \$6,000 a mile, a total of \$670,500, and the idea is to begin on 50 miles next spring.

A few prominent citizens of Toronto and the mayor and board of control held a conference recently with Mr. F. E. Townsend and some of his associates of New York, who propose to erect a large central terminal station in Toronto. Their plan is to provide facilities for water, steam and electrical transportation. The promoters of the proposal also interviewed the railway companies. After the interview they expressed themselves as well pleased with the prospects. Most of them left for New York. Mr. Townsend and Mr. H. D. Eakins remained behind and will open an office in Toronto for the preparation of details.

1910 Record Year at Winnipeg

Rapid Development of the Western Metropolis—Satisfactory Conditions in Building Trades and Supply Quarters

Office of the "Contract Record."

Winnipeg, August 13, 1910.

The first seven months of 1910 were the most remarkable in the history of Winnipeg, so far as the erection of residences is concerned. The Builders' Exchange, the building inspector, and the contractors agree that all records have been surpassed in this regard. Close upon 1,800 homes, varying in cost from one to ten thousand dollars, have been constructed right within the boundaries of the city, and fully as many more have been built in the immediate suburbs and are not included in the returns of the local building office. Incidentally there have been more of the higher type of dwellings erected than ever before. Houses ranging in price from eighty to twenty thousand dollars are being built by the dozens, and generally the class of building is greatly improved over previous years.

The old type of house with its four walls and gabled roof is becoming extinct and every new street opened up soon presents an array of thoroughly modern houses of original design and in good taste. This change has been brought about largely by the fact that almost every house built is erected for sale and probable purchasers will not consider roughness of design or construction.

It is estimated that about seven of the eleven million dollars represented in building permits issued here this year, have been for homes. This proportion, which equals about 60 per cent. of the total, is extremely large and further evidences the stability of enormous growth of the building trade in Winnipeg during this record-breaking year. An idea of the despatch with which contractors are doing their work may be obtained from the fact that a goodly percentage of contracts are now finished. This is noteworthy, seeing that it was well toward the end of April before work was generally started.

Apartment blocks have furnished the next largest portion of the building figures, although they were pressed closely by warehouses and general business blocks. By the end of this month the hotels and warehouses will take second position. Before the close of the year, Building Inspector Rodgers expects to see them take first place from the residences.

There are no signs of labor trouble of any consequence. Building material prices are quite normal and stocks are plentiful. There is no depression in any line worth noting.

The several big contracts which have been let are getting along well. The steel work on the Bank of Montreal building, and on the Orpheum Theatre is going ahead rapidly, and on the numerous concrete buildings in course of construction, cement is being dumped as fast as it can be hauled.

The biggest contract let recently was that for the McLaren Hotel, for Main street and Rupert avenue. This contract was awarded to C. W. Sharp & Son, at \$175,000. The hotel will have 161 rooms. It will be seven storeys in height, the first storey of cut stone and the other six of pressed red brick. The rotunda will be finished in marble and the general interior fittings are to be of the very best procurable materials. The construction is to be absolutely fireproof. It is proposed to have the hotel completed by June 1st, 1911, and to make it one of the finest in Canada.

An interesting situation has arisen in Toronto in connection with a contract for the mason work on the new Earlescourt school, the contractors for which are Messrs. Teagle & Son, their tender having been for \$13,000. This firm refused to complete the work and new tenders were called for. Ultimately a tender for \$11,500 from Chas. W.

Wood was accepted. The solicitor for the board claims that Messrs. Teagle & Son's deposit of \$650 should be forfeited, but as the deposit has actually never been paid, the board will probably have to go without it, unless they can collect it by law. Messrs. Teagle & Son in explaining their actions state that the Board of Education had already on a previous occasion given them a raw deal in connection with a tender for the mason work on Brown school. Their tender for the work at \$16,316 had been accepted but they say that subsequently they had been thrown down and the contract had been given to Orr Bros. Their action in connection with the Earlescourt contract was taken as a protest against their treatment in the Brown school matter. Some interesting developments may possibly occur before the matter is definitely settled.

Current Railway Notes

J. McMillan, of McMillan Bros., contractors for the first 70 miles of the main line of the C.N.R. west of Edmonton, states that his firm requires 500 more men and teams on its contract.

Three camps of C.N.R. surveyors are stationed between Port Arthur and Selwood, and they claim that their work will be completed during the coming winter, and that the laying of the steel can be commenced in the spring of 1911.

Work on the new Eastern Railway was commenced early in August by the turning of the first sod at Dartmouth, N.S. In order to complete the road as speedily as possible, the construction work will be divided up and the contracts sub-let.

Good progress is being made with the construction of the Canada & Gulf Terminal Railway. Hugh Doheny has the contract for this work, his superintendent of construction being J. R. Cassidy, late superintendent at Harvey Junction for McDonald & O'Brien, contractors on the Grand Trunk Pacific. Mr. Cassidy is located at Little Metis, Que.

Railway contractors on the National Transcontinental Railway report great difficulty in securing an adequate supply of men for the construction camps. The recent action of the Government in removing the restrictions against the entry of navvies from the United States, has helped the situation somewhat, but along practically all sections of the line there is a great demand for more men.

Construction work was commenced at the end of July on the line of railway by which the Canadian Northern Railway contemplates tapping its coal areas on the Brazeau river, from Stettler, Alta., east of Lacombe. The surveys for the line have all been completed and 70 miles of the road are to be finished this year. The line will cross the C. & E. near Lacombe, and continue northwest into the Brazeau coal fields. It is the intention to have this line completed and in operation by the fall of next year. The line will be continued through the Brazeau fields to connect with the main line of the railway, at some point west of the McLeod river.

According to a statement of C. C. Van Arsdel, chief engineer of the Pacific coast end of the Grand Trunk Pacific Railway, 240 miles at that end will be completed by next summer. According to Mr. Van Arsdel, rapid progress is being made from the Prince Rupert end of the road, in spite of the fact that not enough labor is procurable to carry on the work as fast as is desired by the engineers in charge. One hundred miles of grade have been completed, and the steel laid. Contractors and outfits are spread over the entire road for 140 miles farther into the mountains, and are rushing the construction as fast as possible. The construction of this end of the road is particularly heavy, owing to the

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Collingwood, Ont.

The tenders for pavement of 3,636 yards on Hurontario street according to material were as follows: Westrumite, \$2 per yard, \$7,040; tarvin, \$7,150.80; brick, \$9,784.25; tar-lithic, \$1.55 per yard, \$5,536.80. The latter was recommended. K. S. Macdonnell, engineer.

Edmonton, Alta.

The commissioners have been authorized to collect data on cost of a hydro-electric plant on the Athabasca river, 100 miles north of this city.

Fernie, B.C.

The by-law to expend \$32,000 on sewage and fire alarm systems was carried.

Hamilton, Ont.

The Board of Works is reported to have recommended that sewers be constructed for use of the Oliver Chilled Works, at a cost of \$9,000.

Tenders will be received until August 31st at the office of the Burlington Beach Commission, Room 800, Bank of Hamilton Building, for the construction and filling in behind concrete revetment wall about 1,650 feet long, 7 feet at base, on the bay front at Burlington Beach. Plans and specifications of E. G. Barrow, consulting engineer, this city.

Moncton, N.B.

J. Edington, city engineer, has reported on the water supply, and his recommendations are being considered by the Water and Light Committee of the City Council.

New Westminster, B.C.

The Municipal Construction Company, Vancouver, has secured the contract for laying the new steel main to Coquitlam Lake, which will supply water to this city and the municipality of Richmond. The 25-inch pipe line will be fourteen miles in length, and is calculated to discharge 250,000 gallons of water every 24 hours. There is already a 14-inch main tapping the lake, connecting with two reservoirs in the city, the high level one being at an elevation of 410 feet and the low level one at 250 feet. The tender price for hauling and laying the new pipe line is \$125,000, and the total cost to the city will be \$360,000. The work will take about a year to complete, and is in charge of A. R. Lewis, A.M.I.C.E., of the city engineer's office.

Ottawa, Ont.

The cost of the scheme to get the city water supply from McGregor's Lake, in the Gatineau district, some 12 miles north of the city, is placed at approximately \$2,000,000.

The by-law for the new water supply from McGregor's and adjoining lakes may be submitted to the ratepayers at the next election. The estimates place the expenditure at about \$2,000,000. The report of Mr. Allen Hazen, the water expert, is expected in about a month.

Prince Albert, Sask.

Work will probably begin early next year on the proposed trunk sewer. F. A. Creighton, City Engineer. C. O. Davidson, City Clerk.

The city council have decided to submit to the ratepayers a \$110,000 by-law for the construction of a sewage disposal system. Tenders will be invited in time to commence construction work next spring.

Regina, Sask.

Tenders will be received by the city clerk up to September the 8th for approximately 35,000 square yards of pavement, 19,000 lineal feet curb and gutter and 3,000 lineal feet of curb. L. A. Thornton, city engineer. For further particulars see "Tenders and For Sale Department" of this issue.

Tenders will be received up to September the 8th for approximately 140,000 square feet of concrete sidewalk. L. A. Thornton, city engineer. For further particulars see "Tenders and For Sale Department" of this issue.

Rainy River, Ont.

Tenders addressed to J. H. Wilson, town clerk, will be received until September 6th for the following: (a) Laying 300 feet of 15 inch sewer pipe, laying 650 feet of 12 inch sewer pipe, laying 650 feet of 10 inch sewer pipe, laying 1,700 feet of 9 inch sewer pipe, laying 350 feet flexible joint iron pipe, constructing 19 manholes, constructing 2 flush tanks, constructing 6 lamp holes, constructing pump house and installing machinery. (b) Laying 3,450 feet of 6 inch pipe, laying 1,100 feet of 8 inch pipe, laying 3,300 feet of 9 inch pipe. (c) Installing disposal plant. Plans at office of above.

Saskatoon, Sask.

Tenders will be received until September 8th for all works in connection with sanitary and storm sewers and sewage disposal works for buildings and ground of the University of Saskatchewan. Brown & Valance, architects, Canada Life Building, Montreal.

Tillsonburg, Ont.

C. E. Raynes, town clerk, will receive tenders up to August 30th for the construction of a sedimentation tank for sewage disposal. Bell & McCubbin are engineers. For further particulars see "Tenders and For Sale Department" of this issue.

Vancouver, B.C.

Tenders will shortly be called for bitulithic and "Hassam" street paving; also for the construction of 2½ miles of cement sidewalk; also for wood block paving.

Weyburn, Sask.

Geo. Ross, secretary-treasurer, will receive tenders up to August 31st for a sewage ejector station and sewage disposal works, etc. Chipman & Power, engineers. For further particulars see "Tenders and For Sale Department" of this issue.

Welland, Ont.

The ratepayers will again vote on a by-law for waterworks extensions. The total cost of the proposed scheme is \$52,000 and includes the following items: 17 pumpers, etc., \$141,000; water wheels, \$2,300; cast iron pipe, \$9,100. Wm. Kennedy, jur., is the consulting engineer.

Winnipeg, Man.

The city has decided to construct four trunk sewers, and the districts to be benefited and the cost as it is divided among the various streets are as follows: District north of Polson avenue—Jefferson avenue, McPhillips, Red river, \$275,690; McPhillips street, Jefferson, Selkirk avenue, \$118,500; total, \$394,190. Clifton district—Clifton, Portage, Sargent, \$101,222; Lavinia, Clifton, Strathcona, \$6,757; total, \$114,736. District west of Clifton—Center from Assiniboine river to Portage avenue, \$19,382. Ash street district—Ash street, Assiniboine river to Godfrey, \$44,495; Godfrey, Cambridge street to Renfrew, \$56,905; total, \$101,400. Total for four districts, \$629,708.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, will be received until September 14th for piping system and pipe tunnel and wiring ducts required in connection with the shops east of Winnipeg. Plans, etc., at office of Gordon Grant, chief engineer, Ottawa, and in the office of S. R. Poulin, district engineer, St. Boniface; also for wiring system required in connection with the locomotive shops of the National Transcontinental Railway east of Winnipeg.

AWARDED.

Buckingham, Ont.

Messrs. Wilson & Carriere, contractors of Hull, who have just completed their \$38,000 contract for sewerage and waterworks in the city, have been awarded a contract amounting to \$9,000, for the construction of a sewerage system here.

Hamilton, Ont.

A contract for building a sewer on Wentworth street was awarded to S. Cheesman at \$1.15 per foot. The city engineer, who received contracts for Hilliard, Gilson and Niagara streets, will sublet them at the same price if possible.

Harriston, Ont.

D. B. Campbell, of Strathroy, received the contract for municipal drain construction, township of Minto, at \$5,939. Other tenderers were Daniel Shea, Egerton, at \$5,111, and Crowley & McDonald, Rostock, at \$6,987.

London, Ont.

The contract for special castings for Huron street pumping station was let to the Galt-shore Thompson Company, Hamilton, at 4½ cents per pound.

Moose Jaw, Sask.

The contract for supplying materials for and laying 3,286 lineal feet of 6-inch and

700 lineal feet of 12-inch cast iron water main was awarded to P. Kilkenny, of this city, at \$13,975. J. Coleman, of Moose Jaw, also tendered at \$14,550.

The contract for supplying materials for and construction of approximately 63,000 square feet of concrete walks; 9,000 lineal feet of combined curb and gutter; 6,000 square feet of concrete crossings, and 6 miles of wooden walks, was awarded to R. L. Frost, of Moose Jaw, at \$15,330. W. E. Ramson, of this city, also tendered at \$16,072, and the Western Pavers, Limited, Winnipeg, at \$16,417.50.

Toronto, Ont.

The contract for sidewalk construction on Markham street was awarded by Barber & Young, 57 Adelaide street east, York Township engineers, to E. J. Elliott, 279 Main street, this city, at 48 cents per lineal foot. No other tenders were received and the council decided to call for fresh tenders to close August 29th.

The Board of Control awarded the following contracts for work in connection with the new addition to the city high level pumping station: Masonry, Brown & Love, \$13,700; carpentering, George Henry, \$2,299; plumbing, H. A. Johnston, \$397; roofing, Flowers & St. Ledger, \$425.

Vancouver, B.C.

Contracts for street improvements were awarded as follows: Paving Westminster road from Prince Edward street to Eighth avenue, bitulithic, R. S. Blome Company, \$49,500; Cambie street, from Hastings street to Robson street, wood blocks, Christian & Hartney, \$29,411.35. Other tenderers: T. R. Nickson, \$35,500; Palmer Bros. & Henning, \$31,750; M. P. Cotton, \$34,844. Asphalt paving on First avenue, from Yew to Macdonald, Independent Asphalt Company, \$43,800; other tender, M. P. Cotton, \$54,000. Westminster avenue, south of bridge, paving, Palmer Bros. & Henning, \$9,994.20; paving Abbott street, wood blocks, south from Water street, Higman & Doctor, \$2,900; other tender, M. P. Cotton, \$3,159. Evans, Coleman & Evans were given the contract for supplying cement at \$2.45 a barrel.

H. V. Tucker, of this city, has been awarded a contract for partially grading Tenth avenue at 62 cents a cubic yard. This work is in connection with electric railway construction at Point Gray.

Macdougall & Company, this city, have been awarded a contract for the construction of \$50,000 worth of sewers in Nanaimo, Vancouver, Island, at \$48,346. The work is to be completed within ten months. The estimate of the city engineer was \$50,000. The tenders received were as follows: Pacific Coast Construction Company, Victoria, B.C., \$74,945; James C. Kennedy, Vancouver, \$71,205.25; Hugh Macdonald, Victoria, \$59,523; John W. Moore, jr., Victoria, \$53,751; Macdougall & Company, Vancouver, \$48,346.

Welland, Ont.

The lowest bid for the Lyon's Creek drain was submitted by A. D. Brown, Welland, who will probably receive the the contract at \$5,976. Walker Bros., Thorold, bid \$6,138.

Railroads, Bridges and Wharves

Camrose, Alta.

Tenders for construction of C. N. R. from here to Strathcona, it is stated, have been found too high.

Edson, Alta.

The Grand Trunk Pacific has laid out extensive yards at Edson for the accom-

modation of its general railway traffic. Five miles of sidings will be built at once, but the yards as laid out provide room for twenty-six miles.

Edmonton, Alta.

The Canadian Northern Railway has applied to the Dominion Government for a charter for a railway to run from Edmonton to Bead River, on the Portland Canal, which is part of the British Alaska boundary. The proposed route would give the Canadian Northern shorter haul to tide-water than the Grand Trunk Pacific to Prince Rupert.

At a meeting of the city council last week tenders were submitted for the construction of the Great Ravine bridge and were referred to the city engineer for report. The bids were as follows: Dominion Bridge Company, per Gorman, Clancey & Grindley, \$29,702; Canadian Bridge Company, per Walker & Barnes, \$46,950 (with one sidewalk, \$46,150); Structural Steel Company, per Walker & Barnes, \$46,000 (with one sidewalk, \$45,100); Algoma Steel Company, \$29,300.

Joliette, Que.

Plans for a line connecting Montreal with the Transcontinental Railway by way of Joliette have been filed at the Railway Commission at Ottawa, Ont., by the Joliette & Lake Manan Railway Company. The line is to start from Joliette and run to Weynouthachene on the Transcontinental. The general route as far as Lake Manan has been approved and a location made for ten miles of the way filed. Above the lake the line has not yet been located.

Montreal, Que.

The Montreal & Southern Counties Railway Company, W. B. Powell, general manager, Montreal, Que., is to start work shortly on an extension to the Richelieu river, connecting Montreal and St. Lambert with Chambly Basin, Chambly Canton and the village of Richelieu, and intervening parishes. Later on the railway is to be extended to Granby. The company has also secured a long lease from the Central Vermont Railway, from Montreal to Waterville, and will electrify about nine miles of the track.

North Vancouver, B.C.

The by-laws on the principle of purchasing bridge shares and also \$100,000 of bridge stock were carried by the ratepayers.

Ottawa, Ont.

A syndicate headed by R. T. Shillington, member of Parliament for the Porcupine District, is reported to have been granted a charter to build a line from the T. & N. O. Railway to the Porcupine district. Construction work is to be started this month on the Hudson Bay & Pacific Railway. The survey for the road is now out over 100 miles and the road is surveyed ready for construction work for a distance of 85 miles. The engineering headquarters of the road are at Prince Albert, Sask.

Prince Rupert, B.C.

The Grand Trunk Pacific Railway Company will erect at Prince Rupert a dry dock with a lifting capacity of 20,000 tons at a cost of \$1,500,000, and a marine depot at a cost of \$200,000.

Port Arthur, Ont.

The city, G. T. P. and C. P. R. officials had a conference here last week. This, it is believed, will result in an arrangement for making Port Arthur the headquarters of passenger traffic for the three lines at the head of the lakes. A union station and new docks are among the possibilities.

Regina, Sask.

The G. T. P. have purchased a site of from 15 to 20 acres for their proposed new shops here. Construction will commence upon the approval of the company's plans by the city council.

Stewart, B.C.

Advices from this place state that the Canadian Northern Railway, which recently applied for a charter for a railroad from Edmonton, Alta., to Stewart, is now considering the construction of another railroad from Stewart branching through Portland City up the Salmon river through 20 miles of Alaskan territory into British Columbia.

St. Boniface, Man.

Plans for the proposed subway to be built on Tache street were submitted to the city council last week by the Canadian Northern Railway. The plans provide for the construction of a 40-foot subway to be built entirely at the expense of the railway company. The plans were referred to the city solicitor for approval before final consideration by the council.

Vancouver, B.C.

C. N. R. surveyors will proceed immediately with the work of laying out the townsite of Port Mann for terminals and car shops.

Harris & Bull, this city, have given notice of an application to the Legislative Assembly of British Columbia for an Act to incorporate a company with power to construct a railway from Vancouver city westward and southeasterly through Point Grey, South Vancouver and Burnaby to the city of New Westminster.

Windsor, Ont.

The Grand Trunk is preparing to improve its roadbed in Western Ontario by laying ninety-pound rails in use now. A cargo of the new rails has been unloaded at the company's docks here. The tracks between Windsor and Chatham are to be replaced with the heavier rails this year, and it is expected the work will be pushed as far as London next year.

Winnipeg, Man.

See "Power Plants."

It is reported that the C. N. R. will erect a large roundhouse, storehouse, warehouse and freight sheds at St. Boniface. It is proposed to share the Union depot there with the G. T. P., and build a new traffic bridge across the Red river from Winnipeg. The total improvements will cost over a million dollars, the work to be completed within two years. The necessary arrangements have been made with the council.

The material from the old Louise bridge has been donated by the city council to the parks board and will be re-erected as a connecting link between Assiniboine Park and Portage avenue at a cost of \$10,000.

AWARDED.

Brown Hill, Ont.

The contracts for the construction of a 55-foot clear span steel bridge over the Black river near here were awarded as follows: Concrete abutments, Jesse Winger, Edgeley, Ont., \$1,628; other tenders being \$2,586 and \$1,836. The steel superstructure was originally designed to carry a 15-ton roller and the tenders on this design were as follows: J. Vance, New Hamburg, \$1,093, other tenders being \$1,900, \$1,608, \$1,500 and \$1,514. The tender of Mr. Vance was accepted, but he subsequently withdrew and new tenders were called for on a modified design capable of carrying a 10-ton roller. The tenders on this design were as follows: Hamilton Bridge Works

Company, Hamilton, Ont., \$1,418, other tenders being \$1,350, \$1,515, \$1,429 and \$1,700. Barber & Young, engineers.

Dundalk, Ont.

For the construction of a reinforced concrete bridge over the Saugeen river, John Walker, of Owen Sound, Ont., was given a contract by the township of Glenelg, at \$1,600. Other bids were: Atkinson & McNab, contractors, Durham, \$2,000; J. J. Zettler, contractor, Walkerton, \$2,350; William Moore, contractor, \$2,700.

Edmonton, Alta.

The local contracting firm of Pennie & Kerr were awarded the sub-contract for all the excavation work on the C. P. R. high level bridge here.

Fort William, Ont.

The C. P. Railway Company awarded the contract for piers, abutments and pedestals for bridge over the Kaministiquia river to O. A. C. Stewart & Company, Winnipeg.

Galt, Ont.

The tender of Hancock & Thomas has been accepted by the city council for the erection of the Kerr street and Ainslie street concrete bridges.

London, Ont.

The Middlesex county council have awarded contracts for a bridge over the Aux Sable river for the steel to the Hamilton Bridge Works and for the cement work to R. Walton, of Kerwood, Ont.

St. Boniface, Man.

A contract to build a culvert over the Seine river at Provenchre avenue was awarded to Guilbault & Company at \$27,810.

Vancouver, B.C.

The contract for constructing a slip at the foot of Balsam street was awarded to Armstrong, Morrison & Company at \$7,835. The tenders were as follows: Ironsides, Rennie & Campbell, \$9,796; Higman & Doctor, \$10,720; H. V. Tucker, \$11,985.

Public Buildings, Churches, Schools, etc.

Dubuc, Sask.

Tenders addressed to J. L. Bartley, secretary-treasurer, will be received until August 31st for the erection of school here. Plans, etc., with above, or at office of Storey & Van Egmond, architects, Regina.

Halifax, N.S.

The city council have selected a site for a market building.

North Vancouver, B.C.

The by-laws to raise \$10,000 for new school was carried.

Ottawa, Ont.

The headquarters of the Golf Club will be completed by October 1st. Horwood, Taylor & Horwood are architects.

C. P. Meredith, architect, is calling for tenders for fixtures for the city hall.

Weeks & Keefer, architects, are calling for tenders for the fire station.

Quesnel, B.C.

This town is discussing a new fire hall and modern fire apparatus. A by-law to that effect will be voted on soon.

St. Andrews, Man.

Tenders are being called until September 3 for erection of municipal hall. Plans at office of F. R. Evans, architect, Winnipeg.

Stratford, Ont.

At a meeting of the city council last

week a by-law to raise \$5,000 for an isolation hospital was introduced and passed.

St. Vital, Man.

A by-law authorizing the issue of debentures for the sum of \$20,000 for the erection of school will be submitted to the ratepayers on August 25th.

Toronto, Ont.

The congregation of Grace Anglican Church, Elm street, have decided to sell their building and erect another on a new location.

Vancouver, B.C.

Tenders addressed to W. Ferris, secretary, school board of South Vancouver, will be received until August 25th for the erection of an 8-room brick and stone school building at Cedar Cottage, South Vancouver. Plans and specifications at office of J. H. Bowman, architect, 112 Crown Building, city.

Wallaceburg, Ont.

On September 6th the ratepayers will vote on the raising of \$20,000 in debentures for school purposes.

AWARDED.

Calgary, Alta.

The Otis-Fensom Elevator Company were awarded a contract for the installation of an elevator in the city hall at \$5,400.

Granby, Que.

For the installation of heating, plumbing and ventilation at the college and convent here, the Roman Catholic School Commission received five bids. Up to date, contracts have only been awarded for heating, the successful tenderers being: for the college, T. Lessard & Sons, Limited, Montreal, and for the convent, W. J. Walker, Granby, Que. Architect, Jas. Sawyer, Montreal.

Maisonnette, Que.

Contracts have been awarded as follows for the construction of the new Town Hall: Masonry and brickwork, Messrs. Perrault & Audy; reinforced concrete floors, E. Loygon. Mr. C. Dufort, architect.

Montreal, Que.

Contract for the additions to the All Saints' Church, Marie Anne and St. Denis Boulevard, has been awarded to John Wighton, general contractor; Messrs. Cox & Amos, 112 Mansfield street.

Nanaimo, B.C.

The local lodge I. O. O. F. has awarded the contract of building the new hall to Mescher Bros., of Victoria, whose tender was \$29,310; the contract for heating the building being awarded to Messrs. MacDonald & Perry, of Vancouver.

Orillia, Ont.

The contract for the erection of Sunday School for the Baptist Church here has been awarded to W. L. Bennett, this town, at \$5,000. J. H. Robertson, Orillia, architect.

Winnipeg, Man.

The contract for the erection of the two police sub-stations has been awarded to John McQuarrie, this city, at \$54,000. E. H. Rodgers, Inspector of Buildings, architect.

Residences

London, Ont.

Mr. Jno. Hayman is contemplating the construction of a large apartment house on Wellington street.

Niagara Falls, Ont.

The residence of Chas. Weir was destroyed by fire last week at a loss of \$5,000.

Ottawa, Ont.

James Mather, this city, is the architect for the residence to be erected for Admiral Kingsmill at Rockcliffe. It will be a limestone structure, and the estimated cost is \$20,000. Holbrook & Sutherland have the general contract.

C. J. Burrett, architect, has been instructed to prepare plans for a residence for John McDonald in Carleton Place.

Among the building permits recently issued are: J. B. Larkin, dwelling, York street, \$3,000; H. Nesbitt, dwelling, Florence street, \$2,700; Dr. Ami, alterations, Laurier avenue east, W. G. Adamson builder, \$3,000; Christian Neilson, Hawthorne avenue, dwelling, \$2,500; Robert Edmondson, dwelling, \$2,500, Blackburn avenue; W. E. Hunt, dwelling, Arlington avenue, \$5,100; T. C. James, dwelling, Driveway, W. E. Noffke, architect, \$12,000.

J. A. Ewart, architect, is calling for tenders for a residence for E. J. Campbell on Stewart street, to cost about \$5,000.

Toronto, Ont.

Tenders addressed to F. S. Baker, architect, this city, will be received until August 27th for all trades required in the erection of a residence in Eglinton.

Victoria, B.C.

J. McLaren, dwelling on Trutch street, to cost \$4,000; Gus A. Porter, dwelling on Linden avenue, to cost \$3,500.

AWARDED.

Brandon, Man.

J. A. Twiss was awarded the contract for building a residence for E. L. Stady, on Fifteenth street, at a cost of about \$5,000.

Montreal, Que.

Contract for alterations to property on Peel street for the Geo. A. Drummond Estate has been awarded to Bonnell Bros., contractors, Guy street. Architect, Geo. T. Hyde, 157 St. James street.

Sir Robert Lucas is erecting a residence at LaChine, Que. Masonry contract awarded to John Wighton, contractor, Sussex street. Carpentry awarded to U. Panze & Pils, Limited, Greene avenue. Architect, H. C. Stone, 84 St. Francois Xavier street.

Ottawa, Ont.

C. and W. H. Lester have been awarded the contract for masonry and brickwork in connection with alterations to Dr. Kline residence, corner of Somerset and O'Connor.

The following contracts have been awarded for the residence of W. E. Noffke, architect, is erecting on the driveway: T. C. James, mason and brick work; Smith Brothers, carpentering; Kelly & Ferguson, painting; Currie & Lavoie, plumbing; John J. Green, plastering. The building will cost \$14,000.

Weeks & Keefer, architects, have awarded the contract for the construction of Dr. J. E. Taggart's residence on Chénow avenue to A. Slack. The cost will be about \$11,000.

Business Buildings and Industrial Plants

Aylmer, Que.

Bailey's lumber mill here was destroyed by fire on the 18th inst. Estimated loss \$10,000.

Blackville, N.B.

McLaggan Bros. saw mill here was destroyed by fire on the 19th inst. Estimated loss, \$10,000.

Battleford, Sask.

Plans have been competed for a new Dominion lands office and post office to be erected here at a cost of \$100,000.

Balfour, B.C.

It is expected that an early start will be made on the G. T. R. hotel here. Foundation work will be proceeded with as soon as the revised plans are received from Montreal.

Calgary, Alta.

The Calgary Milling Company's plant was damaged by fire last week to the extent of \$20,000.

Cobourg, Ont.

The town council has entered into an agreement with the International Tool Company of Toronto for the establishment of an industry in this town. Work is to be commenced on the plant within ninety days, and it is to be in operation in nine months' time. Secretary, Mr. Chapman.

Edmonton, Alta.

Tenders addressed to the City Commissioners will be received until August 29th for the erection of extension to the car barns.

Gracefield, Que.

Campbell & Stearns, formerly of L'Orignal, are preparing to erect a saw mill here at a cost of \$25,000.

Hamilton, Ont.

It is stated that the Guelph Specialty Company will open a branch here and that the Canada Reflector & Mirror Company of Pittsburg has decided to locate here.

The Hamilton Bridge Works Company have purchased ten additional acres to provide for future expansion.

Londonderry, N.S.

Fire last week destroyed the machine shop of the Canada Iron Corporation at this place. Loss \$15,000.

Longueuil, Que.

Plans are nearly completed for the new military school which the Government plans to build here.

London, Ont.

J. H. Chapman & Company will make extensive alterations to their store in the near future.

Moncton, N.B.

The store building owned by S. B. Leblanc, at Legeres Corner, near this city, was burned down last week at a total loss of \$9,000.

Medicine Hat, Alta.

The Alberta Iron Rolling Mills have signed the agreement to install their \$100,000 plant in this city this fall.

Montreal, Que.

The permit has been issued for the new C. P. R. depot at Mile End, to cost \$37,000.

The National Acme Manufacturing Company will erect a new plant in Montreal. Plans and specifications to be seen at the Builders' Exchange, 263 St. James street, Montreal.

It is stated that J. A. Jacobs is planning the erection of a large hotel on the site of the Scroggie departmental store, which he has acquired. Estimated total cost of building and equipment, \$1,000,000.

Napanee, Ont.

The barns of W. H. Hunter were destroyed by fire last week at a total loss of \$10,000.

Orillia, Ont.

The Canadian Refining & Smelting Company have definitely decided to establish

a factory here. The town is giving the company a site of about 9½ acres.

Osgoode, Ont.

The premises of the Union Bank, Nixon's livery stable, Boyd's general store and other buildings were destroyed by fire last week at a total loss of \$20,000.

Ottawa, Ont.

A charter has been granted to the McLaughlin Paint Company, which has located on Armstrong street, and is making arrangements for erecting larger premises.

Maass Brothers have purchased a large lot on Irvine avenue, and will erect a machine shop on it, to cost about \$5,000.

James Mather, architect, is preparing plans for a new bakery for Slinn-Shouldis, Limited. The building will be erected on Catharine street. It will be of solid brick, two storeys and a basement, and 231 feet by 120 feet. He will call for tenders in ten or twelve days.

Portage la Prairie, Man.

The Rat Portage Lumber Company are planning to start the erection of a new planing mill here this fall.

Peterboro, Ont.

The Canadian General Electric Company are calling for tenders up to September 6th for the various trades in connection with the company's machine shops here. For further particulars see "Tenders and For Sale Department" of this issue.

Sudbury, Ont.

A. W. Fraser, of Ottawa, is authority for the statement that the contract has been given to a Minneapolis firm for the erection of a 2,000 barrel flour mill and grain elevators at this place.

St. John, N.B.

The Dominion Iron & Steel Company are said to be negotiating for control of the Pender Nail Works here. This would probably mean considerable extension.

St. Catharines, Ont.

Tenders addressed to A. E. Nicholson, architect, will be received until August 31 for erection of office building for the Security Loan & Savings Company.

Sandwich, Ont.

Ratepayers have authorized the granting of special inducements to the Canadian Salt Company, in order to secure the big chemical plant which will probably be operated in connection with the present Windsor plant. The town will grant the company a fixed assessment of \$35,000 for ten years and in return will secure a plant valued at about \$250,000.

Toronto, Ont.

The Board of Education will receive tenders up to August 26th for the enlargement, fittings and supplies of various schools and collegiates in the city. For further particulars see "Tenders and For Sale Department" of this issue.

The carriage works of Cottrell & Rigby were burned last week. Estimated building loss, \$2,000.

Tenders will be received until the 27th inst. for brick work, cut stone, structural steel and all carpenter work required in the erection of an office, warehouse and elevator building for "Faramel, Limited," to be erected on Dupont street. Plans and all particulars can be obtained at the office of F. H. Herbert, architect, 65 Adelaide street east, Toronto.

Victoria, B.C.

It is stated that the Victoria & Sydney Railway Company will build new office quarters on Blanchard street, at a cost of

\$17,500. Dinsdale & Malcolm are the contractors.

It was practically decided at the meeting of the civic health committee that the building of the isolation hospital on the reserve opposite Barnet should be deferred until next year.

Vancouver, B.C.

The Dominion Bond & Trust Company, this city, will erect a fourteen storey business block to cost half a million on the southwest corner of Granville and Cordova streets, opposite the C. P. R. station.

The Vancouver Milling & Grain Company will erect a new 100,000 bushel elevator, 94 feet in height, and a new warehouse, on Smythe street. Both buildings will be constructed of reinforced granite.

Windsor, Ont.

It is proposed to build a new Federal building on a different site.

The Imperial Bank is seeking a building site here.

Negotiations are under way by Border Chapter, Daughters of the Empire, for the purchase of the Her homestead, on the Huron-Sandwich line, as the site for the proposed tuberculosis hospital, for which the members of the Windsor Chapter have been collecting funds.

Welland, Ont.

Deere & Company, of Moline, Ill., U.S., will locate its Canadian branch here. Estimated expenditure, about \$1,000,000. Proposed site between the Welland division of the G. T. R. on the east and the canal on the west, about 140 acres. By-laws to provide for macadam road and running of water main to the works will be submitted shortly by the township council.

United Motors, Limited, will build an automobile factory in the township of Crowland. The directors of this concern are Frederick Sager, Detroit; E. A. English, Toronto; W. L. Adams, Niagara Falls; and L. C. Raymond and B. J. McCormick, of Welland. The capitalization is \$200,000. The construction of the proposed works will be commenced at an early date.

Winnipeg, Man.

The plans for fire alarm signal station were passed by the council. Noted in last issue.

Dingle Bros., this city, will erect a 4-storey brick warehouse on Stanley street, at a cost of \$35,000.

It is reported that Ross & MacFarlane, architects, Montreal, have plans well under way for a large hotel to be erected by the G. T. P. at a cost of over one million dollars. It is stated that tenders will be called upon the completion of the plans, and that excavation work will be proceeded with this fall in order to permit of an early start on the work next spring. The proposed hotel will be located one block west of the new union passenger depot and will be known as the "Fort Garry."

AWARDED.**Brandon, Man.**

The contract for the new C. N. R. hotel here was awarded to Thos. Kelly & Sons, Winnipeg.

Brantford, Ont.

J. D. Tindall & Son, Woodstock, Ont., were the successful contractors, at about \$20,000, for the 3-storey addition to the works of the Verity Plow Company, Limited, this city. (In our last issue it was erroneously stated that Richards & Pringle had this contract.)

Montreal, Que.

Contract for all the reinforcing steel, including Kahn bars rib metal and cup bars for reinforced concrete elevator and feed mills to be erected at Ottawa for Mr. W. R. Cummings, has been awarded to Mr. G. B. Reynolds, Montreal and district engineer and sales agent for the Trussed Concrete Steel Company of Canada, Limited. Mr. A. E. Baxter, Buffalo, N.Y., designing architect.

Messrs. Jas. Robertson & Company, Limited, are erecting a factory building on Shannon street. Contractors, Robertson Bros., Westmount.

Messrs. H. L. Piper & Company are erecting a three storey factory building on St. Remi street. Contractors, Robertson Bros., Westmount.

Messrs. Blau Gas Company, Limited, Jacobs Building, are erecting a warehouse building on St. Helen street. General contractors, D. G. Loomis & Sons. Architect, D. J. Crighton, Jacob Building.

New Westminster, B.C.

The B. C. Packers' Association of Vancouver are contemplating the erection of a \$40,000 addition to their plant here.

Regina, Sask.

Wilson & Wilson, this city, were the successful tenderers at \$20,724, for the proposed warehouse of the National Drug & Chemical Co., Montreal. Architects, Storey & Van Egmond.

Winnipeg, Man.

The contract was let to A. J. Bonnett for a brick addition to the rear of the Manor hotel at about \$12,000.

Power Plants, Electricity and Telephones

Ingersoll, Ont.

The chairman of the Electric Light and Power Committee was authorized to prepare plans and specifications for new sub-station on Mill street, for which tenders will be called as soon as possible.

Kamloops, B.C.

A new long distance telephone will shortly be installed between this city and Vernon.

Medicine Hat, Alta.

Bids will be received by D. Milne, mayor, for furnishing two direct connected gas engine driven 125 kw. alternating current units, each engine to be capable of delivering not less than 200 b.h.p. on natural gas of 1,100 b.t.u. per cubic foot. M. A. Maxwell, consulting engineer to city of Medicine Hat.

Matheson, Ont.

Surveying gangs have been sent out to start work on the new electric railway, which will be built from Matheson, on the T. & N. O. Railway, to Porcupine, with a terminus on the shore of Metagami Lake. The men are in charge of Mr. W. C. Chalmers, who is one of the syndicate which will build the line. The work of building the rate will be rushed, as it was stipulated by the Government when permission for construction was given, that the work must commence within ten days and be finished by the end of the year.

Nanaimo, B.C.

The city council has reached an agreement with the Vancouver promoters of the tram line proposition, and the ratepayers will now be asked to approve the scheme. The company propose to put down about twenty miles of track, at a cost of \$300,

000, more or less, the system to comprise extensions to Ladysmith, South Wellington, Extension, Brechin, Northfield and Wellington, where coal mines are being operated.

Perdue, Sask.

The town council intends to install a telephone system which will connect with the wheat fields rural line now under construction. This is the first step towards the long distance line to Saskatoon.

Port Credit, Ont.

Bids will be received until August 29th by the Hydro-Electric Power Commission, Continental Life Building, Toronto (Adam Beck, chairman), for constructing a transformer station building near Port Credit. Bidders may submit separate bids for structural steel work.

Tillsonburg, Ont.

The Hydro-Electric power by-law was carried.

Vancouver, B.C.

The board of park commissioners will again consider the proposal to build a tram line around Stanley Park. The Electric Railway Construction Company are asking for permission to build the line.

Calgary, Alta.

The city council have adopted the recommendations of the street railway commissioners for extensions of the car lines to the suburbs, and a by-law to raise \$454,000, to carry out the scheme will be given its two preliminary readings at the next council meeting, and submitted to the ratepayers at the earliest possible date. Besides many miles of new rails, the estimates include several bridges, twelve new cars and equipment.

AWARDED.**London, Ont.**

The contract for the sub-station in the east end of the city was awarded to Hyatt Bros. at \$3,550, the lowest bidders. Tenders were also received from J. Garratt, \$3,720, and Copp Bros., \$4,300.

Ingersoll, Ont.

The following tender was recommended for acceptance: Canadian General Electric Company, for transformer for power station, \$4,600; switchboards, providing a marble board instead of slate is supplied \$3,500; street regulators, \$1,500; street fixtures, \$1,180.27; total, \$10,780.27. Ross & Holgate, engineers.

Moose Jaw, Sask.

The Canadian Boving Company, Limited, Toronto, manufacturers of high and low lift centrifugal pumps, water wheels and governors, etc., have received an order, through the consulting engineer, Mr. J. B. McRae, for 200 B.h.p. Diesel engines for the Moose Jaw street railway. These engines are manufactured by Mirlees, Bickerton & Day, Limited, of Stockport, England, and are the first of the kind to be installed in Canada.

Toronto, Ont.

The Board of Control has awarded the following contracts for the electrical sub-stations to be erected at the corner of Ruskin and Edwin avenues: Masonry, Teagle & Son, \$26,905; masonry, if artificial stone is used, \$25,105; roofing, Duthie & Company, \$187; plumbing, Fred. Armstrong & Company, \$410; painting, James Casey, \$170.

Victoria, B.C.

L. A. Borde, this city, was awarded the contract for the installation of cluster lights here. Amount of contract, \$3,481.

Weyburn, Sask.

The contract for an extension to the electric light plant at this place has been awarded by the engineer, Mr. G. V. Reed, to Allis-Chalmers-Bullock, Limited, of Winnipeg, at \$8,600. Other bids were: Canadian General Electric, Winnipeg, at \$9,900; Leonard & Sons, London, Ont., \$10,700; Canadian Westinghouse, Winnipeg, \$11,300; Goldie & McCullough Company, Winnipeg, \$11,689; Robb Engineering Company, Winnipeg, \$11,790.

Miscellaneous

Fort William, Ont.

The council will probably submit a by-law to raise \$5,500 for improvements at the cemetery, these to include \$2,500 for residence, \$1,800 for a fence and \$1,200 for purchase of gravel and general improvements.

Mayor L. Peltier states that the citizens will be given an opportunity to choose between illuminating gas furnished by the city and granting a franchise to a private corporation for a gas plant at a special election, which will be held at an early date.

Medicine Hat, Alta.

The ratepayers have approved by-laws to raise \$50,000 for the installation of an electrical plant, \$45,000 for waterworks extension and \$18,500 for industrial sites.

Montreal, Que.

Recent building permits include Estate Geo. A. Drummond, Sherbrooke street west, alterations to property 182 Peel street, \$7,000; A. Deslauriers, 174 Windsor street, a three storey building, 140 St. Antoine street, \$5,000; W. N. Aitken, 279 Drummond street, additions to property at 900 St. Catherine street west, \$4,000; B. Rignon, 232 Fairmont avenue, additions to property on Fairmount avenue, \$3,500; Geo. W. Reed & Company, Limited, 337 Craig street west, a three storey building on St. Antoine street, \$4,000; Montreal Park & Island Railway Company, Montreal Street Railway Building, shops and works at St. Laurent, Que., \$200,000; Catholic School Commissioners, Plateau street, a four storey school building on Visitation street, \$105,000; H. Vermette, 2697 St. Lawrence Boulevard, three houses containing six dwellings on Clark street, \$6,000; Canada Sugar Refining Company, Limited, Montmorency street, a three storey building on St. Patrick street, \$18,000; H. L. Piper & Company, Normand street, a three storey factory building on St. Remi street, \$18,000; Ferron & Demolon, 117 Desery street, house containing four dwellings on Duquette street, \$4,000; James Robertson & Company, Limited, William street, a factory building on Shannon street, \$5,500; Jos. Dupuis, 65 Delinelle street, five houses containing fifteen dwellings on Delinelle street, \$12,000; E. F. Garipey, 2116 St. Lawrence Boulevard, house containing three dwellings on St. Urbain street, \$3,000; Blau Gas Company, Limited, Jacobs Buildings, a warehouse building on St. Helen street, \$5,500; Elie Pandin, 1829 Christopher Colomb street, three houses containing nine dwellings on Christopher Colomb street, \$7,000.

Toronto, Ont.

At a meeting of the city council last week the new drainage extension schemes for East and West Toronto, the erection of a public lavatory at Roncesvalles avenue and Queen street, and the construction of five groynes for the protection of the lake front at the beaches were passed.

(Continued on page 28)

Tenders and For Sale Department



Department of Railways and Canals

QUEBEC BRIDGE

Tenders for Superstructure

Notice to Contractors

Extension of Time for Receiving Tenders

The time for receiving tenders for the superstructure for the Quebec Bridge advertised to be received up to the 1ST OF SEPTEMBER, 1910, is hereby extended for one month, viz.: up to the first of October, 1910.

By Order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 9th August, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 85

Tenders
for

Electric Lighting

Sealed tenders addressed to the undersigned and marked "Tenders for Electric Lighting" will be received at the office of the City Clerk, Charlottetown, Prince Edward Island, until 12 o'clock noon on SATURDAY, THE 10TH DAY OF SEPTEMBER, 1910, for supplying the City of Charlottetown with Electric Light for Street and Commercial purposes. Tenders to state price and illuminating capacity per lamp for street light, and rate per kilowatt hour for commercial lighting.

The lowest or any tender not necessarily accepted.

Further information can be obtained by applying to the office of the CONTRACT RECORD, 504 Confederation Life Building, Toronto, or to

W. W. CLARKE,
City Clerk.

Charlottetown, P.E.I., July 20th, 1910. 34

TOWN OF WEYBURN
Province of Saskatchewan

Sewerage Work

Sealed tenders will be received by the Secretary-Treasurer of the town of Weyburn, until 8 p.m. on WEDNESDAY, AUGUST 31ST, 1910, for the following works:—

Contract "P"—Sewerage Ejector Station.

Contract "X"—Sewage Disposal Works, including Tanks, Filters and Beds.

Plans, specifications, etc., may be seen at the office of the engineers, Winnipeg, Toronto, and Weyburn.

R. H. SMITH, ESQ., M.D.,
Mayor, Weyburn, Sask.

GEO. ROSS, ESQ.,
Sec. Treas., Weyburn, Sask.

CHIPMAN & POWER,
Engineers, Winnipeg and Toronto.

Town of Dauphin
Province of Manitoba

Water Works and Sewerage Notice to Contractors

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on THURSDAY, SEPTEMBER 1ST, 1910, for the following:

Contract "A"—Labor, laying about six miles of water pipes and sewers; sub-divided into two sections.

Contract "D"—Furnishing cast iron water pipe and special castings.

Contract "E"—Furnishing gate valves for fire hydrants, etc.

Contract "M"—Labor and materials for ten miles of gravity main; sub-divided into three sections.

Contract "R"—Constructing concrete reservoir.

Contract "S"—Furnishing sewer pipes.

Contract "W"—Furnishing wooden stave pipe.

Plans, specifications, etc., may be seen at the Town Hall, Dauphin, or at Engineer's offices, Winnipeg and Toronto.

No tender necessarily accepted.

R. C. SPARLING, Esq., Mayor.
J. A. CAMPBELL, Esq., Chairman.
J. W. JOHNSTON, Esq., Secretary-Treasurer.
CHIPMAN & POWER, Engineers.



Sealed tenders addressed to the undersigned, and endorsed "Tender for Breakwater at Bare Point, Port Arthur, Ont.," will be received at this office until 4.00 p.m., on WEDNESDAY, AUGUST 31ST, 1910, for the construction of a breakwater at Bare Point, in the Harbor of Port Arthur, Electoral District of Thunder Bay and Rainy River, Ont.

Plans, specifications and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont., E. B. Temple, Esq., District Engineer, Port Arthur, Ont., and J. L. Michaud, Esq., District Engineer, Merchants Bank Building, St. James Street, Montreal, Que.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation and the place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works for the sum of forty-five thousand (\$45,000.00) dollars which will be forfeited if the person tendering declines to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, August 10th, 1910.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 84

City of Regina

Pavement Construction

Sealed tenders, addressed to the undersigned City Clerk and endorsed on envelopes, "Tenders for Pavements," will be received up to 12 o'clock noon, THURSDAY, SEPTEMBER 8TH, 1910, for approximately 33,000 square yards Pavement and approximately 19,000 lineal feet Curb and Gutter, and 3,000 lineal feet of Curb.

Particulars may be had upon application to the City Engineer.

A marked cheque for \$6,000 must accompany each tender. The cheques of unsuccessful tenderers will be returned. The lowest or any tender not necessarily accepted.

L. A. THORNTON,
City Engineer.

A. E. CHIVERS,
City Clerk. 35

City of Peterboro
Province of Ontario

Notice to Contractors

Sealed tenders will be received by the City Clerk until 8 p.m. on THURSDAY, SEPTEMBER 1ST, 1910, for the following works:

Contract "A"—1. Laying 2,000 feet Sanitary Sewer.

2. Laying 4,200 feet Storm Drains.

Contract "G"—Electrically operated Air Compressor and Ejectors.

Contract "P"—Sewage Pumping Station.

Contract "S"—Tile Sewer Pipes 30-inch to 8-inch.

Plans and specifications, etc., may be seen at the City Engineer's office, Peterboro, or at the office of Consulting Engineers, Toronto.

ROBERT HICKS, Esq.,
Board of Works.

T. A. S. HAY, Esq., C.E.,
City Engineer.

R. S. ARMSTRONG, Esq.,
City Clerk.

CHIPMAN & POWER,
Engineers, Toronto.

Tenders for Sewers

Township of York

Sealed tenders, plainly marked on the outside as to contents, will be received by the undersigned up to twelve o'clock noon of MONDAY, AUGUST 29TH, 1910, for the construction of the following works in the Township of York:—

892 feet Vitrified Pipe Sewer on Spadina Road northerly from the city limits.

982 feet Vitrified Pipe Sewer on Spadina Road northerly from the city limits.

Plans and specifications may be seen and all necessary information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

The lowest or any tender will not necessarily be accepted.

BARBER & YOUNG,
York Township Engineers.

Toronto, August 17th, 1910. 34

Assignees Sale of Cement Plant

The Assignee of the Grey and Bruce Portland Cement Company of Shallow Lake, Limited, will offer for sale by public auction at the Seldon House, Owen Sound, on the 15TH DAY OF SEPTEMBER, 1910, at 2 o'clock p.m., all the lands, plant, machinery and chattels of the said company. For further particulars apply to A. D. Creaser, Owen Sound, Solicitor for Assignee. 35

The Royal Institute of British Architects, London

Examination for Admission as Associate

An examination for admission as Associate of the Royal Institute of British Architects, London, will be held in Toronto from the 17th to 23rd of November, 1910.

Full particulars and all information regarding this examination can be had by applying to

F. S. BAKER,

34 Traders Bank Building, Toronto.

To Contractors

Sealed tenders, addressed to the undersigned, will be received until TUESDAY NOON, 30TH INST., for the construction of a Sedimentation Tank for Sewage Disposal in the town of Tillsonburg. Plans and specifications may be seen at the office of the undersigned or at the office of Bell & McCubbin, civil engineers, St. Thomas. A marked cheque for \$200 payable to the Treasurer of the town of Tillsonburg must accompany each tender as a guarantee of good faith. The council do not bind themselves to accept the lowest nor any tender.

A. E. RAYNES,
Town Clerk.

Tillsonburg, August 19th, 1910.

34

Notice to Contractors

Sealed tenders, addressed to the undersigned, at 212 King street west, Toronto, and endorsed "Tender for Machine Shop," will be received up to 5 p.m. on SEPTEMBER 6TH, 1910, for the various trades in connection with Extension to the Company's Machine Shop at Peterboro.

Envelopes containing tender should have plainly marked on the outside (in addition to the words "Tender for Machine Shop") the particular trade covered by the tender.

Plans and specifications may be seen on application to the building department at 212 King street west, Toronto, or in the office of the clerk of works on the job at Peterboro.

The lowest or any tender not necessarily accepted.

CANADIAN GENERAL ELECTRIC COMPANY,
LIMITED.

34

City of Regina

Sidewalk Construction

Sealed tenders, addressed to the undersigned City Clerk and endorsed on envelopes "Tenders for Sidewalk Construction," will be received up to 12 o'clock noon, THURSDAY, SEPTEMBER 8TH, 1910, for approximately 140,000 square feet of Concrete Sidewalk.

Particulars may be had upon application to the City Engineer.

A marked cheque for \$1,000 must accompany each tender. The cheques of unsuccessful tenders will be returned.

The lowest or any tender not necessarily accepted.

L. A. THORNTON,
City Engineer.

A. E. CHIVERS,
City Clerk.

35

To Contractors

Sealed bids will be received by the undersigned up to noon of AUGUST 27TH for all trades required in the erection of a residence in Victoria avenue, Eglinton.

The lowest or any tender not necessarily accepted.

F. S. BAKER, Architect,
Traders Bank Building, Toronto.

34

Board of Education Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board, will be received for the

Enlargement of Humboldt Collegiate Institute (all trades)

Fittings for Science Rooms, Harbord
Street Collegiate and Riverdale High School
(Cabinet Work, Plumbing and Electric Wiring)

Fittings for Domestic Science Rooms,
Brown, Kent and Kimberley Schools
(Cabinet Work and Plumbing)

until

Friday Noon, August 26th, 1910

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH,
Chairman of Committee.
Toronto, Ont.

W. C. WILKINSON,
Sec.-Treas.
34

Positions Vacant

Advertisements under this heading two cents a word per insertion. B x No. ten cents extra

SALESMAN WANTED—To sell insulating varnishes, either alone or as a side line. Must have good connection with electrical trade. Write Box 129 "Contract Record," Toronto, Ont. 35

Miscellaneous

Advertisements under this heading two cents a word per insertion.

CONTRACTOR'S OUTFIT FOR SALE—Six Wheeler, No. 3, concrete line plant, nearly new. Owner going into another line of business. Joseph Patterson, Box 114, St. Marys, Ontario. 35

Miscellaneous

(Continued from page 27)

Toronto, Ont.

The recommendations of the Board of Works for the repaving of Yonge street north of the C. P. R. tracks was referred back for further consideration, as were also the recommendations that by-laws be submitted to the property owners authorizing the issue of debentures for \$500,000 for the reclamation of Ashbridge's Bay and for \$769,000 for the Bloor street viaduct.

Recent building permits include: Richard Dunkley, pair semi-detached 2-storey brick dwellings, Symington avenue, \$4,500; Jas. Soutar, pair semi-detached 2-storey frame dwellings, brick fronts, \$4,000; G. A. Graham, 1½ storey brick dwelling, and a garage, Warren road, \$6,000;

Maple Leaf Milling Company, 2-storey brick warehouse and stable, Dupont and C. P. R., \$26,000; W. J. Kernohan, 2-storey brick dwelling, Warren, \$12,000; Shawell Edwards & Company, Limited, 1-storey brick warehouse and 2½ storey brick office, Peter street, \$13,000; Snowden & Foxton, pair semi-detached 2-storey brick dwellings, near Gerrard, Hiawatha, \$5,800; A. Walker, 1-storey brick gospel hall, corner Brunswick and Sussex, \$6,800; Bank of Toronto, 2-storey brick apartments and bank, at junction of Roncesvalles, Dundas and Boustead, \$9,500; the Newell Company, 4-storey brick warehouse, corner Ontario street and Ontario place, \$45,000; R. J. Christie, alterations and addition to dwelling, corner Queen's Park crescent and St. Albans, \$55,000; Fred Brown, pair semi-detached 2-storey brick dwelling, Concord, \$4,000; Otto Higel Company, 5-storey brick factory, King street west, \$50,000; Mrs. Martin Graham, 2-storey and attic brick dwelling, Forest Hill road, \$12,000; A. W. Clogg, 2-storey brick dwelling on north side Hearnsdale avenue, \$4,000; J. W. Brown, pair semi-detached 2-storey brick dwellings, Concord, \$4,000; Butler Bros., pair semi-detached 2½-storey brick dwellings, Clinton street, \$5,000; Trusts & Guarantee Company, Limited, alterations to front of bank and offices, King street west, \$6,000.

Vancouver, B.C.

Recent Building permits include: Pilkington Bros., block on Powell street near Columbia avenue, five storeys, cost \$80,000; Mr. A. W. Johnson, four storey block at 195 Alexander street, cost \$21,000; School board, manual training school, Napier and Cotton, \$3,000; R. W. Gabriel, 2335 Eighth avenue west, \$5,000; J. Slemmon, 1426 Fourteenth avenue, \$3,500.

Winnipeg, Man.

Recent building permits include: R. J. White dwelling, west side of Craig, between Portage and Wolseley, \$2,500; Telegram Printing Company, alterations to printing office, Albert street, southwest corner of McDermot avenue, \$7,000; First Church of Christ, Scientists, River avenue, corner Llewellyn, brick and stone, 98 x 98 feet, \$70,000; MacLaren Bros. hotel, 7 storeys, Main street, southwest corner Rupert, 66 x 131 feet, reinforced concrete, \$165,000; P. Olson, dwelling, Home street, east side, between Portage and Livinia, \$2,500; A. T. Wilson, dwelling, north side of McMillan avenue, between Pennington and Nassau streets, \$3,000; J. Martino, 3 dwellings, south side Redwood avenue, between Parr and Brown streets, \$3,000; J. C. Gage, dwelling, 83 Kingsway, \$2,500; W. Hanbury, dwelling, north side of Jessie avenue, between John and Hugo streets, \$2,500; J. C. Hicks, apartment block, 2 storeys, McMillan, northwest corner of Lilac, \$12,000; J. C. Hicks, 5 dwellings, McMillan, north side, between Watt and railway, worth \$12,500; J. Bell, dwelling, Craig, west side, between Portage and Wolseley, \$2,500.

AWARDED.

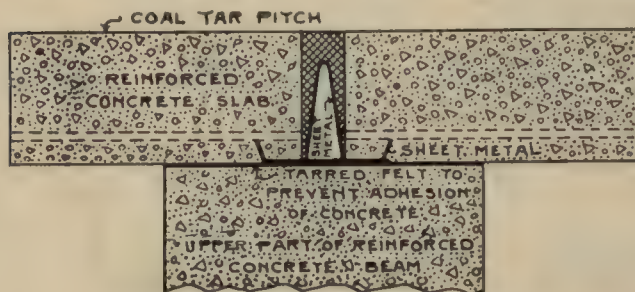
Mersea, Ont.

The contract for dredging and embanking of drainage work has been awarded by this township to the Detroit Dredging Company at 10 cents per cubic yard. Other bids received were Schwaikart Dredging Company, Detroit, 10 cents per cubic yard; Chatham Dredging Company, Chatham, Ont., 9½ cents per cubic yard and \$100 additional for cutting; Colmore Bros., Toledo, Ohio, 11 1/4 cents per cubic yard. Engineers, Owen McKay and Alex. R. Leamington, Ont.

Expansion Joint in Concrete Roofing

In an article on the construction of walls and roofs for a building in a recent issue of "System," O. M. Becker, industrial engineer, and William J. Lees, construction engineer, of the International Harvester Company, made some interesting observations on the use of concrete in factory roof construction. Recognizing that the qualities desirable in a roof are strength combined with lightness, resistance to heat conductivity, fire and acid resistance and weather tightness, they hold that except possibly for the last named quality these desirable qualities are all to be found in a monolithic concrete construction to a greater extent than in any other one material. By a roof of this description they mean, of course, one that is laid in place by putting the mixture of cement, sand and broken stone, when freshly made, into forms, and allowing it to harden or set in a more or less homogeneous mass. As exponents of the concrete roof they add further that such a roof does not condense moisture on the under surface so much as other materials, with the exception of wood. The objection that is sometimes made to concrete roofs, however, that they are not impermeable to water, can, they claim, be overcome by mixing a good cement waterproofing compound with the top dressing of the concrete, providing also that the roof is designed to permit of expansion and contraction without causing cracks.

A type of expansion joint to allow for expansion changes is shown in the accompanying sketch. This



Expansion Joint in Concrete Roofing.

shows that the space between the abutting ends of the concrete slabs contains a fold of sheet metal embedded at each end into the concrete, but allowing for flexibility without giving a direct opening of any kind through the roof at the joint. A filling of coal tar pitch is employed to fill the joint flush with the roof surface and as a flexible material which is also counted to resist the leakage of water. It will be noted that the concrete beam on which the slabs rest was especially covered with tarred felt to prevent adhesion of the concrete slab itself, so that the slabs can have the freedom of lateral movement to accommodate such changes as take place with changes in temperature.

Another stage in the construction of the new Quebec bridge has been successfully passed by the placing in position of a large caisson, built by Messrs. M. P. & J. T. Davis. The caisson was placed on the north side of the river on August 1st.

During the month of July, 95 building permits were issued in Hamilton, Ont., an increase of 34 over the month of July, 1909. The total value of the permits during the month was \$268,500, as compared with \$205,475 in July of last year.

A thorough inspection of the trunk sewers of London, Ont., has been made by City Engineer Wright. He

finds that the sewers are in excellent condition. Consulting Engineer Graydon, however, reports that a storm sewer is necessary to relieve the present system. It is probable that a by-law will be introduced by several of the aldermen with a view to providing for a storm sewer.

Monday last was the second anniversary of the disastrous fire at Fernie, B.C., and upon that date the property which has been re-erected in the town amounted in value to \$4,845,000.

The corner stone of the Provincial University of Saskatchewan was laid on July 29th by Sir Wilfrid Laurier in the presence of a large number of people.

Estimating Amount of Heating Surface for a Building

Wm. J. Baldwin in his work, "Baldwin on Heating," gives the following rule for estimating the amount of heating surface necessary to maintain the heat of the air of enclosed space in buildings to the desired temperature:

The heating surface necessary to warm a room, of course, should be proportional to the cooling surface, and the glass of the windows and the outside walls form the largest factors in cooling.

The glass which forms the windows forms the highest cooling factor in ordinary practice, and it may be taken as 1,000, in which case the following table shows approximately the value of other building materials:

Table of Approximate Power for Transmitting Heat of Various Building Substances Compared with Each Other

Window glass	1,000
Oak and walnut sheathing on walls	66 to 100
White pine and pitch pine	80 to 100
Lath and plaster, walls good	75 to 100
Lath and plaster, common	100 to 150
Common brick (rough)	150
Common brick (hard finish)	200
Common brick (hollow walls, hard finish)	150
Sheet iron	1,100 to 1,200

A square foot of glass and a square yard or ordinary outside wall have about the same cooling value.

It has been found that 1 square foot of heating surface with steam at 1 pound pressure will just about offset the cooling done by 2 square feet of glass, when the outside temperature is 70 degrees. This is so well established now that it need not be questioned.

In the early days of steam heating the writer was acquainted with this fact, and he devised the following rule:

Divide the difference in temperature between that at which the room is to be kept and the coldest outside atmosphere, by the difference between the temperature of the steam pipes and that at which you wish to keep the room, and the product will be the square feet, or fraction thereof of pipe surface to each square foot of glass (or its equivalent in wall surface).

Thus: Temperature of room, 70 degrees; less temperature outside, 0; difference, 70 degrees. Again: Temperature of steam pipe, 212 degrees; less temperature of room, 70 degrees; difference, 142 degrees. Thus: $70 \div 142 = 0.493$, or about one-half a square foot of heating surface to each square foot of glass, or its equivalent.

It must be distinctly understood that the extent of heating surface found in this way offsets only the windows and other cooling surfaces it is figured against, and does not provide for cold air admitted around loose windows, or between the boarding of poorly constructed wooden houses or for ventilation. These latter conditions, when they exist, must be provided for separately.

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HERBERT B. MUIR, Representative

WINNIPEG Telephone 224 404 Travellers' Bldg.
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Vol. 24

Toronto August 24, 1910

No. 34

The Strike at Winnipeg

The action of the Winnipeg Builders' Exchange in locking out nearly eight hundred masons and bricklayers owing to the boycotting by the workmen of one of the leading western firms is drastic only in the sense of its being efficacious. If Canadian contractors are to have any say at all in the conduct of their business and in the direction of their contracts they must show a little more of the spirit of the Winnipeg Builders' Exchange. This association is to be congratulated upon the example it has set and the firm stand it has taken.

For some time the balance of power has been inclining to the trades unions. They have set the number of hours a man may work in a day. They have stipulated what price a laborer is worth and in some cases they have even controlled his output. They have laid down this condition and that, and now the only thing they desire is to compel contracting firms to employ only union men, at their terms.

It is all very well to keep peace for the sake of trade prosperity, but there is a limit to every form of endurance and there always comes a time when pacific measures are construed by the ignorant into admissions of weakness. The Montreal firm which claimed the privilege of open shop was well within its rights and it would be an enduring disgrace to contracting interests to allow any blackmailing of this sort by the unions.

This Winnipeg affair, we venture to think, will be a nail in the coffin of the present constitution of trades unionism. The violation of privileges, the abuse of power, are things that were never tolerated for any length of time in any stage of British history. If they had been, Canada would long since have lost her identity,—and if they are, the glorious destiny foretold by far-seeing politicians and others will be long in its fulfillment. So long as the union works only for the equit-

able rights of the trade it represents it is a power for good of inestimable value, particularly in a building country like Canada; but let it exceed its proper functions and nothing can have a more baneful influence, a more demoralizing effect, upon the working community.

The Decreasing Efficiency of Labor

A Chicago contemporary contends that the costs of work at the present time are from 25 to 50 per cent. higher than they were five years ago. On the face of it this is startling, and possibly an exaggeration, but certain it is that the cost of construction work has increased materially in the period named—in Canada equally as much as in the United States,—and it is disturbing, under these conditions, to reflect upon the decline in the efficiency of labor. Both skilled and unskilled labor are included. This decrease in efficiency, taken in conjunction with the increased wages and higher prices of recent years, show up very unfavorably against the conditions under which construction was carried out but a few years back.

Various causes are adduced for the less efficient workmen. The reason assigned by some is that work is much more plentiful than formerly; by others that those in charge are less efficient, and by a few that it is traceable to the labor unions. Those who have studied the question at all seriously remain unconvinced after hearing arguments based upon the above contentions. The cause has not yet been wholly determined, neither has a satisfactory solution been offered. The matter is a vital one to all interested in construction, but most of all to contractors.

The contractor must brace himself to meet the extra burden by more scientific management and by making himself familiar with the latest labor saving machinery and tools, which, of course, are designed to take the place of men. The former must be the primary consideration, however, for efficient men will always be needed in construction work. The progressive contractor, he who is able to read the signs of the times and who can adapt himself to the changed conditions of the present day will meet the situation by improved methods of management. The regular daily or weekly wage does not bring out the best that is in a man and the contractor who feels this and who offers an incentive greater than the regular daily wage will doubtless obtain good results from his men. There is a growing tendency on the part of the laborer of to-day to consider that he is worthy of something more than his hire; that he should be afforded the chance to earn extra remuneration by ability and hard work. This tendency in itself is not alarming. The way to meet it is to modify the time honored wage system and introduce a system of payment whereby a man will be rewarded more nearly in proportion to his merits.

County Engineer and Highway Superintendent J. Y. McClintock, of Monroe County, New York, according to the Empire State Motorist, has invented a new method of highway surfacing which promises to go a long way toward meeting the demands of the day for automobiles as well as horse travel. Because of its comparative cheapness it is not unlikely that the new method will find great favor in the rural districts and villages where the traffic is not excessive.

The new method is to make the wearing surface of two-inch cubes, which can be made of various materials to meet the requirement of the traffic of the particular road. One of the good points of the method is the com-

affected by the quantities of work to be done; and any change on the part of the owner's mind affecting the quantity of work to be done, should—but rarely does—tend to increase or decrease the contractor's unit-price. In order to guard against such a contingency, the contractor should add something to his price by way of insurance. After an estimate has been made, it is a practice of many contractors to "unbalance" their bids. A great danger from this is that the work may have to be completed with quantities different from what were originally figured.

General Layout—The general layout of the work can be determined only by a personal inspection of the ground; and on this the estimator should make copious notes, having special reference to the distance of railroad connections, the distance of the railroad connection from shipping points of materials and supplies, the character of the country, the kind of water, and as many of the local conditions as can be reasonably and quickly noted.

Bonus or Discounts—This item depends largely upon the particular business followed. If the contractor is figuring to earn a bonus on the contract price by getting through before the time limit, such being provided in the contract, it should appear in the estimate; and, as offsetting this, what he can lose by delay should also appear in the estimate. Not many months ago, one of the largest cities in the United States paid for a considerable amount of work in bonds at par, which several contractors, needing the money, sold at a discount of not far from 3 or 4 per cent., as it was not convenient for the city to raise the money on short notice. It is safe to say that this had not been figured on in their estimates.

Charity or Accidents—This is an item about which it is practically impossible to give advice in advance. The first part of it covers a good many sins and other things in contract work; while accidents are generally provided against, as far as possible, by insurance. Where the insurance companies refuse to insure, the contractor has got to provide against this item in the estimate somehow; and it is well to estimate the rate that the insurance companies would be likely to insure for if their rules did not prevent them from doing so, and to multiply this rate by about two.

A contractor is supposed to assume certain risks; but, as pointed out by Colonel Raban, of the Institution of Civil Engineers of Great Britain, it is another question whether all of the risks should be put upon the contractor. Risks from weather, the problems of handling men, and the general vagaries that go with all construction work, are probably the contractor's risk; but, when held up by strikes, or by eventualities that are peculiar to his line of business, it seems unreasonable to shift these risks to the contractor's shoulders, and thus needlessly raise his estimate.

Depreciation and Repairs—No other part of the estimator's task will call for the exercise of more careful judgment than the determination of the percentages of depreciation and the amount for repairs.

Fire Insurance—The rates vary widely with different localities and with different kinds of buildings or equipment insured; and where a general approximation is not sufficiently definite, the estimator will have to go to the nearest fire insurance agent, who, with the idea of getting business, will be so keen to furnish him with information as to make it a pleasure to ask for it.

Burglary Insurance—This, like fire insurance, will depend upon local conditions and the state of mind of the insurance companies. Where it is not thought advisable to purchase burglary insurance, the estimator should nevertheless realize that theft is possible if not

likely, and it is wise to allow about $2\frac{1}{2}$ per cent. of the value of the constant stock of small tools and supplies on the work for this item.

Freight, Express, etc.—This must depend upon the class of material handled, the distance to be hauled along the railroad, and the amount of competition between roads. It will be more in sparsely settled country than where there is much competition.

Accident Insurance—Insurance against accident to both employees and outsiders, on work of normal risk, will cost about as follows:

Masonry	3	per cent. of the pay-roll.
Ornamental iron work	3	per cent. of the pay-roll.
Excavating (no blasting)	3	per cent. of the pay-roll.
Carpentry	2.25	per cent. of the pay-roll.
Private dwellings	1.85	per cent. of the pay-roll.
Plumbing	1.25	per cent. of the pay-roll.
Painting	1.25	per cent. of the pay-roll.

When the risk is great, these items may run as high as 8 or 10 per cent. Insurance on building wrecking runs as high as 18 per cent.

Bond—From a well known indemnity company, in 1909, when a bond is in favor of New York City and is for 5 per cent. or more of the contract price, $\frac{1}{2}$ of 1 per cent. of the bond is charged. When it is less than 50 per cent., $\frac{1}{4}$ of 1 per cent. is charged. The minimum charge is \$10. All other bonds cost $\frac{1}{2}$ of 1 per cent. of contract price. Bonds on contracts for furnishing supplies only (no labor) cost $\frac{1}{4}$ of 1 per cent. of contract price.

Estimated Unit Cost

Hourly Direct Labor—From his general experience and what information he can gather from published data, the estimator is in a position to determine with fair accuracy between what limits he can reasonably expect to come on the item of direct labor, which is the fundamental labor charge and which ought to be nearly proportional to the actual amount of work accomplished.

Weekly and Monthly Labor—This can be selected as a percentage of the item above mentioned, and depends very largely upon the local conditions, number of men employed, etc. Where there is a large amount of plant, such as steam shovels, hoists, drills, etc., it may run as high as 15 per cent. maximum. For average work it is likely to be about two-thirds of this.

Superintendence—This is likely to vary from 10 per cent. to 20 per cent. of the direct labor pay-roll. It will be more on small work, and less on large work. On large work, it is generally too small for true economy.

Materials—The amount of these to allow for can be figured from the plans of the finished work. A percentage, generally not less than 3, should be allowed for loss in handling, shortage in shipment, etc. There should also be an allowance for miscellaneous supplies.

Miscellaneous—It is a practice of many estimators to add from 5 per cent. to 10 per cent. to their estimate for miscellaneous and contingencies. The more the detail of the estimate, the less the necessity for a large amount for this item. Miscellaneous items can cover possible inefficiency of laborers, strikes, raise in rates of wages, or unforeseen contingencies. From 5 per cent. to 20 per cent. of estimated labor cost is a fair allowance. It is an item used to insure against oversight or ignorance in making up an estimate. On materials the prices of which can be obtained before putting in a bid, there is no necessity for this.

Field Sub-contracts—Sub-letting often results in low cost of work, because a sub-contractor who gives all his attention to the work can frequently get a small job

done to better advantage than a large contractor who has not so much time to devote to details. One contractor can generally manage several sub-contractors on a job much more satisfactorily than several independent contractors can be managed by the architect.

It is then necessary to decide upon the percentage to be added for overhead charges. These can vary from as low as 4 per cent. to as high as 22 per cent., depending upon the kind of organization and the distribution of expenses. It will be noted that a number of the items mentioned are overhead, and it is well to itemize as many of these as possible in order to make the percentage to be added include as little as possible, and thus be nearer the truth.

Profit—The estimator can figure his grand total of cost, to which should be added a percentage for profit. On small work where the risk is large, this should be high; and on large work where the risk is small, it may be as low as 10 per cent. when there is competition. The profit should not only take care of the risks of the business that cannot be or are generally not included in the above items; but it should also take care of the compensation to the stockholders, or to the contractor himself for his time and skill and risk in organizing the business and keeping it going. Thus, on certain work, 25 per cent. or 30 per cent. is not an excessive profit.

The second dam of the Canadian Government's Ottawa river storage system has been finished by the contractors and turned over to the engineers. This dam is situated at one end of one of the outlets of Lake Kipewa, lying about nine miles east of the Ottawa and discharging into it at a point about 300 miles up stream from the capital. The entire storage scheme calls for 45 dams located throughout an area of 45,000 square miles, controlling all the important lake expansions and feeders of the upper reaches of the Ottawa river and regulating the flow of the Ottawa for 600 miles from its course.

Raising Large Derricks in Erecting Tall Buildings

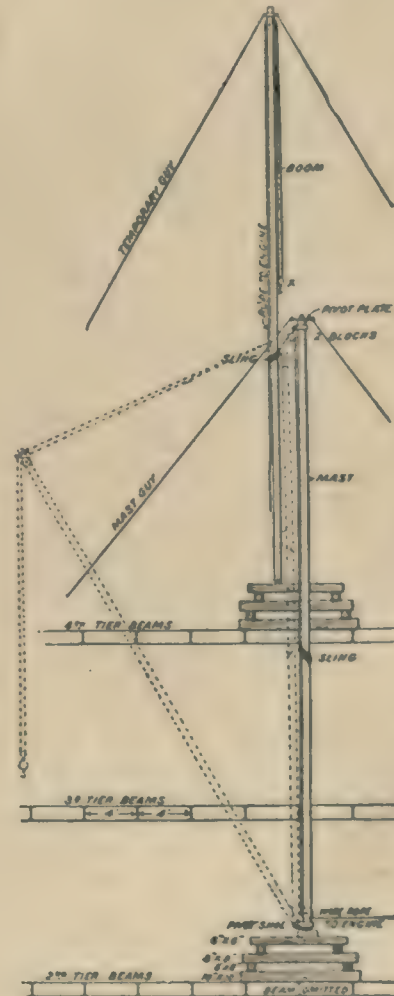
One of the most important operations which must be performed in the construction of edifices of great height, says a writer in the "Building Age," is the raising of large boom derricks from one tier of beams and girders to that above. It is almost needless to state that the work requires the greatest care and circumspection while in progress, and must be executed by experienced workmen who are technically termed "riggers" and who, like sailors, are thoroughly acquainted with all the ropes, knots, tackle, hooks, splices, blocks, turnbuckles, etc., essential to the execution of work of this class.

Regarding the first raising of the derrick mast to its perpendicular position the operation is so simple that it is only necessary to state that it is drawn to this position by wire guy ropes, of which there are never less than four and frequently more. The greatest care must be exercised as the pole rises, especially as it approaches the perpendicular. The blocks and tackle for hoisting can be adjusted by means of the boatswain's chair. In the sketch, the derrick is shown set on one tier of girders, the boom having been raised to the second floor level above.

After the boom of the derrick has been elevated to the next floor level where it is to be placed, which is done by disconnecting the boom from the pivot shoe on the mast, it is equipped with temporary guy ropes and lifted with a stout rope sling set about half the distance

of its height, use being made of the mast-hoisting tackle. When up to the desired level it is set on and lashed to a solid timber platform placed across the steel beams plumb to an upright position and the temporary guy ropes made fast, thus forming an excellent yet simple expedient for raising the mast to the upper tier, which, as the illustration shows, is done in a somewhat similar manner; that is, by rigging a fall on the boom and a sling on the mast. Now, when the block hook at X and the sling at Y are attached the wire rope fall may be carried to the engine drum and the mast raised to its next position.

The floor beams carrying heavy derricks and loads of this description must always be temporarily shored



Raising Large Derricks

directly under the blocking from the basement floor up to prevent jar, strain, and vibration.

It is usual to raise derricks of this kind through two tiers at least, and the mast being, say, 60 feet in height and the boom 2 feet shorter, this can readily be done. There must be a man at each guy rope when raising and the utmost accuracy and care be exercised to screw up all turnbuckles, set all blocking, etc., and all falls and chains must be tested as to their bearing capacity. Finally, the work as it proceeds should be superintended by a tried and experienced foreman, so as to avoid accident of any kind.

The last payroll passed by the Vancouver Board of Works covered the wages of 1,618 employees and called for \$45,200. This constitutes a record.

Satisfactory Methods of Water Painting

Pointers from the Experience of a Master Painter — Some Helpful Results—Items of Interest for the General Building Contractor

By E. L. Linington, Toronto

First, to my mind, comes the vexed question of the hot and cold water paints, and this is a question largely of individual likes and dislikes, for it is well known that both have their merits, and I would not like to throw cold water on the hot water man and vice versa. But I have tried out both of them, and personally I will not have the hot water article any more—not because it is in any way inferior to the cold water paint, but because of the lost time in making up the same, for in my experience every pail of tinting color costs me at least one half hour's time securing the hot water, and often more, then, if it be in the hot weather, we have to wait for it to chill before going on with the work, so I have concluded to use the cold water article altogether.

After settling the question of what brand of paint to use the next important step, I think, is to be sure of our tinting colors, and I do not wish to insult the intelligence of this audience by advising on this question, but it is a fact that largely dry colors are used for this purpose, and, gentlemen, from my own experience I cannot make a solid job unless I use colors ground in water. I find that where considerable dry colors are used, there is a tendency to shade which cannot be avoided, no matter how well the paint may be strained or brushed out.

On the question of preparing I think enough has been said at our former conventions. Some people prefer a coating of gloss oil and others a flat lead coating, but where practical I like to line the ceilings, coves or walls with a good heavy lining paper, then give same a coat of flat paint, and in my mind you have an ideal surface to tint on, and one that will readily wash off when the room is being done over again. If expense is not the most prominent feature I would use a prepared cotton in place of the lining paper, and treat with paint before tinting, then you have a ground that will not readily crack through and one that can be painted over at any time if necessary.

Pointers from Practical Experience

At the present time we have a large number of water paints on the market, with which one can do the most beautiful work—tints that will stipple and blend together, and I find that the limit for beautiful work depends entirely on the ability of the decorator.

The paints are largely in dry powders, with one or two exceptions, where the pigment is ground in paste form and is soluble in water; of the latter there have been some adverse criticisms, but I find, to a great extent the faults are with the men who do the work, especially the preparing and mixing. If one will follow carefully the specifications laid down by the makers they will have but little trouble. There is also one great benefit in these paste water paints, namely, their washing properties, for I find that after about one month's time has elapsed you can clean the surface with a damp cloth, provided some care is taken. Again, it is not necessary to remove old coatings to coat over again—in fact you cannot remove them, and if necessary at any

time you can coat with oil paints without any fear of chipping or cracking—in fact, one of these pigments makes, to my mind, a perfect ground for either painting or enamelling.

Now, at this point, I would like to state a few points that have lately come under my notice. We had a contract to paint a large manufacturing building after a fire, and the entire building was blistered and smoked. We thoroughly washed all the work with hot water and Savogran, and then coated with oil paints in the usual way, the paint apparently drying. After completing three flats in this way we found that in some places on the fourth floor the paint would not dry. We tried several things, shellac, pure japan and turps among others, but everything refused to dry. I then coated with Duresco water paint and it dried perfectly. We then finished with oil paints and made a good job. About two weeks after this I was very much surprised to hear that a lot of our work on the upper floors was wet, and on inspecting same found that such was the case. It evidently had never dried properly, and it came back again as wet as when first put on. Now we did not wish to wash it off, and we could get nothing in the paint line to dry it. As a chance I tried a coat of Duresco right on to the wet paint, and to my surprise it dried out perfectly, the paint being a French grey. I used a pure white water paint, and the result was a light grey, and in two hours was as hard as a rock.

On another job where we had a large office to do the walls were red brick, and they wished them finished in enamels. The work was not dry enough for oil paints, so we gave them two coats of cold water paint, using this time Opolite. To every pail of paint we added one-half pint of raw linseed oil, but in at the first mixing. We then coated with a pale hard drying varnish, to which was added some zinc white, and we turned out a very creditable job.

On another job the ceilings were finished in staff plaster with considerable ornamentation. The flats were to be cottoned and painted, and usually it takes a number of coats to bring the work up to a level surface. In this case I had one coat of Duresco put directly on the cotton, and then I finished with two coats of color and wiped, and it was one of the best jobs I ever turned out.

It seems against the rules to put a water paint on goods like cotton, which is held in place with paste, but it did not lift a joint and made a better job than five coats of oil or flat paints would have made.

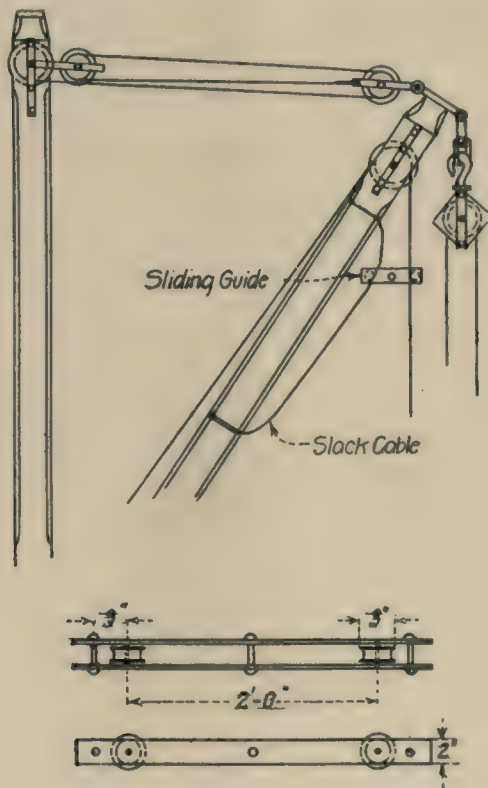
I have also found that a good water paint is much better than an oil paint for a verandah ceiling where the sheeting is next to the roof and subjected to the sun's direct heat. I have found it nearly impossible to stop the paint from being discolored where oil paints were used, but on several jobs that we have done with water paints there has been no staining, and the work has been remarkably well.

For a quick rush job it will make a splendid priming, and not raise the grain, leaving a good surface for painting, but you must not make the mistake of forgetting the shellac bottle or you will have a poor looking job on your hands.

Methods of Keeping Fall Block on a Derrick from Twisting and Swinging

A simple method of keeping the fall block on a derrick from twisting is used on the New York Barge Canal at Buffalo.

As shown by the accompanying sketch a cable is fastened along the boom with about 2 feet of slack. One end of the cable is fastened as close as possible to the sheave near the end of the boom, and the other end of the cable is fastened about 10 or 15 feet from the base of the boom. Two flat pieces of iron about $\frac{1}{4} \times 2$ inches $\times$ 2 feet are fastened together with two sheaves between them, one sheave at each end, as shown in the sketch. This is then put on the derrick with the slack cable and the fall line passing between the sheaves, as shown in the operation of the derrick. This guide slides up and down on the cables. When the boom is being lowered



Derrick Arranged to Prevent Twisting of Fall Block

the guide slides up. Besides preventing the twisting of the blocks it also serves, to some extent, in preventing the load from swinging.

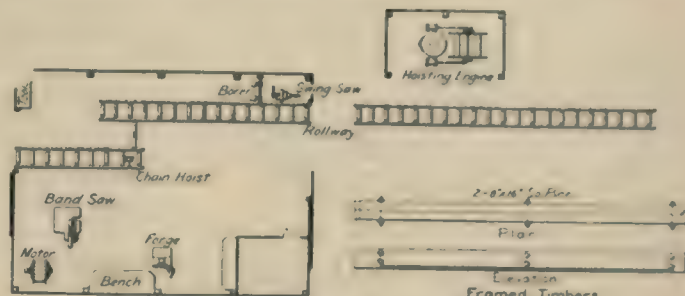
Timber Framing Plant for Mill Construction

The construction of a large mill of the slow-burning type, at Holyoke, Mass., necessitated the framing of a large amount of heavy timber, and a specially designed plant was installed for this work, says the "Engineering Record." The floor beams used in the construction of this mill were two 8 x 16-inch southern pine timbers bolted together. The work of framing consisted of squaring the ends of the timbers, cutting for the pintles, bevelling the wall ends and boring holes for the bolts.

The equipment consisted of a 36-inch swing cut-off saw, an adjustable vertical post boring machine having a 12-inch vertical and horizontal adjustment, a 42-inch band saw with 30-inch vertical clearance, trestles equipped with rolls, and chain falls arranged for swinging the timber for angular saw cuts. As electric current was available, the plant was driven by a 15 h.p. electric

motor. A temporary building was erected over the plant to protect it from the weather. The machines were arranged so that the framing could be done progressively. The general layout of the timber framing plant is shown in the accompanying drawing.

The timbers were unloaded from the cars and piled near the entrance to the framing building. They were



Plan of Timber Framing Plant

taken from the pile as needed, placed on the roll-way and pushed under the swing saw. Stops were arranged on this saw table so that no measurement was necessary, as the timbers were simply brought up against the stops and the sawing done. After the end was squared, the timber was rolled along on the roll-way and the other end was either squared or cut off on a bevel if it happened to be a wall end timber. The timber was then rolled onward underneath the boring machine and the holes were bored for the bolts. Then a pin was placed in the top bolt hole and the timber was swung on the chain falls and the notch for the pintle was cut by the band saw. The timber was then rolled out of the building where the corners were chamfered and the two sticks were bolted together. It was then placed on teams and sent forward to the mill.

It was found possible for this plant to frame 100 pieces of timber a day and the labor cost was somewhat less than \$1 per 1,000 feet b.m. This cost includes the labor of taking the timber out of the pile, framing, chamfering, bolting it together and placing it on a team for delivery. The total cost of the framing plant, including building and machinery, was about \$1,200. The machinery cost was \$500. The location of this plant was unfortunate, owing to the fact that a railroad embankment was on one side and a canal on the other side of a narrow strip of land, which did not give ample space for handling the timber, and this tended to greater cost of framing.

Kaministiquia River Bridge

The new bridge over the Kaministiquia river at Fort William, Ont., will be approached on wooden trestles, on a gradient of 1 in 20, and the bridge proper will be 330 feet long, of which the actual opening of the bascule span will be 180 feet, with 40 feet for the swing. There are to be in all, 13 pieces of concrete work to be put in position for abutments, piers and pedestals, of which six sets will be for the portion of the bridge over the river. Piers 8, 9 and 10 are for the bascule span, and of these piers 8 and 9 will be 72½ feet by 14 feet and 24 feet above foundations, while pier 10 will be 45 feet 10½ inches, by 14 feet 4½ inches, and 28½ feet in height above foundations. The swing part of the span will be carried on piers 8 and 9. The pedestals for the other spans will be 5½ feet square. The substructure will be of concrete, piles to be used in the foundations where necessary. The superstructure will be of steel, carried on steel pillars, and will have a total length of 330 feet between the trestle approaches.

Structural Data on the "Herald" Building

From which Conclusions May Possibly be Formed Concerning the Recent Disaster—Theory Against Sprinkler Tank Having Caused Disaster

From the report of the Canadian Fire Underwriters' Association on the Montreal "Herald" building collapse we have extracted the following particulars, which appertain principally to structural matters. The article will be of additional interest if reference is made to the photographs and details published in our issue of June 22nd last:

The building was about 110 feet in depth by from about 70 to 72 feet in width, divided into two nearly equal sections by a 12-inch brick wall (2-foot stone wall in basement).

Walls.—The east and west walls were party walls with the adjoining properties, the east wall being 12 inches on the fifth and fourth floors, 16 inches on the third, not known on the second and first, 26 inches in basement. This was a blank wall except in the basement at driveway, where there was a doorway, brick arched, 3 feet wide by 7 feet 4 inches to 8 feet high; also a small opening for coal hole, 2 feet square. This east wall is said to have been partly rebuilt, or at least repaired, after the first in the adjoining property in January, 1901. The east exposure was occupied by the Imperial Bank and other offices and sample stocks, and the Herald building was 15 feet higher than the main roof of the Imperial Bank building, and 8 feet higher than the roof house on same. The west wall was a party wall with the adjoining exposure, occupied by the J. C. McLaren Belting Company, and the wall of the Herald building was some 15 feet higher than this exposure. This west wall above the exposure was only 8 inches thick, although it appeared as 12 inches from the front at mansard roof. The wall was 12 inches at the level of the floor in the fifth storey, but the thickness below this is not known. There were no openings in this wall.

The south or rear wall was 12 inches on the fifth, fourth, and third floors, 16 inches on the second and first, and 26 inches stone in the basement. This wall was full of windows. The north or front wall on St. James street, was stone facing with ornamental columns and brick backing, except at the top floor below the mansard, where it was 8 inches thick. This front wall was of good thickness, but on account of the ornamental finish, it is hard to give the exact figure. This wall was also full of windows.

The centre wall was, as stated, 12 inches except in the basement, where it was a 2-foot stone wall, and there were also brick piers 16 by 4 inches on each side, at each bay, to the top of the second floor. This wall did not cut the roof, but extended to the under side of same. There were unprotected openings each floor in this wall, there being a brick arched opening 7 feet 9½ inches wide by 11 feet high at the first bay from St. James street, and a brick-arched opening 8½ feet wide by 11 feet 1¾ inches high at the third bay, both on the first floor. On the second and third floors, there were double brick-arched openings, 6 feet wide and about 9 feet high, with a brick pier 1 foot 9 inches between. On the fourth and fifth floors there was a single arched opening 6 feet wide and 9 feet high. There was another small doorway on the fourth floor at second bay, with wood lintel. A section of the stone wall in the basement, about 22 feet long at the front end, had been cut away, so as to make one large room for the newspaper press, and two 18-inch steel I-beams, supported on the stone walls, had been inserted to hold the wall above. There was also a small doorway at third bay, with wooden lintel over. It was also stated that on each floor above the basement there had been built in wall 14

inches by 8 inches wooden timbers, running lengthwise of the building. In other words the brick wall was broken at each floor by these wooden timbers. After the collapse, all this basement wall was intact, also the centre wall to the level of the first floor ceiling, except a small section where it was bonded with the rear wall.

Finish of Walls.—Mainly close plaster; some open finish in top storey and in basement.

Roof.—Boards on joists; gravel covering, except mansard front and rear, metal covered. There was a blind roof space from 1 to 5 feet high at the ceiling, and higher than that at the front, due to a sort of double mansard made when a portion of the roof was reconstructed in 1909.

Floors and Supports.—Fifth storey, 1½-inch, single; fourth, 1½-inch, 1¼-inch and ¾-inch, making a total of 3½ inches; third and second, 1½-inch and 1¼-inch, making a total of 2¾ inches; first, 1½-inch and ¾-inch, making a total of 2½ inches. All floors laid on 3 by 8½-inch joists, 23 to 26 inches on centre; joists not bridged so far as could be seen.

The joists were supported by the brick walls, and by beams running laterally with the walls and which in turn were on timbers running across the building and supported by the brick wall and by the columns. The beams and timbers are said to have varied in size on the different floors, but on the third floor the beams were 14 inches by 8 inches, and the timbers 15¼ inches by 11¼ inches. The timbers were cut away 6 inches where the beams cross them, the joists thus running parallel with, and 8 inches above the timbers. The beams and timbers formed panels or pockets, approximately 4½ feet by 19 feet, 9½ feet by 19 feet, 10 feet by 19 feet, and a few smaller, there being a number of angles to the building. The basement floor was wood on the ground. It was noted after the collapse that on the third floor, east side, in the portion of the building still standing, where the wall increased in thickness 4 inches, the space between the joists, where resting on the wall, had not been filled in. Some of the timbers across the building had a sort of truss formation in the centre. At the ceiling of the first floor, a portion of the timber inserted in the wall had broken off, but the rest is still in place.

Columns.—Fifth floor, wood, 7 inches by 7 inches; fourth floor, iron; third floor, mainly iron, some wood; second, first and basement floors, mainly iron, although there were two steel columns, said to have been inserted in 1906 in the basement at the front section near a press. On the fifth, fourth, and third floors, second, first and basement floors, there was only one row of columns down the side; on second, first and basement floors, there were two rows. On the fifth and fourth floors, west side, there was one row of columns; on the third floor, due to extra columns, there were three rows, at least in the portion of the building left standing, one row coming in at the west wall to help support the fourth floor. On the second, first and basement floors, there were two rows. The iron columns were circular in shape, except at the bottom, each column varying in diameter from 7½ inches at the top, to 8 inches at the bottom, with square base 11¼ inches and ¾-inch thick, and of an ornamental design. The cap and pintel are said to have been of a peculiar design, consisting of an ornamental cap, a plain plate, a 3-inch iron rod or tube about 20 inches long, and another

iron plate on which the column above rested. The columns were above one another, timbers not self-releasing.

Ceilings.—Third floor and blind roof space, open joist; balance mainly wood lath and plaster, with small part metal clad or wood sheathed. The plaster followed the contour of beams and timbers, forming pockets above mentioned.

Stairways.—One, encased in wood, in each section, at east and west walls at rear of buildings.

Elevators.—One, with automatic traps, and partly enclosed in wood, east side, rear. One (unused), west side, rear; boarded over and partly enclosed.

Power.—Electric motors. Some shafting in building, but how much cannot be stated.

Private Fire Protection.—"International" automatic sprinkler system, as noted; also 3-inch standpipe with hose on each floor and on roof, supplied by a 4-inch connection from city mains independently of the sprinkler system; Underwriters chemicals, fire pails, night and Sunday watchman using night watch boxes connected with Dominion Messenger & Signal Company's office.

Sprinkler Tank.—The sprinkler tank was of 12,000 U. S. gallons capacity, was erected in August or September, 1905, and was supported over the roof as follows:

Two 24-inch steel I-beams, 35 feet 7 inches long, were run from the centre wall to the east wall. On the centre wall each of these beams rested on two or three 5-inch beams, 4 feet long, embedded in concrete, and running parallel with the centre wall. As previously stated, this centre wall did not cut the roof, and at the time of the erection of the tank, it was stated that several courses of brick of the old wall at these piers had been removed and relaid in cement mortar.

On the east wall, the beams extended through the 12-inch wall, and rested on iron plates, so far as could be ascertained, the wall being built around the beams. The beams were placed 12 feet apart, and the beam nearest to the rear was some 28 feet from the rear wall. On these beams was erected the tank trestle, which was of 5 inches by 5 inches angle iron, with bracing. Two of the legs of the trestle came directly over the centre wall, and the other two legs 12 feet east of the centre wall.

The tank was enclosed in a frame enclosure, double with a 4-inch air space, as shown on the diagram, which enclosure extended only to the tank platform and not to the roof.

The total weight of the tank structure and tank filled, was estimated at 60 tons, and the design was to place two-thirds of the load, or 40 tons, on the centre wall, and one-third, or 20 tons, on the east party wall.

The C. F. U. A. last inspected the tank on February 15, 1910, at which time it was found full. It had also been found full at other inspections, except on one occasion when the insured had notified the office that it had been emptied to repair leaks. The engineer of the Herald testified that it had been examined by him two weeks before the disaster, at which time it was full. He had also tested it by the overflow tell-tale since then and found it full. From the usual attention given the fire apparatus by the insured, it can reasonably be assumed that the tank was full.

Theory Against the Sprinkler Tank Having Caused the Disaster.—The sprinkler tank was found some 20 feet (in a horizontal line) away from where it stood, and on the opposite side of the wall. It was also found well down in the debris, and standing almost upright. The staves and hoops were largely grouped together, as shown in the photograph. The tank was partially burned, particularly at the top, but, as the staves were being taken out, it was noted that the "crown" for the bottom of the tank, was at the bottom of the pile. One of the steel girders was bent, and the trestle badly bent and broken, but this could have been due to the

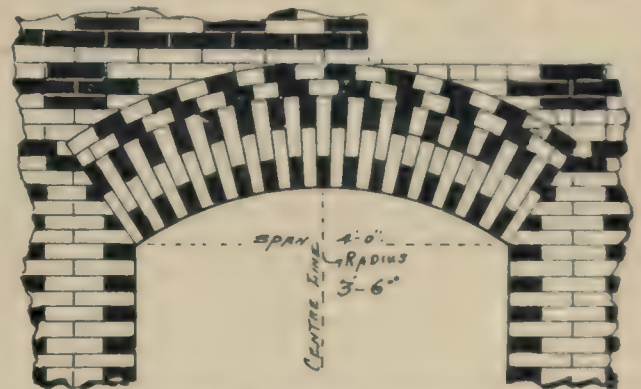
fall and the fire. One girder was found lying across the centre wall, and the other on the debris, west side.

If either of the steel girders had given way first, the tank would have fallen in the east side. The same would have happened if the east legs of the trestle had buckled. If the west legs had buckled, the natural tendency would have been for the tank to have tipped in falling, and been largely broken up in falling through the floors, and the floors would not have been taken clean as they were. The rear wall fell largely into the lane at the back of the building, and it would appear as if the rear and centre walls had gone out with the floors, and the tank had slid bottom down into the opening already provided. It is not likely that the tank would have turned a complete somersault in falling and remained together.

Effect of Variegated Brickwork

By Owen B. Maginnis.

This never ending detail of building construction seems almost unlimited in its application, not only in the numerous designs which are evolved by the use of the ordinary common brick or brick front, but also with special brands made by different manufacturers. In this short article we will consider the matter of colored and enamelled brick. The question is now a matter which architects are earnestly en-



Effect of Variegated Brickwork.

gaged in developing to the betterment of their designs, both in artistic beauty and constructive strength, obtaining both in unison.

It is not very usual to employ enamelled brick for the exterior elevations of buildings for the reason that the surfaces, through the deposit of dust, wind and rain, will become streaky and discolored and incapable of being washed or cleaned. In addition to this the cost of the brick is extreme, as the best enamelled brick are imported from Europe, and the duty being heavy, they are rarely employed except on the very best class of public or private structures. Very fine brick are now made in many colors, whereby various combinations may be obtained, according to the taste of the architect. These are mostly rough on the edge and end, like ordinary rough brick, but very effective if properly laid out. These front brick are supplied by the manufacturers in almost all the well known colors or shades of colors, mottled, speckled or lined; also in the form of stones, as rock-faced, wash face, etc. The effect of the combinations is usually forecast by building a small sample, observing another design already built, or by a colored drawing. In straight perpendicular work the observance of the bonds and the placing of the headers and stretchers is the only part of the workmanship to be watched, but in the construction of arches much more is required. The attached sample will illustrate to the reader the value of the care which must be exercised in the laying of colored front, or enamelled brick. It represents an arch in

the basement of a public building piercing a 28-inch wall, both sides, jambs and soffit of the walls and arch being laid in blue and enamelled brick, the black denoting the blue and the white the primary color. The headers are blue and the stretchers white. Extremely careful cutting or setting must be followed in this example, especially in the cutting of the voussoirs of the arch, which is generally done on the works, though they are sometimes moulded at the factory from a full-size detail furnished by the architect or the factory's

draftsman. To save time and unnecessary labor, it is the practice to supply one-half the elevation and soffit, as it is reversible from the centre line working both ways, unless the sides be of different colors, or the jambs be splayed; then details must be made for both sides. In conclusion, it might be said that only the actual manual practice will ever enable any mechanic to lay up such an arch as is here represented, even were it of common brick.—American Carpenter and Builder.

The Economics of Concrete Construction

Saving Effected by Use of Gravel Concrete—Some Interesting Costs in Proof — Relative Values of Various Materials*

By A. B. HEWSON.

The rapidity with which concrete has risen to its present position in building construction is only equalled by the growth in complexity and diversity of the work of the modern architect.

The architect has risen to every new demand of an ever-shifting situation, with wonderful results, but his days are so full of a never-ending succession of problems demanding instant solution, that he has little time for exhaustive research along any one line.

I shall compare only the relative values of washed gravel and crushed limestone in combination with torpedo sand; this comparison, I believe, covers local questions of economics.

I propose to prove that any given quantities of gravel, sand and cement mixed in the generally used proportions such as 1:2:4 or 1:3:6 will make at least 7½ per cent. more concrete than like quantities of crushed limestone, sand and cement.

I propose to prove, as a matter of sequence, that on an even basis of price for gravel and crushed stone, graven concrete costs in place at least 32c. per cubic yard less than limestone concrete on carload delivery of materials, and at least 39 cents per cubic yard less on team delivery. Incidentally, I call your attention to the fact that the market price of gravel averages 10 cents per cubic yard less than limestone.

The explanation of the greater bulk of gravel concrete is that gravel, on account of the rounded shape of its particles, averages 7½ per cent. less in voids than crushed stone. When you mix concrete 1:2:4 or 1:3:6 you have 50 per cent. of sand to fill the voids in the coarse aggregate. If the voids in crushed stone absorb 95 per cent. of the sand and the voids in the gravel only 80 per cent., it naturally follows that 15 per cent. more of the sand appears in the gravel concrete, thereby increasing its bulk 7½ per cent.

Practically all authorities agree that the voids in the average washed gravel are 40 per cent., and in the average crushed stone 47.4 per cent. That this is true of Chicago's gravel and limestone is proven by a comparison of the standards used by the trade in reducing the weighed materials to the selling unit of the cubic yard:

Limestone 2,500 pounds per cubic yard
Gravel 3,000 pounds per cubic yard

Assuming the standard for limestone to be correct, and that of gravel unknown, other things being equal, we have the following proportion, the weights of the two materials being in inverse proportion to their voids:

$$x : 2,500 :: 47.4 : 40$$

This produces gravel at 2,960 pounds per cubic yard. Allowing the 40 pounds difference to cover the greater density

of the gravel due to the presence of a large proportion of granite, trap and other igneous rocks heavier than limestone, we demonstrate conclusively the relative voids to be substantially as stated.

Let me demonstrate it:

Carload Delivery	
Limestone Concrete	
Stone, 100 cubic yards, at \$1	\$100.00
Sand, 50 cubic yards, at \$1	50.00
Cement, 175 barrels, at 85 cents	148.75
	108.5: 298.75

2.75%

Gravel Concrete	
Gravel, 100 cubic yards, at \$1	\$100.00
Sand, 50 cubic yards, at \$1	50.00
Cement, 175 barrels, at \$1	148.75

108.5 divided by 7½ per cent. equals ... 116.64: 298.75

2.56

Number of cubic yards concrete 1:2:4 produced by above quantities according to "Thompson & Taylor" minus voids	
per cent.	47½
Limestone concrete cost, per cubic yard	\$2.75½
Gravel concrete cost, per cubic yard	2.56

Saving on materials	\$0.19 1/3
7 per cent. cost of handling and mixing figured at \$1.85 per cubic yard	.12 9/10

Total saving \$0.32 1/3

Team Delivery	
Limestone Concrete	
Stone, 100 cubic yards, at \$1.50	\$150.00
Sand, 50 cubic yards, at \$1.50	75.00
Cement, 50 cubic yards, at \$1.50	75.00
Cement, 175 barrels, at \$1	175.00
	108.5: 400.00

3.68%

Gravel Concrete	
Gravel, 100 cubic yards, at \$1.50	\$150.00
Sand, 50 cubic yards, at \$1.50	75.00
Cement, 175 barrels, at \$1.00	175.00

116.64: 400.00

\$3.42 9/10

Number of cubic yards concrete 1:2:4 produced by above quantities according to "Thompson & Taylor" minus voids	
per cent.	47 1/2
Limestone concrete cost, per cubic yard	\$3.68 2/3
Gravel concrete cost, per cubic yard	3.42 9/10

Saving on materials, per cubic yard	\$0.26 11/30
7 per cent. cost of handling and mixing figured at \$1.85 per cubic yard	.12 9/10

Total saving, per cubic yard \$0.39 1/2

* Paper read before the Architects' Business Association of Chicago.

If large consumers find it profitable to buy coal on the basis of the number of pounds of water a given quantity will evaporate, why should not the architect buy concrete on the basis of the amount produced by a given quantity of materials, particularly when the materials producing the maximum bulk produce also the maximum strength.

So many widely varying strength test figures have been issued by crushed stone and gravel men showing results in favor of their respective materials, that I have considered it ill advised to add to the collection. I therefore have placed in your hands extracts from data published by the United States Geological Survey which are the first comprehensive statistics on concrete ever published by our government.

Uncle Sam spends upwards of \$30,000,000 yearly on public buildings, and Congress, realizing the possibilities of economy from a proper selection of building materials, established the Structural Materials Division of the United States Geological Survey for the accumulation of data on the relative values of various materials through the medium of an elaborate systematized series of tests.

Bulletins setting forth these tests and their results are published and sold by the Superintendent of Documents, Washington, D.C., for the information of such as desire them, and cover a wide field of research.

These tests are especially valuable, coming as they do with the weight of unprejudiced authority and having been conducted with the advice and assistance of the most eminent engineers in the country. The facts concerning the decrease in strength of limestone concrete mixed to the wet consistency are of peculiar interest. The uniform superiority of gravel concrete in ultimate strength under all conditions and its superiority at all ages in the medium and damp consistencies, is most conclusive.

It is peculiarly conclusive in relation to local conditions since the gravel tested was about $8\frac{1}{4}$ pounds per cubic foot lighter than our Chicago gravel and the limestone about $4\frac{1}{2}$ pounds per cubic foot heavier. Notwithstanding this handicap, the gravel excels. Furthermore the specific gravity of the gravel tested was less than that of the limestone, while the specific gravity of Chicago's gravel is greater than its limestone.

There is another point of importance in the economics of concrete.

It is agreed that the strongest concrete is that in which there is just sufficient sand to fill the voids in the coarse aggregate plus a small percentage to cover inequality in mixing, with the same conditions obtaining between the sand and cement.

When you add more sand than this, you weaken your concrete.

Does it not follow that, if gravel concrete excels limestone when compared in identical proportions, it would still further excel in comparisons where the sand is in the same proportion to the voids in both materials? For illustration, would not a $1\frac{1}{2}$:3:7 gravel concrete excel a 1:2:4 limestone concrete? Would it not be proportionately rich in cement? Would it not give an equal bulk of concrete and a greater strength efficiency with less sand and less cement?

Furthermore, if a 1:2:4 limestone mixture produces a smooth finish, will not a $1\frac{1}{2}$:3:7 gravel concrete do the same since the proportion of mortar to the voids is identical in both cases?

In view of the fact that the consistency in which concrete is mixed is a large factor in its strength, would it not be well to regulate the quantity of water used as carefully as you do the other elements? It will give your walls and floors uniformity of strength. It will make your stress figures more dependable, and your factor of safety less wasteful.

In confined spaces where the intervals between the reinforcing bars are small or the concrete must be forced through wire mesh, a denser and therefore stronger concrete can be

obtained with gravel. The rounded particles work into place more readily and lie snug to the steel. There are few jagged edges to catch on the steel or on companion particles forming pockets which reduce the strength and damage the appearance of the surfaces.

Gravel concrete, properly proportioned, will produce water tight walls where limestone will fail under the same conditions. This is also due to the lesser proportion of voids and the closer association of the particles.

Marble in British Columbia

The annual report of the Minister of Mines of the Province of British Columbia for the year 1909 has just made its appearance. While this is devoted mainly to coal and the metals, it makes brief reference to the structural and decorative materials. The report says that excellent building stone of various sorts is found in abundance in almost every part of the province, but the fact of its widespread distribution has, however, been somewhat against the establishment of large quarrying industries, as a sufficient local supply could always be obtained, and, except within reach of the larger cities, few regularly equipped quarries have been opened. On the coast, chiefly between Vancouver Island and the mainland, there are several well equipped quarries taking out granite, sandstone, and andesite, all of excellent quality. These quarries supply the stone building material of the coast cities, and also export to the United States.

In the interior of the Province, the Canadian Marble & Granite Company opened a marble quarry on the line of the Lardo-Trout Lake Railway, about 8 miles from Lardo, and took during 1909 block marble which, when sawed into slabs, amounted to some \$30,000 in value. This company formerly shipped the rough blocks of marble which were elsewhere sawn into slabs, etc., but during the past year the company has been busily engaged in erecting at the quarries large and well equipped dressing works, so that by next season the marble will leave the works in the finished state. During this period of construction the product shipped from the quarry has been comparatively small.

The Nootka Marble Quarries, on Nootka Sound, on the west coast of Vancouver Island, that were opened up in 1908, have not made any very important shipments, and information as presented by the board of directors indicates that some \$3,000 worth of marble is on hand at the quarry, but does not show that any sales were made. The quarry has not been operated since July, 1909.

Fifteen millions is the rough estimate of the cost of deepening the Saskatchewan river in connection with the proposed waterway from Edmonton to Winnipeg. This is exclusive of the canal works, which would be necessary to overcome Grand Falls.

The Northern New Brunswick & Seaboard Railway from Black's Cut, on the Intercolonial Railway, to the iron ore mines at the confluence of the Austin brook with the Nipisiguit river, Northumberland county, N.B., has been practically completed, some ballasting being all that is required to permit it being opened for traffic. The contractors were Wheaton Bros., and J. J. Taylor was engineer in charge of construction. J. J. Drummond, F. McDougal and W. F. C. Parsons, of the Canada Iron Corporation, which owns the mines and railway, recently made a visit of inspection to the property. The ore dock at Newcastle, which is being built by Reid & Archibald, is expected to be ready for operation Sept. 1. The spur line from the Intercolonial Railway to the ore dock at Newcastle has been completed.

Winnipeg's Bid for Building Supremacy

Facts and Figures which Argue well for the Progressive Western City—Some Notable Contracts, with Photos of Construction

Winnipeg, Aug. 20th, 1910.

This city is to-day the Mecca of building tradesmen. At present there are more than 1,500 buildings for various purposes in different stages of construction throughout Winnipeg. In the limits and suburbs there are almost an additional thousand represented in small homes and business places which are drawing upon Winnipeg artisans for labor. That the labor market has withstood the strain of the exceptionally heavy demand is only owing to the big influx of mechanics this year and to the fact that many immigrants who came west on other missions have been attracted into the field by the wages paid and the favorable working conditions adopted by contractors. The amicable settlement of union

building. The solidity of construction provided for by the plans of the Bank of Montreal, has necessarily delayed, to outward appearances, work on the structure. The work on the base and foundations is proceeding well, however, and as much steel work as it is possible to place, under the conditions, has been set up. This contract will not be completed for another year.

The new Union Depot, progress on the erection of which was detailed very completely in the "Contract Record" of July 20th last, is now a reality. The outside work on stone and steel is finished and the carpenters and marble workers are busy with the interior work and decorations. The contractors, Lyall-Mitchell Company, state that the structure will be open to the public within two months.

The Great West Life building, on Lombard street, is the



7-Storey Garage for the Canada Cycle & Motor Company
J. McDiarmid & Co., Contractors

disputes in the early spring was fortunate for those who intended building, for since that time there has been practically no difficulty.

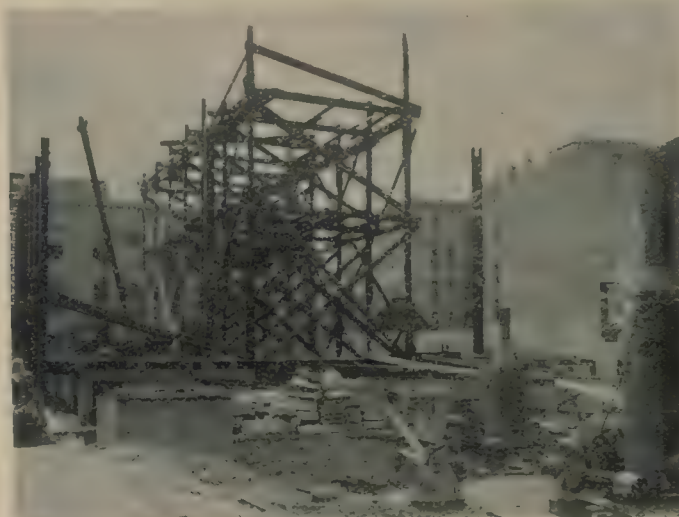
A visit paid at present to the central portion of the city will reveal the nature of the tremendous development of Winnipeg. There is scarcely a block in which there are not some traces of the builder.

The percentage of work which has been completed is very small, leaving about seven of the eleven million dollars' worth started this year still under construction. On all this, work appears to be progressing very favorably. Most contractors have now secured all their jobs for the year, and are devoting their attention to contracts already commenced.

The supply of material is quite adequate and between now and winter there should be no abatement. Brick, cement and lumber, as well as stone, are now heavily stocked in the city to insure against any such shortage as occurred during the early spring, hampering work to the extent of two or three weeks.

Many Important Contracts Under Way

In the limelight of building contracts at present are the Union Depot, the Bank of Montreal, and the Great West Life



Bank of Montreal's New Winnipeg Building in Course
of Construction—Norcross & Co., Contractors.

most imposing edifice put up this year. C. W. Sharp & Son, contractors, have recently taken out a permit for the completion of the structure. The price was \$175,000, which speaks well for the finish of the interior.

One of the most notable works of the year is the 200-foot chimney for the power house for the T. Eaton Company. The height of this chimney from the grade line is 185 feet. At the base its diameter is 15 feet, tapering to 7 feet 6 inches at the summit. There are 220 cubic yards of concrete in the base of the chimney. This base is 37 feet 6 inches square and 6 feet deep. In all approximately 127,000 brick were used in the chimney. This stack is the highest in western Canada and one of the highest in the entire Dominion.

In addition to these buildings there is the 7-storey garage for the Canada Cycle & Motor Company, the McLaren hotel and the Orpheum theatre, some 50 apartment blocks and dozens of warehouses.

Builders' Ultimatum to Strikers

A somewhat drastic action was taken by the Builders' Exchange on August 19th, following their ultimatum to the masons and bricklayers offering the workmen the chance of returning to work at once on the Lyall-Mitchell Company's buildings or the alternative of being locked out. The men



The Great West Life Building, Winnipeg—C. W. Sharp & Son, Contractors

chose the alternative and the lockout went into effect automatically.

The trouble with the Lyall-Mitchell men arose through orders received by the workmen from Montreal where the union is at variance with Peter Lyall & Sons, owing to the firm's declaration for open shop. The men employed by the Lyall-Mitchell Company of Winnipeg claimed that the concern for which they were working and the Montreal firm were one and the same and quit work in sympathy with the strikers in the eastern metropolis. This was on Monday, August 15th. The Winnipeg Builders' Exchange gave the men until August 19th to show up and when they did not return every contractor connected with the Exchange notified the men that their services would not be required after

noon. There are between 600 and 800 affected, and while the situation is serious at the present outlook it is too early in the day to indulge in pessimistic predictions.

From the Federal Capital

How the International Plasterers Succumbed Contractors Busy on many Important Commercial Buildings

Correspondence of the "Contract Record."
Ottawa, August 20th, 1910.

The plasterers' strike, the only thing this year to interfere with building operations in this city, has practically died out and contracts are being completed under normal conditions. Until last spring the National Union of Plasterers was the only one actively in existence in this city. Then a number of plasterers from outside Ottawa came in and first joined this union. Later they changed their allegiance to the International body. For a time they maintained that the National Union of Plasterers had dissolved. When the International Union struck for an increase in wages from 40 to 45 cents, however, a large number of plasterers remained at work and showed that the National organization was very much alive. This union had an agreement with the contractors for a minimum wage of 40 cents an hour, binding until next May, and the men of this union at the time it was signed refused to make it void by changing to the International. There were enough of these men to keep up with the work in hand. While the International men claim that a number of contractors have signed to pay a compromise price of 42½ cents an hour, the contractors produce lists to prove that at most only two of their number have signed such agreements.

Money has been somewhat scarce during the past month or two, but not sufficiently so as to hold up work. Most of the builders had arranged their loans earlier in the year and were not affected at all.

The larger contractors have been pretty well tied up with the important commercial buildings this summer and have left residence work alone. For this reason, principally, there are not so many residences to be completed for September 1st as at this time last year. This, however, is rather a good thing. In former years there was a continual cry that Ottawa was over-housed and the slackness in building this summer, in this class, will show that Ottawa is growing so fast that any reduction in residential building will make houses scarce for the winter. Hundreds of families give up their houses on May 1st to live during the summer months in some of the resorts which are connected with electric railway to the Capital. They are returning now and the prospect is that houses will be scarce, a condition that will stimulate building during the winter and next summer.

The buying of building lots this month is very active. One firm sold 151 in two days in Ridgemont Park, about a mile from the city. On many of these lots residences will be erected at an early date.

The Ottawa Improvement Commission will begin work beautifying Nepean Point next week and will continue to Sussex street as soon as the houses are demolished on the property bought by the city for conversion into a park. There are about 15 of them which will be sold by auction. It is expected that the improving will take about two years.

Indications are that the Government will not begin the erection of the departmental buildings on Sussex street and Mackenzie avenue for at least a year. Tenants have received such intimation. Some of the residences, however, will be converted into temporary office buildings.

Builders' supplies are fairly plentiful now. The shortage in brick is to a great extent overcome. Some of the architects report difficulty securing terra cotta and other lines shipped from Great Britain.



200-foot Chimney Erected this Season at the T. Eaton Company's Power House, Winnipeg

Vancouver and Coast Correspondence

No Cessation in Building Activity — Erection of Residences Striking Feature—Ample Supplies of Building Material—Prices Well Maintained

Vancouver Office of the "Contract Record."
Vancouver, B.C., Aug. 19th, 1910.

The tremendous activity in Vancouver's building operations is being commented upon everywhere. Every citizen of Vancouver is firmly convinced as to the wonderful future ahead of his city, but all are so busy trying to make money to invest in property or business enterprises that few have time to keep in touch with the tremendous development in progress. In the business section the huge new office buildings force themselves upon the attention of all. Half a score of large business blocks and wholesale warehouses are under way in the downtown section, and about the same number of modern apartment blocks are under way in the west end and elsewhere. As for new dwellings, they are being completed at a wonderful rate by an army of workmen, yet so large is the influx of new population that it is impossible to supply the demand. To show how acute is the situation, even at present, the owner of a large apartment, which will not be completed inside of two months, has already rented the 42 suites it will contain, having had over 200 applications.

At the present time leading contractors estimate that about 30 per cent. more building is being carried on this season than last, while the larger average size of the structures really increases the percentage to about 50 per cent. Contractors state that building operations during last winter were unusually heavy, and owing to the shortage of dwellings they anticipate a steady run of work during the bad weather season to come.

So much for the city, the small boundaries of which limit the scope of Building Inspector Jarrett's monthly permits. But the returns, while large, fall far short of the actual totals, as no account is taken of the enormous amount of building that is continually in progress in the populous suburbs of South Vancouver and Hastings. Steps are being taken to have these and other suburbs taken into the city, when beyond doubt Vancouver will head the list for the Dominion, month after month.

Something About Trade Conditions

Business is so good with the contractors' supply firms that they cannot hire enough vehicles to deliver their orders as promptly as desired. As a result small orders from the outskirts have to be held back. Early in the season there was a shortage of brick owing to the winter building carried on, but supplies were secured from Seattle until the Vancouver Island, Howe Sound and Fraser River yards began delivery. Granite, structural iron, sand, gravel, etc., came to hand in sufficient quantities to suit the builders. The proximity of lumber and shingle mills made it easy to secure the enormous supplies needed in these lines, but at times there was a famine in sash and doors. The local factories were operated to the limit, yet the Wheeler & Osgoode Company, of Tacoma, Wash., and the Robinson Company, of Blaine, Wash., found a market here for numerous carloads. These firms, it is said, do not turn out stock that compares in quality with the products of Carnish & Cooper, Robertson & Hackett and the E. H. Heaps & Company factories, and there is room for a big expansion in this branch of trade. "Give us a big custom factory capable of supplying us with all kinds of interior trim!" is the cry of the contractors.

The statistics for July prove that Vancouver's wonderful record of progress is being well maintained, the increases running from 50 to 80 per cent. over the same month a year ago. Bank clearings, July, 1910, were \$37,630,303; July,

1909, \$22,937,715; July, 1908, \$15,690,197. Land registry receipts: July, 1910, \$14,752.94; July, 1909, \$11,843.70. Building permits: July, 1910, \$639,380; July, 1909, \$549,107. For the seven months of 1910 ending with July the total is \$7,525,260, and for the whole year of 1909 were \$7,258,565.

Prices of Building Materials

(Delivered on Job)

Building paper, tarred, per roll, 90 cents.
Building paper, plain, per roll, 70 cents.
Bricks, common, per 1,000, \$13.
Bricks, pressed, per 1,000, \$40 to \$62.
Cement (Vancouver), per barrel, \$3.10.
Roofing felt, per 100 pounds, \$2.45.
Fire brick (Scotch), per 1,000, \$45.
Fire brick, small quantities, \$48.
Lime, per barrel, \$1.35.
Sewer pipe, per foot, 4-inch, 18c.; 6-inch, 33c.
Plaster of paris, per ton, \$18.50.
Putty, per pound, 5 cents.
Tar, 4-gallon tin, \$1.25; per barrel, \$8.50.
Hard wall plaster, per ton, \$17.50.
Nails, base, \$3.25.
Nails, cut, \$4.25.
Mixed paint, gallon, \$2; ½-gallon, \$1.10; quart, \$60c.
Boiled linseed oil, gal., \$1.40; barrel lots, per gal., \$1.20.
White lead (genuine), 100 pounds, \$8.
White lead, No. 1, per 100 pounds, \$7.50.
Varnishes, furniture, 80c.; \$1; hard oil, \$1.75; elastico-oak, \$2; elastico-floor, \$3.25.
Sash cord, per pound, 50 cents.
Sash weights, per 100 pounds, \$3.
Tacoma hair fibre, per ton, \$18.
Fire clay, per ton, \$20.
Plate glass (35 per cent. off local tariff).
Sheet glass (10 per cent. off local tariff).
Expanded metal lath (Hays'), 27 cents per square yard; Herringbone lath, 17 cents per square yard.
Ready roofing (Cendor brand), ½ ply, \$2.25; 1 ply, \$2.65; 2 ply, 3.40; Malthoid, 1 ply, \$2.75; 2 ply, \$3.25; 3 ply, \$3.70.
Hexagon floor tiling, average 55 cents per square foot.
Wall tiling, average 60 cents per square foot.
Turpentine, per case, \$10.
Resin, per pound, 5 cents.
Elephant lead, per 100 pounds, \$8.

Monster Vancouver Office Building

The accompanying view is the perspective of a building to be erected at the corner of Homer and Pender streets. Vancouver, B.C., by the Consolidated Building Company, Limited. The building will have a frontage of 104 feet on Pender street and 120 feet on Homer street, with a lane at the rear on the south side. The building will contain 12 storeys and basement, with steel frame work, and will be as nearly fireproof as possible. The exterior of the building will be faced with pressed brick and sandstone. All of the steel columns and girders will be encased with fireproof materials and all interior partitions will be constructed of hollow fireproof partition tile, plastered on both sides. The floors will be constructed of steel beams and reinforced concrete. The finished floors in the basement and first storeys and in all lavatories and corridors throughout the upper storeys will be of marble mosaic tile. The finished floors for offices in the



Proposed Consolidated Buildings, Vancouver—
Donellan & Donnellan, Architects.

upper storeys will be of smoothly trowelled cement, covered with cork carpet. All windows will have metal sashes and frames will be glazed with plate glass.

The basement will be arranged for a modern cafe and dining room with accommodations for 500 guests, and will be thoroughly ventilated by means of exhaust fans connected with an air chamber, from which ventilating flues will extend above the roof. The boilers, pumps, engines and electric motors for generating heat, light and power will also be placed in the basement.

The approaches and steps leading to the basement and first storey from the exterior of the building will be of granite. All interior stairs will be of marble, supported on steel framework, and will have ornamental bronze railings and newel posts. The walls and ceilings of the entrance lobby and corridors on the first storey, and the walls and ceilings around the basement entrances will be faced with polished Alaskan marble. All corridors and toilet rooms on the office floors above the first storey will have marble wainscoting.

The first storey of the building will be used for stores. The upper floors will each have 28 offices, making a total of 308 offices on the eleven floors, in addition to the toilet rooms. Several of these offices on each storey will be provided with fireproof vaults constructed as parts of the building. The architects are Donnellan & Donnellan, 319 Pender street, Vancouver.

Salvation Army "People's Palace," Vancouver, B.C.

A view of the fine new building to be erected by the Vancouver branch of the Salvation Army is shown herewith. The lot chosen on Powell street runs through to Alexander street, the situation being close to the docks and railway. The available frontage is only 25 feet, and to compensate for this the building will be ten storeys in height. The cost will be about \$85,000. Branch buildings are to be erected in other parts of the city, the total outlay anticipated being \$150,000. Major Phillips is the officer in charge. The architect is Mr. Thos. Hooper, who has designed many of Vancouver's finest buildings.

Some Good Pipe Contracts

Manager O. C. Shultz, of the Pacific Coast Pipe Company, Vancouver, is a busy man these days. The fine plant of the company is turning out pipe at a rapid rate in order to clear

the way for a start on two big contracts for municipal water systems. One comprises 72 miles of wood pipe for Richmond municipality, on Lulu Island, the tender price being \$69,961, and the other covers 60 miles of pipe for Ladner municipality, the tender figure being \$79,820. These contracts will be filled simultaneously, so that the laying of the pipe may be commenced in the near future.

Newsy Items from the Western Province

The Canadian Wood Pipe Company are now comfortably located in their new factory on Pacific street, north-east end of Granville street, and Manager Macgregor is happy. The capacity of the new plant is more than double that of the old one, the increase being rendered necessary by new business. Among recent contracts booked we may mention one from Revelstoke Council for 20,000 feet 12-inch pipe and 4,500 feet 10-inch, also 13,000 feet of 6-inch pipe for the C.P.R., to be used for conveying water to their prairie roundhouses. Another C.P.R. order is for an inverted siphon to convey water across a valley for irrigation purposes, 1,800 feet of pipe 53 inches in diameter being required. This is a large pipe, but the company once supplied a section of pipe 84 inches in diameter to the B. C. Electric Railway Company.

Mr. H. Pim, manager of the Vancouver branch of the



Salvation Army's proposed new branch at Vancouver
Thos. Hooper, Architect.

Canadian General Electric Company, is convalescing after an operation for appendicitis.

Several months ago the Sumner Iron Works, of Everett, Wash., which is engaged largely in the manufacture of logging and other heavy kinds of machinery, purchased thirty acres for a manufacturing site in block 124, Burnaby, between Vancouver and New Westminster. For weeks past it has been known that the machinery was ready at Everett to be shipped on an hour's notice, and it is now announced that clearing will begin immediately. In order to protect certain patent rights, the plant must be in operation by next March, so that the owners have no time to lose.

Crude oil is likely to come into general use for heating Vancouver's public buildings. Recently a most successful demonstration of the Jordan crude oil burner was made at the King Edward high school. The crude oil is completely atomized, and as the lighted gas leaves the burner under strong pressure it makes a great blaze and gives forth a tremendous amount of heat, which is stored in the collecting chamber and thence distributed by means of large pipes to the various parts of the building.

The building permits issued in Victoria during July aggregated \$222,290, bringing the total for the seven months up to \$1,425,125, compared with \$1,161,320 for the corresponding period last year.

Mr. H. M. Burwell, of the firm of Hermon & Burwell, engineers, declares that Vancouver can save one million dollars in the next fifty years by making provision for water mains on the new Second Narrows bridge.

The burning of the British Columbia Oil Refining Company's plant at Port Moody, B.C., early in the month, made a spectacular blaze and occasioned a loss of about \$100,000. Just before midnight Edward Conyers, night engineer, attempted to descend into an oil tank with an electric light in his hand, when a tremendous explosion occurred, which carried him high into the air and scattered burning oil in all directions. The contents of twenty similar tanks successively caught fire and were consumed, along with two carloads on the C. P. R. track, and a large shipment of asphalt on the wharf. Five-sixths of the plant was destroyed, but a large tank containing 25,000 gallons of oil was saved, together with two smaller ones, by the use of chemicals, which smothered the flames.

The B. C. Electric Railway Company will shortly possess a third line between Vancouver and New Westminster, passing through East Burnaby. Contractor M. P. Cotton has a large force of men at work and a considerable stretch of roadbed will soon be ready for the track layers.

The new plant of the Dominion Carbolineum Works makes an important addition to South Vancouver's list of industries. The buildings have been under construction for about six months, and the work has been carried on under the personal supervision of Manager Harpie. Previously the business had been carried on at Coal Harbor, Vancouver, in cramped quarters, and the rapidly increasing trade compelled better facilities. The new plant has been designed to answer all demands for years to come, and combines a well equipped sawmill and modern creosoting equipment capable of treating large timbers and paving blocks at a rapid rate. The daily output of the plant is about 85,000 feet, and in addition to the large local demand there is reason to believe the prairie towns will call for large quantities.

In order to protect the Seymour creek water supply, the Vancouver city council has purchased 160 acres of land at the falls, four miles above the intake point. The purchase of existing timber limits along Capilano, Lynn and Seymour creeks is also being considered as a protective measure.

The Hamilton Wire Works is erecting a branch plant on Lulu Island, New Westminster, to employ 100 men. The

company will supply the trade in British Columbia and as far east as Saskatchewan.

North Vancouver city is experiencing a steady building boom, many homes going up in the outlying sections. From Capilano in the west to Lynn Creek in the east, there is great activity visible. With the long-talked-of bridge now within range, the coming of the Imperial Car Company, and the prospective railway, North Vancouver's future is assured.

The city of Victoria is supplied with water by the Esquimalt Waterworks Company at six cents per thousand gallons, while Vancouver is charging adjoining municipalities ten cents for the same quantity. On the face of it this would seem a strong argument against municipal ownership.

Mr. W. Owen, an English civil engineer, has been in Vancouver in the interests of a group of English capitalists who intend establishing large steel works here for the manufacture of steel rails, angle bars, wire goods and tin plates. Mr. Owen is reported to have acquired an option on 50 acres of land at Port Mann, on the Fraser river, opposite New Westminster. The enterprise will involve an expenditure of about \$15,000,000 in the acquisition of sites, coal and ore supplies, erection of buildings and installation of plant. Employment will be furnished to upwards of 2,000 men.

The new provincial home for the insane, to be erected at Coquitlam, B.C., will be absolutely fireproof throughout, the plans showing massive structures of concrete, stone and steel. The work of construction will be commenced this fall.

The British Columbia Telephone Company, in addition to doubling the size of their main building on Seymour street, has let a contract for a branch exchange at the corner of Tenth avenue and prince Edward street. It will be four storeys, of pressed brick, with cut stone front.

Taking over the water records on Seymour creek held by Point Grey and South Vancouver, damming the waterfall on Seymour creek to hold back the stream for a distance of four miles at a cost of between \$60,000 and \$75,000, and constructing a third water main system across the inlet and through the suburbs, are the steps which Mayor Taylor thinks will soon be necessary in order to keep up with the water needs of a greater Vancouver.

The new dredge to be constructed in England to carry out the improvements to be made by the Dominion Government in Vancouver harbor will be one of the most powerful on the Pacific coast. She will be able to dredge to a depth of 50 feet, and handle 1,000 tons of material per hour. The harbor entrance at Prospect Point is to be approximately trebled in width and made deep enough to serve the largest steamer at any stage of the tide. It is expected that the dredging will finally result in diminishing the tidal current in the narrows by at least one-third and almost entirely eliminate the dreaded tide-rips.

Mr. Wynn Meredith, the eminent San Francisco consulting engineer, who is in charge of the British Columbia Electric Railway power development enterprise at Jordan River, Vancouver Island, spent a few days in Vancouver recently. He was accompanied by Mrs. and the Misses Meredith.

Good progress is being made on the waterworks system being constructed in Delta municipality, south of New Westminster. In all 50 miles of wire wound wooden pipe will be laid, the contract for which was awarded to the Pacific Coast Company, of Vancouver, at \$79,820.10.

The municipality of Point Grey, adjoining Vancouver, to the south, has the honor of having the lowest tax rate among the organized districts of British Columbia—4 45/100 mills on the dollar on improved lands and 8 5/100 on wild land. The total value of real estate property is \$15,181,367, and the total tax levy is \$85,000. By-laws recently passed authorize the expenditure of \$500,000 for a water system, \$250,000 for sewers, \$100,000 for roads and \$100,000 for parks.



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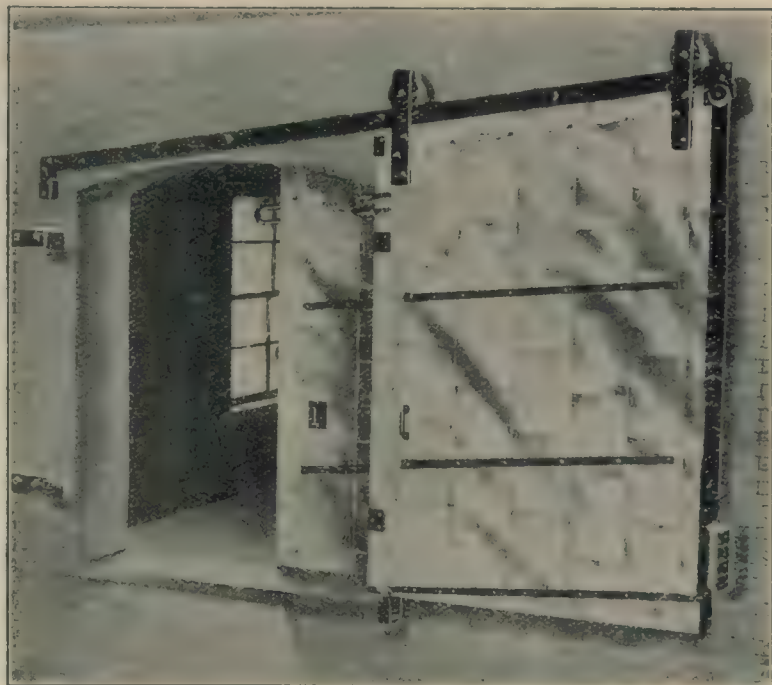
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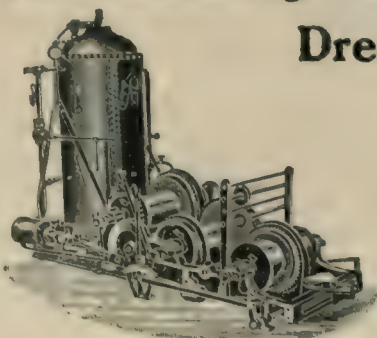
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Personal and General Notes

Mr. G. H. Bryson, assistant city engineer of Victoria, B.C., has resigned.

The Ontario Municipal Association will hold its annual meeting in Toronto on Tuesday and Wednesday, Sept. 6 and 7 next.

Agents of Mackenzie & Mann have taken an option on the large brick manufacturing works of Humber Bros., of Victoria, B.C.

A rich strike of asbestos ore has been made on a ranch two miles from Okanagan Falls, B.C. The find is one of vast importance to western industries.

D. H. McFadden, of Emerson, Man., has resigned as inspector of public buildings for Manitoba, and the Provincial Government has appointed Wm. Baker, of Winnipeg, as his successor.

The C.P.R. will spend about \$150,000 on improvements in Kamloops this year. They propose moving their sheds and track to the river front, thus relieving the centre of the town of the annoyance.

J. A. Grant, of Grant Bros., railway contractors, Los Angeles, Cal., and Mrs. Grant, after spending some time in their native place in Glengarry county, Ont., sailed from New York, July 20, for a European tour.

Mr. James White, of Ottawa, formerly chief geographer of the Dominion, and now secretary of the Commission of Conservation, is making a trip through the West and British Columbia gathering data for a report on the water powers of the Dominion.

Western builders and contractors and supply men generally will do well to watch movements at Port Mann, B.C. Large building operations are promised in the near future, and as this place is spoken of as the terminus of the Canadian Northern, it will certainly be a town of considerable growth.

In a recent test of the Fernie, B.C., water supply, in the case of a big conflagration, City Engineer R. Potter reports a force of 88 pounds per square inch at the hydrant, which would last about 20 hours. After that they have sufficient supply to give a force of 66 pounds per square inch, indefinitely.

At a recent meeting of the Toronto City Council the by-law to amend the existing building by-laws of the city, to make it compulsory on builders to provide adequate protection for all employees engaged in erecting steel frames for buildings was given two readings and referred to the Legislation Committee.

Stonecutters on the Queen's Science Building, at Kingston, Ont., went on strike because the masons are cutting the coarser stone. They have been off for three weeks and building operations are delayed. Through strikes the contractor has lost two months' time this season. The dispute is between two sections of union men.

As the result of the strike of the bricklayers and stonemasons, the Montreal Builders' Exchange has decided to establish local unions affiliated with the Canadian Federation of Labor. A preliminary agreement has been signed between the officials of the two bodies, and it is the intention to have the new unions incorporated and to make an agreement between them and the Builders' Exchange.

Mayor Morley, of Victoria, is of the opinion that a combine exists among the merchants of that city in restraint of

trade. Recently when tenders were called by the city for the supply of a large amount of material for corporation work there was but one tender submitted and this was signed by the half-dozen or more firms carrying the goods sought. In view of the facts the mayor said the council should consider the advisability of asking for outside bids when next calling for tenders for material.

The following members of the Toronto City Council and Guild of Civic Art have been nominated to act on the Civic Improvement Committee, which will supervise the preparation of a comprehensive plan for the improvement of the city. From the Guild of Civic Art: Sir William Meredith, Messrs. K. J. Dunstan, James Ryrie, R. J. Dilworth, J. M. Lyle, Edmund Burke, J. P. Hynes, W. A. Langton, Alexander Laird and James B. O'Brian. From the City Council: Mayor Geary, Controllers Ward, Spence and Church, Ald. Chisholm, O'Neill, Maguire, Welch, Graham, McCausland and Baird.

Current Railway News

Mr. Brown, Dominion Land Surveyor, left Regina last week to lay out five new townsites on the G.T.P. line between Regina and Griffin.

J. Gunn & Sons expect to proceed immediately with the construction of the Edmonton-Strathcona bridge. Mr. W. Gunn is now in the Twin Cities completing arrangements for the commencement of the work. The machinery has been shipped for some time but was held up at the provincial boundary awaiting certificates.

According to a Regina, Sask., dispatch, the Grand Trunk Pacific management is now only awaiting a settlement of its terminal matters with the Regina city council to let a contract for the construction of this line westward, and also to finish up the link from Regina southwards to its grade on the line to the boundary. Every effort is being put forth to rush construction on the line from Balcarres to Regina, but the contractor, Mr. McArthur, is badly handicapped owing to the difficulty of securing sufficient men and teams for the work.

The Transcontinental Railway from Levis to Moncton, N.B., will in all probability be open for traffic in the spring of next year. The completion of this section will put into operation one of the most important links of the whole line. Arrangements are already being made in a preliminary way for car ferries across the St. Lawrence pending the construction of the Quebec bridge. From Quebec to a point 195 miles west the line is about completed now, but from the latter point to Lake Superior Junction it will not be done for two years. On this interior section the work has been held back until supplies and a plant could be taken in from the other end by rail. The distance as well as the character of the country made it practically impossible to haul in a construction plant. The section from Lake Superior Junction to Winnipeg will be ready for operation this fall.

The contractors on the coal fields extension of the Grand Trunk Pacific have started to cut out the right of way from Edson. This branch, which is to be about 70 miles in length, will cross the Yellowhead Pass Coal Company's lien and the will cross the Yellowhead Pass Coal Company's line and the Pacific Coast Pass Coal Company's lines and unless labor difficulties, so troublesome in the West, are greater than anticipated, the grade should be ready before the winter closes in. On the Battleford branch of the Grand Trunk Pacific the contractors are seriously hampered by lack of labor, but track laying is expected to begin on the grade by the middle of next month. On the Prince Albert branch the same con-

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—The Philosopher of Metal Town.



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ditions prevail, but it is likely that about 90 miles of the grade will be ready for steel before the winter. Ballasting cannot be continued after the frost sets in, so the work is being rushed with all possible speed. On the Regina portion good progress is being made between Melville and the southern limit, about 100 miles south of Regina. Farther than that there is nothing but tentative surveying. All the contracts have been let for the work from Melville to the southern limit, and it is intended to connect with the main line through Brandon.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

1285. Paints, varnishes, cement, etc.—A firm of general forwarding agents in New York City, with extensive connections in Buenos Ayres, are in the market for the above goods and will welcome correspondence from Canadian firms.

1300. Railway material—A Yorkshire firm of railway material manufacturers and iron founders wish to appoint a first class firm in Canada to act as their agents.

1301. Railway material—A Staffordshire firm manufacturing bolts, nuts and fencing, and all classes of railway material, wish to enter the Canadian market.

1306. Plaster and cement—A North of England firm manufacturing plaster and cement wish to extend their business connections in Canada.

1307. Valves for speed pumps, etc.—A London firm manufacturing patent valves for high and low speed pumps, air pumps, air compressors, blowing engines, etc., wish to get in touch with a firm in Canada open to take up the Canadian patent rights, or to manufacture the article on their behalf in the Dominion.

"Everything in Iron"—A Useful Work

We have received from the Canada Iron Corporation, Limited, Montreal, a comprehensive and well illustrated catalogue of their leading lines. This book, indeed, is something more than a catalogue. It is a work of art; moreover it has a real educational value. In an early chapter relating to the reduction of iron ore it is pointed out that in the earliest times the general use of iron was precluded by the difficulties encountered in its manufacture. It was as a prize that Achilles offered at the games in honor of his lamented friend, Patroclus,—

"A mass of iron, an enormous round,

Whose weight and size the circling Greeks admire,

Rude from the furnace and but shaped by fire."

During the last half century enormous strides have been made in the reduction of iron ore and if the ancient Greeks were to visit the present-day blast furnaces of the Canada Iron Corporation they might be stimulated to further admiration. The various processes of manufacture described and illustrated in this work are of particular interest.

The historical data contained in the introduction to the section relating to cast iron pipe are worthy of note. From the information given it appears that the Greeks used clay and lead pipe for distribution purposes as early as 600 B.C., and many centuries later bored logs were used for the same purpose, but it was not until the 14th or 15th century that castings of iron began to come into general use. Cast iron pipe was first heard of in the 17th century. There are cast iron mains in use to-day which were laid more than 200 years ago. The cast iron pipe leading to the fountains at Versailles are said to have been laid in 1685, and the first cast iron pipe for water purposes in London were put down in 1800. In Philadelphia the first iron pipe were used about

1804. In these and other places pipe have been laid bare after the lapse of a century and found to be in perfect condition. Cast iron is therefore now accepted as the standard material for gas and water underground mains.

The Canada Iron Corporation, Limited, are the first on this continent to make the process of casting pipe vertically a continuous operation. At the Fort William plant there are two long parallel pipe pits joined by transfer cars, and the pipe flask carriages are moved through them by an endless chain. The ovens are built over the end of one pit and fired from below. The pipe flasks, having been rammed in the other pit, are carried across by the transfer cars and onward slowly through the overs. The hot metal is poured into them as they emerge, and by the time they complete half of the circuit the freshly made pipe are ready to be stripped. Ramming starts over again, and so the operation continues year in and year out by different shifts of men without interruption or cessation of work. In the Fort William plant all sizes of cast iron pipe are manufactured at the rate of 80 to 120 tons every 24 hours.

At the annual convention of the Canadian Society of Civil Engineers held at Ottawa last January, a committee was appointed to consider standard specifications for cast iron pipe and special castings. The Canada Iron Corporation, Limited, have adopted the standard specifications of the American Waterworks Association. These are reproduced in full in the work under review and provide a handy reference for engineers and contractors.

Diesel Engine Has Many Good Points

In the Contracts Department of this issue appears a notice to the effect that the Canadian Boving Company, Limited, have received an order for 200 B.h.p. Diesel engines for the Moose Jaw Street Railway. These engines are manufactured by Mirrlees, Bickerton & Day, Limited, of Stockport, England, and are the first of the kind to be installed in Canada. The Diesel represents the highest possible quality in this line of work. All parts which do not come within a limit gauge of 1/3000-inch are rejected, everything thus being absolutely interchangeable. The Diesel engine is claimed to be the most economical form of motive power in existence and will generate current at about one-half to one-third the cost at which it can be obtained from steam plant. Its use dispenses entirely with boilers, boiler setting, boiler flues and chimney shaft, boiler house buildings, boiler feed pumps, feed water heaters, mechanical stokers, all steam and water piping, and coal and ash handling gear. The complete power equipment is contained in one building of moderate dimensions and each unit is self contained and independent. The cheapest oil can be used with the Diesel without any alteration whatever as far as actual running is concerned. "Fuel" oil can be obtained in bulk in Toronto for 3 cents a gallon and should not cost more than 4 to 5 cents a gallon, delivered, if bought in car lots. From what we can learn of the Diesel we think it an advantageous and economical proposition. Diesel engines are not an experiment. Engines built more than 14 years ago are running to-day in regular service.

The "Surveyor" states that the Ogmore Council, England, has received the following claim: "I beg to send my claim to you. You know very well what for. When I owe you money, you are sending very sharp letters to me. Understand it is my turn now. You know alright that you have put a manhole and a long string of pipes in my garden. A bominabul stink from that there manhole, and you think I've no claime agin you. You pay up, and very quick. Now I want £15, 'cos I am going on my holidays. I know I owe you £3. You take it out, and send me £13, and I will be off next week."

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Arnprior, Ont.

The road commissioner, Mr. D. Carmichael, has asked for tenders for the building of a road, and the erection of a fence on lots 21 and 20 in the 20th and 23rd concessions of McNab Townships.

Berlin, Ont.

The by-law to spend \$8,300 in improving the sewerage system was carried.

Chippawa, Ont.

A by-law to provide for a waterworks system will probably be submitted to the ratepayers shortly.

Edmundston, N.B.

Tenders addressed to M. D. Cormier, town clerk, will be received until September 8th for the following: Supply and erection of stand pipe and accessories, construction of concrete foundation, etc., in connection with the installation of waterworks here. V. H. Dupont, engineer, 62 St. James street. L. A. Dugal, mayor.

Fernie, B.C.

A by-law was passed to borrow \$27,000 for sewer extensions and \$4,500 for the purpose of installing a fire alarm system.

Hull, Que.

The residents of Wrightville, a suburb of this city, have petitioned the council for a sewerage system and for the installation of larger water mains. The laying of cement walks has been recommended by the Streets and Roads Committee.

Montreal, Que.

The building of a boulevard from Ste. Catherine road to the road running parallel to the Riviere des Prairies and to continue eastward from Bordeaux through Ahuntsic, Cartierville and Sault au Recollet, entering the city at Maisonneuve, was the scheme favored by the majority of the representatives at the first regular meeting of the Metropolitan Park Commission.

North Bay, Ont.

The Tp. of Widdifield passed a by-law to raise the sum of \$33,000 for the purpose of opening, improving, grading and graveling streets, also for construction of waterworks.

North Buxton, Ont.

Tenders are being called until September 8th for new pump house, wheel, boiler and engine, etc., to be erected in the Pike Drainage Scheme, Raleigh Township, work to be completed this fall. Plans, etc., at office of A. E. Robinson, S. Buxton. T. R. Clarke, North Buxton.

Nanaimo, B.C.

It has been decided to construct some five miles of cement sidewalks in addition to those already under way, making in all some twelve miles of permanent walks which will be constructed during the next three months.

New Westminster, B.C.

At the Burnaby Board of Trade meeting recently the question of building many miles of sidewalk was discussed. Although plans are as yet in a tentative state, it is likely that the work will be undertaken in the near future.

North Vancouver, B.C.

Tenders are being received for the laying of an eight-inch water main from the present intake, North Lonsdale, in D. L. block 880, to Mosquito Creek, in D. L. block 1345, a distance of about 2,100 feet.

Penticton, B.C.

The ratepayers have sanctioned the purchase of the irrigation system from the Penticton Water Supply Company. The system will be purchased by a debenture issue of \$100,000.

Prince Rupert, B.C.

The bids for street grading and 16-foot plank roadways were as follows: Neil Norman, close cutting and grading, \$5,453.71, made up by rock excavation, \$3.50, and earth \$1.00; S. H. Watson & Company, building plank roadway, \$1,236, close cutting and grading \$4,103, rock \$2.40, earth 70 cents; E. C. La Trace, plank road, \$782.45, close cutting \$120, rock \$2.25, earth 90 cents; John Swanson, grading \$2,311, rock \$2.25, earth \$1.00; S. B. McCordie & Co., roadway \$1,239.46, grading and close cutting \$4,213.20, rock \$2.50, earth \$1.20; W. H. Mitchell & Company, grading and close cutting, \$3,912.60, rock \$2.50, earth 60 cents; City Engineer, roadway \$1,300, grading \$4,000, rock \$200, earth 60 cents.

Regina, Sask.

A by-law was passed to provide for the raising of \$132,000 for pavements, and \$28,000 for sidewalks.

Township of Norris.

Tenders will be received up to September 19th for the construction of municipal drains. A. MacEwan, clerk. For further particulars see "Tenders and For Sale Department" of this issue.

Vancouver, B.C.

City Engineer Clement has prepared an estimate for a trunk sewer on Glen drive from Eighth to Sixteenth avenues.

AWARDED.

High River, Alta.

McKibbin Bros., Calgary, received the contract for the construction of 3,000 square feet of cement sidewalk at 9 5-8 cents per square foot for sidewalks, 10 1/4 cents per square foot for crossings. Prices were as follows: 10 cents per square foot for all; 10 7-10 cents for walk; 12 7-19 cents for curb, 10 cents for walk, 12 1/2 cents for crossings; 10 7-9 cents for walk, 22 cents lineal foot for curb.

The contract for 800 barrels of Portland cement was given to Kelly & Young, this place, at \$3.20 per barrel, f.o.b. High River.

Estevan, Sask.

McKenzie & Prevost have been awarded the contract for the construction of the cement sidewalks on the principal streets. Prices in tenders varied between 17 and 35 cents per square foot. Amount of contract, \$10,000. Engineer in charge, Mr. Gibson.

London, Ont.

C. Leathorne was awarded the contract for the storm water drain, at \$749, side drains, 29 cents per foot. Other tenderers were: Thomas Martin, \$987.80, side drains 40 cents per foot; B. Johnson, \$350.00, side drains 40 cents per foot; W. J. Johnston & Company, \$818.00, side drains 41 cents per foot.

Moose Jaw, Sask.

The contract for six miles wooden sidewalk was awarded to Contractor Ross, of this city, at 29 cents per lineal foot. Other prices submitted were: Messrs. Walker, 29 1/2 cents; McLeod, 33 1/2 cents, and Fenwick, 33 cents per lineal foot. J. M. Wilson, City Engineer.

Swift Current, Sask.

Laidlaw & McDonald, Fort William, Ont., have been awarded the contract for the construction of four miles of sewers and six miles of waterworks here.

St. Marys, Ont.

Leslie & McNeil, contractors, were given the contract for the laying of 4 miles of cement at 8 1/2 cents per square foot.

Railroads, Bridges and Wharves

Belleville, Ont.

The Railway Commission has approved of the route of the C. N. R., located north of the highway from Trenton to a point east of Belleville cemetery, thence south of the highway to the city. This work will, it is stated, be commenced about September 1st.

Calgary, Alta.

See "Power Plants."

Dipper Harbor, N.B.

Tenders are being called by the Department of Public Works until September 25 for construction of extension to breakwater here. R. C. Desrochers, secretary.

Estevan, Sask.

It is announced officially that the C.P.R. will build the westerly extension of 20 miles from here, commencing August 29.

Kenora, Ont.

Messrs. J. T. Arundel, general superintendent of C. P. R., and J. Brownlee, superintendent of this division, have submitted plans for the subway on Main street. Estimated cost about \$41,150.

Montreal, Que.

It has been intimated that a new wharf will be constructed at St. Helen's Island this fall. The city has \$50,000 to spend on improvements to the island, but as it is federal property the work will be under-

taken by the Harbor Commissioners at the expense of the city.

Ottawa, Ont.

It is reported that the C. P. R. is securing options on private properties in the west end, adjacent to the round-house on Wellington street, either for its enlargement or to erect other buildings.

Toronto, Ont.

It is stated that the C. N. R. has acquired the Bay of Quinte line, thereby altering their policy for Eastern Ontario.

It is rumored that the C. P. R. will build a new line from Smith Falls here, and that already the survey has been made from Belleville.

Vancouver, B.C.

Tenders for constructing a wharf at the foot of Balsam street for the landing of supplies for the Kitsilano district were as follows: Ironsides, Rannie & Campbell, \$9,796; Higman & Doctor, \$10,720; H. V. Tucker, \$11,985; Armstrong, Morrison & Company, \$7,835.

Verdun, Que.

Quinlan & Robertson have contracted with this municipality for the construction of a river dyke.

Winnipeg, Man.

The estimates for new bridge and subway at Salter street are as follows: Bridge 26 feet wide for two street car tracks and two lines of traffic, with 2-foot 6-inch sidewalks, \$283,350; 34 feet wide, \$368,909; 42 feet wide, \$451,359. Subway, same accommodation for traffic as the 26-foot bridge, \$525,000. City Engineer Ruttan.

AWARDED.

Coaticook, Ont.

Helmer & Winstanley got the contract for the reinforced concrete bridge over the Coaticook river.

London, Ont.

The contract for concrete abutments and floor of bridge on First street, London Township, was awarded to F. E. L. Talbot, at \$430. The following tenders were received: Kelly & Winters, \$507; E. Waltham, \$455; W. S. Odell, bulk tender for this and the county bridge, \$1,123; Levi Crouse, \$480; Joseph Patterson, \$483; W. J. Anthistle, bulk tender for this and the county bridge, \$1,340.

Smith's Falls, Ont.

M. McCormack, of Sudbury, and J. H. Morin, of Montreal, received the contract for the C. P. R. subway on Cornelia street. Work to be concluded by end of October.

Victoria, B.C.

A contract for the extension of the Kettle Valley Railway line from Rock creek, on the west fork of the Kettle river, a distance of 35 miles, has been awarded to L. M. Rice & Company, contractors, of Vancouver and Seattle. Construction work will be started within three weeks. Mr. J. J. Warren, of Toronto, president.

Public Buildings, Churches, Schools, etc.

Arthabaska, Que.

The Public Works Department, Ottawa, are calling for tenders until September 7 for erection of Public Buildings here. R. C. Desrochers, secretary.

Assiniboine, Sask.

The ratepayers will vote on September 8th on a by-law to borrow \$4,200 to purchase a school site and erect a school.

Barrie, Ont.

The collegiate institute will be enlarged and improved. Estimated expenditure, \$40,000. An architect has been secured.

Chilliwack, B.C.

Tenders will shortly be invited for the construction of the town hall.

Erickson, B.C.

Tenders have been invited by the Public Works Department for the erection of new school here, tenders to be in by September 7th.

Fort Frances, Ont.

Tenders were called until September 1st for erection of school for S. S. New Devlin. Plans, etc., at residence of G. C. Watson, LaVallee.

Fort William, Ont.

A site suitable to both this city and Port Arthur has been secured for the exhibition buildings.

A by-law to raise the sum of \$12,000 for the purpose of improving the City Hall will be submitted to the ratepayers on September 26th.

Halifax, N.S.

G. J. Desbarats, deputy minister of naval affairs, and Alex. Johnston, deputy minister of marine, have been here to look over the ground for the Naval college.

Hamilton, Ont.

The committee on the Shelter Home for Children recommend the purchase of a large piece of land to be available as a prospective building site.

Lyleton, Man.

The post office, Home Bank branch, harness shop, livery stable were destroyed by fire on the 28th inst. Total estimated loss \$30,000.

Montreal, Que.

Less than \$25,000 will bring the total amount to the \$200,000 required by the Notre Dame Hospital for the proposed new hospital building. The committee are confident that the total amount will be subscribed within a short time. Noted previously.

Moose Jaw, Sask.

At a meeting of the Board of Directors of the Saskatchewan Residential College for Boys the plans prepared by Mr. J. D. Atchison, architect, of Winnipeg, were accepted, and the architect authorized to call for tenders as soon as possible. An effort will be made to construct the foundation this year and complete the building by this time next year in readiness for the fall term. The plans call for a building 62 by 120 feet, three storeys high, of steel and brick construction, with ornamental stone.

New Westminster, B.C.

Among the seventeen tenders for the building of the Royal Columbia hospital, the price set upon the work was above that anticipated by the board of managers.

Niagara Falls, Ont.

C. M. Borter was instructed to draw up plans and specifications for the Main street fire hall, the building to be either brick or frame.

Ottawa, Ont.

Plans for the addition to the Howick Pavilion have been approved by the Ontario Government and call for expenditure of about \$6,000.

It is rumored that the government has decided that the present residence of the

Governor-General in Canada has almost outlived its usefulness and that plans are already under way for the erection of a new Rideau Hall on a new site.

Peterborough, Ont.

Tenders addressed to T. F. Matthews, will be received until September 3rd for the erection of new buildings for Murray street Baptist church. Plans, etc., at office of The Geo. Matthews Company, Limited, or at Royal Bank, Peterborough; also at office of the architects, Burke, Horwood & White, 28 Toronto street, Toronto.

Portage la Prairie, Man.

The plans for the new armory have been completed.

Tenders addressed to J. L. Swales, secretary-treasurer, were called until August 30th for one-roomed solid brick school at East Prospect S. D., No. 111.

Quebec, Que.

The terms of the contract affecting the sale of Champlain Market site to Transcontinental Commission state that work must be begun by November 1st. Noted previously.

Regina, Sask.

The plans for the new fire hall have been entrusted to the engineering department.

The Library Board here decided to extend the time for receiving plans for the new library building until September 9th.

Roberval, Que.

Tenders for public building here will be received until September 12th by R. O. Desrochers, secretary, Department of Public Works, Ottawa.

Rossland, B.C.

The Public Works Department are inviting tenders until September 30th for alterations, additions and repairs to the Court House here.

Saltcoat, Sask.

Tenders for making alterations and additions to public school here will be received until September 5th by E. J. W. Raymen, secretary. Plans, etc., at Builders' Exchange, Winnipeg, and at the offices of the architect, W. W. Lachance, Saskatoon and Yorkton.

Saskatoon, Sask.

A campaign for the raising of funds to enable the erection of a large well-equipped Y. M. C. A. building here will be started shortly.

St. Lambert, Que.

The new post office building under contemplation will cost about \$35,000.

St. Thomas, Ont.

The proposition to erect new manual training building on Ross street will be laid before the school board shortly. Chairman Roberts.

Announcement has been made by Rev. Father West that the plans of the new church have been approved by His Lordship the Bishop. The new edifice is to be of stone. It is altogether likely contracts will be let in the near future.

Sydney, N.S.

A Canadian syndicate in affiliation with the Pantage Circuit of the United States will erect a theatre here at a cost of about \$35,000.

Toronto, Ont.

A permit has been issued for the new St. Mary's club house addition on Bathurst street, \$40,000.

Tenders have been called by the Depart-

ment of Public Works for the preparation of site for the new residence for the Lieutenant-Governor on Bloor street H. F. McNaughten, secretary.

Tenders are being called until September 7th for the erection of Pathological Building for the General Hospital. Darling & Pearson, architects. See advertisement in "Tenders and For Sale Department" of this issue.

The Federal Government has secured 973 acres of land (Holliday farm) in the vicinity of Long Branch ranges, which will form part of the site for permanent barracks here. The Militia Department will also endeavor to acquire the 200 acres between for military purposes.

Tenders are being called by the Public Works Department until September 8th for plaster work in connection with reconstruction of west wing of Parliament Buildings. Plans, etc., at office of architect, E. J. Lennox. H. F. McNaughten, secretary. Advertisement in "Tenders and For Sale Department" of this issue.

Waterloo, Ont.

Tenders addressed to R. C. Desrochers, secretary, Public Works Department, Ottawa, will be received until September 14th for erection of public building here. Plans, etc., with local post master and at postal station F, Yonge street, Toronto, and at the above Department.

Westbank, B.C.

Tenders have been invited until August 31st by the Public Works Department for the erection of new school here.

Winnipeg, Man.

Tenders for the superstructure of Westminster Church will be called shortly. J. H. G. Russell, architect.

C. J. Brown, city clerk, is calling for offers of site for new exhibition grounds until September 15th.

At a recent meeting in the Church of Christ, corner of Kate and McDermot, it was decided to build another church of the denomination in the St. James district.

The St. Charles Country Club will erect a \$50,000 club house on its property. Plans have been prepared. E. H. Macklin, secretary. Noted in previous issue.

Tenders are being called by the Board of Control until about September 8th for erection of home for treatment of incipient phthisis. Estimated expenditure, \$20,000. Plans, etc., with Dr. Sharpe.

Building permits were issued for police sub-stations to be erected immediately in Fort Rouge and in North Winnipeg at \$27,000 each.

Tenders addressed to G. G. Teeter, architect, Builders' Exchange, were received until August 31st for erection of church for Olivet Baptist congregation.

The Manitoba Government has purchased 49 acres of land next to the Agricultural College as site for new college buildings, one to be used for the Domestic Science Department.

Tenders addressed to J. H. G. Russell, architect, McArthur Building, will be received until September 6th for all trades, except heating, in connection with the north branch Y. M. C. A. Building. Estimated cost, \$55,000.

Tenders are being called by Public School Board until September 8th for heating and ventilating plant in each of the two technical schools. Plans, etc., with J. B. Mitchell, commissioner of school buildings. R. H. Smith, secretary-treasurer, W.P.S.B.

Competitive plans for the new Tubercular hospital are being invited by the Board of Control until September 12th. Noted previously. The Board of Control is calling until September 7th for supply of labor and materials for erection of tubercular hospital. Plans, etc., for same at office of Mr. G. G. Teeter, architect, Builders' Exchange Building. M. Peterson, secretary.

Yorkton, Sask.

The president of a United States Lutheran seminary, desirous of locating in Western Canada, is expected here shortly to confer with the town council regarding the location of a \$20,000 college.

AWARDED.

High River, Alta.

Carmangay school contract was awarded to P. Taylor, this place, at \$14,000.

London, Ont.

The Metal, Shingle & Siding Company, of Preston, were given the contract for roofing the main building of the Western Fair, at \$970.

Montreal, Que.

The general contract for the erection of a three-storey school building, corner of Rosaire and Boyer streets, for the Catholic School Commissioners of Villeray, has been awarded to Jean Borderie, contractor.

The general contract for the erection of a church building on Church avenue for Corporation des Syndies St. Paul has been awarded to O. Martineau & Fils, general contractors, 1062 St. Denis street. Architect, Joseph Art. Godin, 299 St. Denis street.

Nanaimo, B.C.

The new fire hall contract was awarded to Meecher Bros., of Victoria, at \$29,310. McDonald & Perry, of Vancouver, got the contract for heating at \$2,690.

New Liskeard, Ont.

The contract for the library was let to Dalgleish Bros. This building is 52 feet by 42 feet; cost, \$10,000.

Ottawa, Ont.

We are informed that the Board of Control has awarded contract for new fire station on Cumberland street to Burgess & Company, Ottawa, for \$24,000. Other tenders received: Toms & Bouthillier, \$28,000; Alexander & Campbell, \$29,000; G. A. Crain, \$29,686; A. G. Marshall, \$29,785; all of Ottawa. For city hall general office fixtures, to R. A. Sproule for \$2,600. Other tenders received: Library Bureau of Canada, \$4,135; S. L. Kyle, of Ottawa, \$4,700.

Quebec, Que.

The heating, ventilation and plumbing contracts for the Technical school, have been awarded to Mr. James Ballantyne, Montreal, for \$53,000. The other contracts are still to be awarded. Rene P. Le Jay, M.I.A.C., architect, Quebec.

Toronto, Ont.

The following contracts have been awarded in connection with the sub-station, corner of Ruskin and Edward avenues: Mason work, Teagle & Son, \$26,905, less \$1,800 if artificial stone is used instead of Ohio stone, \$25,105; roofing, Duthie & Company, \$187; plumbing, Fred Armstrong Company, \$410; total \$25,872.

The following contracts were awarded for the new Humberside Collegiate Institute: Masonry, W. T. Joy, \$21,536; carpentry, M. Hutcheson, \$11,025; plastering, G. White, \$2,593; roofing and tinsmithing, G. Duthie & Son, \$1,294; printing, Fred J. Cox, \$1,244; plumbing, Fred Armstrong Company, \$1,440; heating and ventilating,

Fred Armstrong Company, \$8,957; heat regulators, Johnston Temperature Regulator Company, \$680; total, \$47,869.

Winnipeg, Man.

The contract for the construction of the basement of the new church for the congregation of Westminster Church, has been awarded to Saul & Irish of Winnipeg.

Residences

Hamilton, Ont.

Recent building permits include: Bennett & Thwaites, three brick dwellings, on Homewood avenue, between Garth and Locke streets, \$4,500; H. Thoms, brick dwelling, corner Storton and Wilson streets to cost \$2,000; E. & J. Busecombe, seven brick dwellings, York street, corner Sophia street, for Wm. Goldberg, \$12,000; James Weir, three frame dwellings, Niagara street, between Land and Ship streets, to cost \$3,000; J. F. Stuart, brick dwelling, Aberdeen avenue, between Locke and Garth streets, \$4,000.

Montreal, Que.

Eleven tenements in Esplanade avenue, near St. Viateur street, were damaged by fire on the 26th inst. Estimated damage, \$6,000.

Mr. Alphonse Piche, architect, Victoria Building, has prepared plans and specifications, tenders for which are being invited, for the erection of two cottages at Belisle, Que., for Wm. Martel, Esq.

Mr. H. Papineau is erecting eight flats on Papineau avenue by day work.

Mr. J. D. Langevin, Querbes and Fairmount avenues, is erecting 24 flats on Park avenue.

The Sisters of Providence are making alterations to their property on DeMontigny street. Day work.

Mr. H. Beaudry is making additions to stable on St. Lawrence Boulevard. General contractor, Jos. Laurier, 377 Ontario street east. Architect, H. Charbonneau, St. Henri Ward.

Roberval, Que.

The residence of Mr. A. Pelletier, advocate, was destroyed by fire on the 22nd inst. Estimated loss, \$10,000.

Regina, Sask.

Tenders were received until August 30th for erection of apartment block for Messrs. Gardner & Walker. Storey & Van Egmond, architects.

Ottawa, Ont.

Recent building permits include: T. C. James, solid brick dwelling, Canal street, \$12,000. W. E. Hunt, three brick veneer cottages, Arlington avenue, \$5,100; Robt. Edmondson, brick veneer dwelling, Blackburn avenue, \$2,500; C. Neilson, double brick veneer roughcast dwelling, Hawthorne avenue, \$2,500; R. Blackburn, solid brick addition and alterations, Lisgar street, \$2,500.

St. Boniface, Man.

Recent building permits include: The Sisters of the O. M. I. of the convent on Tache street, St. Boniface, a \$15,300 addition to their building; G. C. Smith, house on Doucet street, \$8,000; T. E. Lafrance, alterations to residence on Ste. Jean Baptiste street, \$2,500; R. H. Metcalfe, house on Eugenie street, \$5,000; E. G. Sweet, house on Dulue street, \$2,000; F. A. Devay, house, \$2,600; K. B. Skagford, several houses, ranging in price from \$2,000 to \$4,000; A. Amos, house for the Manitoba Rolling Mills, \$8,000.

Vancouver, B.C.

Recent building permits include: Mrs. E. Gould, 740 Robson street, \$6,000; J. Raleigh, 1675 Tenth avenue, \$2,600; Johnston Stainly, dwelling, 2131 Victoria drive, \$3,500; Wm. Urquhart, Powell street, between Columbia and Carrall, \$6,000; W. Mason, 1265 Eleventh avenue west, \$3,800; J. A. Chisholm, 1976 Grant street, \$2,700; E. Judd, 1054 Pacific street, \$3,000; Bacon & Mugford, 1885 Tenth avenue west, \$3,500; S. J. Steeves, 2846 Birch street, \$4,000.

Victoria, B.C.

Building permits include: R. McKinney for a dwelling on Government street to cost \$2,900; Smith Bros., dwelling on Davie street, \$2,450.

AWARDED.**Montreal, Que.**

Mr. W. N. Boivin is erecting two houses corner Garnier and Mount Royal avenue. Contractor, Alex. Brosseau, 129a Berri street. Architect, R. A. Brassard, 9 St. James street.

The contract for plumbing at residence being erected for Mr. Alex. Stevenson at Baie d'Urfee has been awarded to John Allan. Architect, Mr. Kenneth G. Rae; general contractor, John A. Gordon.

Victoria, B.C.

The contract has been awarded to D. C. Fulton, of Vancouver and Victoria, for the erection of an apartment house on the southeast corner of Vancouver and Couttes streets for the Mount Edwards' Apartments Syndicate, to cost \$70,000. W. D'O. Rochfort, architect.

Business Buildings and Industrial Plants

Brantford, Ont.

The Penman Manufacturing Company have closed a deal with the city council whereby an \$80,000 extension will be erected in the Holmedale district.

Berlin, Ont.

The by-law to loan \$15,000 to Baetz Bros., recently burned out, was defeated.

Brandon, Man.

J. F. Allen, of Davenport, Iowa, is stated to be favorably impressed with Brandon as a suitable location for a branch biscuit factory.

Blairmore, B.C.

Senator Peter McLaren's saw mill recently destroyed by fire on July 17th, it is stated, will be rebuilt.

Chatham, Ont.

It is reported that the Canadian Grain Shocker Company, Limited, will locate in this city. Chas. Matthews, president; E. Nyberg, managing director.

Clavering, Ont.

Mr. Simmie's saw mill here was destroyed by lighting on or about the 23rd inst. Estimated loss, \$4,000.

Chippewa, Ont.

It is announced that the Norton Carborundum Company will almost double its plant here.

Durham, Ont.

The by-law to grant \$20,000 as a loan to the Durham Furniture Company for extensions will be submitted to the ratepayers on the 2nd September.

Duncans, B.C.

It is announced that the work of erecting the mill here, capacity 100,000,000 feet per annum, will be commenced shortly. Mr. Marsh, who is interested financially, has now his headquarters in Victoria and it is stated, has selected the site. Noted in issue of June 29th.

Hamilton, Ont.

The Canadian Westinghouse Company has a permit for the erection of an addition to its plant to cost \$22,000. Additions to the value of \$100,000 are expected. A concrete fire hall will be erected at the corner of Milton street and Myrtle avenue.

The Eureka Smoke Consumer Company, of Rochester, N.Y., will establish a plant here at a cost of \$25,000. Ald. Kingdon is interested.

Merritt, B.C.

It is altogether probable that a large sawmill will be placed on the Coldwater river about ten miles from here. The project is in the hands of the American Timber Holding Company, which owns most of the timber in this district. It is estimated that it controls 100,000,000 feet of timber.

Masson, Que.

The flour mill here owned by Senator Edwards, of Ottawa, was destroyed by fire on the 23rd inst.

Montreal, Que.

Information regarding the building for the National Acme Manufacturing Company can be obtained from E. L. Baugh, 107 St. James street. Noted in last issue.

A. E. Rea & Company, Limited, have taken out a permit for a store which is to be one of four storeys and fireproof throughout. Cost, \$367,752. The Canada Sugar Refining Company has a permit for a new factory on St. Patrick street, \$18,000; the Pipper Light & Power Company has one for a similar building on St. Remi street, St. Henri, \$18,000, and Mr. James Robertson has a permit to put up a factory on Shannon street, \$5,500.

A building permit has been taken out for a \$37,000 C. P. R. depot at Mile End.

North Vancouver, B.C.

M. C. Wiegand, it is expected, will very soon erect another large block on First street, west of Lonsdale avenue.

Nanaimo, B.C.

Mr. M. J. Foley, the well-known timber cruiser, is reported, will erect a sawmill at Nanoose Bay. Estimated outlay, \$30,000. Construction will start in about two weeks.

Ottawa, Ont.

W. E. Noffke has been chosen as architect to prepare plans for a seven-storey building for Blackburn Brothers on the corner of Metcalfe and Sparks street. The building will be about 40 feet on Sparks by 80 feet on Metcalfe. It will be steel fireproof construction, and will have stores, etc., on the main floor. Tenders will be called very soon.

George Matthews Company has instructed W. E. Noffke to prepare plans for a four-storey building on the corner of Rideau and Mosgrove, of brick. The stores on the main floor will be about the most up-to-date in the city. Tenders will be called this week.

John McNee & Sons will erect a big five-storey addition to their factory on Clarence street.

Owen Sound, Ont.

The by-law to grant \$100,000 towards a shipbuilding and dry-dock plant, which will involve the expenditure of \$1,000,000, was carried by the ratepayers. The by-law to authorize the loan of \$20,000 to a furniture manufacturing company (of which Mr. Minchiner, of Stratford, is the financial head), was also carried.

Princeton, B.C.

Among those interested financially in the new cement works to be erected in the suburbs here are the following: Mr. L. W. Shatford, M.P.P.; J. A. Harvey, K.C., and Mr. L. W. Stone. Proposed expenditure, \$250,000. It is understood that a sawmill will be put into commission to supply lumber.

Port Arthur, Ont.

On September 8th the ratepayers will vote upon a by-law to issue \$12,000 car barns debentures, due 1940; \$2,000 swimming bath debentures due 1925. T. McTeigue, City Clerk.

Port Mann, B.C.

That a big English steel works, capitalized at \$2,000,000, will be established here is the persistent rumor. It is believed that the company is closely associated with the Canadian Northern, and that the announcement of the proposed new works will be made in a few days.

Roberval, Que.

The warehouse owned by Mr. A. Laignette, was destroyed by fire on the 22nd inst. Estimated loss, \$12,000.

St. John, N.B.

It is announced that the C. P. R. has purchased the New Brunswick Cold Storage Company's property on Main street, where it is reported a station and hotel will be built.

Toronto, Ont.

Permits have been issued for the erection of the following bank buildings: Molsons Bank, 1716 Dundas street, two-storey brick building, to cost \$12,000; Imperial Bank, corner of Dundas and Bloor streets, \$10,000; and Imperial Bank, corner of Queen street and Roncesvalles avenue, \$9,000.

Vancouver, B.C.

Work will be commenced in a few days at the Fraser River Mills on the new planing mill, sash and door factory, shingle and lath mill that it was announced some months ago would be erected.

Woodstock, Ont.

It is stated that a site has been purchased here for the Woodstock Textile Company.

Vonda, Sask.

The by-law to grant the sum of \$8,000 to Messrs. Kapes & Kinvig, of Columbus, N. D., for the erection of flour mill here was carried. Estimated cost, \$16,000.

Welland, Ont.

It is stated that the Chemical Laboratories, Limited, of Toronto, will amalgamate with a large American concern and locate at Welland.

West Toronto, Ont.

It is stated that much new machinery will be required in the new \$100,000 addition to the Canada Cycle & Motor Company's plant.

Wellandport, Ont.

On the 25th inst. the new post office, Goring's store, Durham's hotel, the telephone office and other buildings were de-

stroyed by fire. Total estimated loss, \$40,000.

Winnipeg, Man.

Options have been secured on several sites here and in St. Boniface for the establishment of a branch factory of the Imperial Wire Company. Major Currie, M.P., is interested.

William Richmond, local manager for Wortman-Ward Company, of London, Ont., it is stated, has been interviewing architects with regard to the erection of a factory, 200 feet long by 60 feet wide, here, with provision made for extensions.

F. W. Heubach, of the Winnipeg Development & Industrial Bureau, has received inquiries from a boot and shoe firm in regard to the establishment of a factory. Inquiries have also come from a firm manufacturing farm implements, a rug and carpet manufacturer, also a manufacturer of blankets, Berlin, Ont., and others.

AWARDED.

Fort William, Ont.

Carter, Halls, Aldinger Company, general contractors of this city, have been awarded the contract for the construction of the new Canadian Pacific car shop.

London, Ont.

The contract for the erection of transformer station was awarded to Hyatt Bros., at \$3,550.

Montreal, Que.

The contract for the erection of a factory building for the Canadian Rubber Company, at the corner of Notre Dame and Monarque streets, has been awarded to Mr. E. G. M. Cape, general contractor. T. Pringle & Sons, Limited, architects.

The contract for alterations to the premises of the Boxer Estate, 132-134 St. James street, has been awarded to Messrs. Peter Lyall & Sons, Limited. Messrs. Ross and McFarlane, architects.

Messrs. Paterson, Wilson & Company, Board of Trade Building, have awarded the contract for the erection of a warehouse building on Casgrain street to the Granite Construction Co., of New York.

General contract for the erection of the factory building by the Alaska Feather & Down Company, on St. Ambroise street, has been awarded to Shearer, Brown & Wills, general contractors, 225 St. Patrick street. Architects, Ross & McFarlane, 1 Belmont street.

The Wire & Cable Company, Guy street, and are erecting a shed on Guy street. General contractors, Shearer, Brown & Wills, 225 St. Patrick street. Architect, J. W. Carmichael, Bell Telephone Building.

Toronto, Ont.

Contract for the galvanized iron and roofing on store building for the Wm. Davies Company, Yonge and Bloor streets, has been awarded to A. B. Ormsby, Limited.

Welland, Ont.

P. S. Peacock has been awarded the contract for the construction of the Chipman-Holton factory.

Power Plants, Electricity and Telephones

Belleville, Ont.

The Seymour Electric & Power Company are undertaking the construction of two power lines to Belleville, one from Camp-

bellford and the other from another point on the Trent river.

Calgary, Alta.

The street railway extension by-law for \$484,000 has been given the required readings by the council, also the sub-way for \$40,000. City Engineer Child, in his report on the development of 3,500 h.p., estimates the cost at \$800,000, the cost per h.p. being \$25.

Fernie, B.C.

See "Waterworks."

Guelph, Ont.

September 26th is the date set for the voting of the People's Railway by-law for purchase of stock, etc.

Montreal, Que.

Tenders for street lighting and power for ten years, addressed to Board of Commissioners, will be received until September 12th. L. N. Senecal, secretary.

Prince Rupert, B.C.

In the report on the installation of an electric light plant, the total cost is placed at \$8,983. The following items are included: Generator, 60 k.w., with exciter switchboard, \$2,000; new poles, \$417; engineering and erection, \$1,000; 64,118 feet of No. 4 x No. 6 wire, \$2,088; pole and cross arms, transformers, etc., \$1,478; engineering and erection, \$2,000. Proposals for gas producer plant to operate a 75 k.w. a.c. generator were given. Cost, \$11,840. The proposition for the installation of a steam plant at the foot of McBride street of sufficient capacity to provide 5,000 16 c.p. lamps for section 1, of which the cost would be \$30,000, was also considered.

It is stated that new equipment for the new municipal telephone system will be required.

St. Catharines, Ont.

The promoters of the Niagara Falls, Welland and Dunnville Electric Railway will have Roberts & Abbott, engineering firm of Cleveland, make the report on their proposed scheme.

Toronto, Ont.

In the report on the underground railway system of tubes, the experts, Messrs. Jacob & Davies, give as the approximate cost, \$10,000,000.

Waneta, B.C.

The application of the Pacific Exploitation Company for permission to erect a large electric power plant on the Pend Oreille river near here has been granted and plans for the plant with a daily capacity of 25,000 horse power have been forwarded for consideration by the lieutenant-governor. The president of the new company is Mr. H. G. Hall, of Nelson; J. W. Falls is manager, and A. Y. Lorch, secretary. The promoters expect to furnish electric energy to the Pend Oreille valley, the Sheep Creek and Ymir districts, and to the Orient, Chewelah and Metlaine districts on the other side of the boundary. Rumors are also in circulation that the C. P. R. is interested in the project, and that the power will be used for the electrification of part of its transportation system. W. B. Pool, of Nelson, is interested.

AWARDED.

New Westminster, B.C.

The Canadian British Insulated Company of Montreal, Lawford Grant, managing director, have received a contract for 40 miles of street railway equipment from the B. C. E. R.

Miscellaneous

Montreal, Que.

Recent building permits include: W. N. Boivin, 335 St. Lawrence Boulevard, house containing three dwellings, \$3,500; H. Monteau, 479 Aylwin street, house containing five dwellings, \$5,000; B. Boyte, 1881 Boyer street, house containing three dwellings, \$3,000; Paterson, Wilson & Company, Board of Trade Building, a one-story building on Casgrain street, \$13,000; F. Aubin, 2883 Esplanade avenue, house containing two dwellings, \$3,000; Joseph Thiébaux, 1 Stadacona Lane, houses containing four dwellings, \$4,080; H. Papi-neau, 880 Mount Royal avenue east, four houses containing eight dwellings on Papi-neau avenue, \$9,000; P. Blain, 99 Rose de Lima street, house containing four dwellings on Notre Dame street west, \$5,000; C. P. R. Company, Mile End, a station building, St. Lawrence Boulevard and C. P. R. tracks, \$37,000; J. D. Langevin, Fairmount and Querbes avenues, three houses, \$32,000; F. Therrien, 373 Dorion street, three houses containing nine dwellings, \$8,000; Corporation des Syndics St. Paul, church building on Church avenue, Cote St. Paul, \$36,275; B. Depatie, 2077 St. Urban street, house containing four dwellings on Waverley street, \$3,500; O. Cnagnon, 1243a Des Erables street, house containing three dwellings, on Messier street, \$3,000; Jacob Shugar, 37 St. Charles Borromeo street, house containing two dwellings, stable and shed, on St. Urbain street, \$8,300; Villieray Catholic School Commissioners, 2760 Labelle street, a three-story school building Rosaire and Boyer streets, \$35,000; Alaska Feather & Down Company, St. Antoine street, a two-story factory on St. Ambroise street, \$30,000; Wire & Cable Company, Guy street, a shed building on Guy street, \$4,000; Sisters of Providence, Fullum and St. Catherine streets, alterations to property on DeMontigny streets east, \$4,225; H. Beaudry, St. Denis and Craig streets, additions to stable at 275 St. Lawrence Boulevard, \$6,900; Boxer Estate, 179 St. James street, alterations to property 132-134 St. James street, \$30,000.

Ottawa, Ont.

Tenders addressed to A. Johnston, deputy minister of Marine and Fisheries, will be received until October 31st for the construction of a twin screw steel lighthouse and buoy steamer for the Pacific coast, etc.

It is stated that the plans for the cruisers for the Canadian navy will not be sent out to Canada as was first proposed. It would be necessary to have experts accompany them and as the tenders will be chiefly by British firms, it is thought unnecessary. Any Canadians firms which would tender would do so in conjunction with British firms.

Pont Rielle, Que.

Tenders are being called by the Public Works Department until September 19th, 1910, for the construction of ice pier in River Quareau. R. C. Desrochers, secretary.

Quebec, Que.

Within the next two or three months the National Transcontinental Commissioners will invite tenders for the construction of car ferries to carry traffic across the St. Lawrence river until the Quebec bridge is built. It is expected that the new ferries will have a capacity of 30 freight cars.

Toronto, Ont.

Recent building permits include: George E. Case, 2 detached 2 sty. and attic brick
(Continued on page 28)

Tenders and For Sale Department

Debentures for Sale

Sealed tenders will be received up till noon, WEDNESDAY, SEPTEMBER 14TH, 1910, for the purchase of \$7,500.00 High School Debentures of the Town of Oshawa. Dated August 3rd, 1910, bearing interest at 4½ per cent. per annum and payable at the office of the Treasurer, Oshawa, in 30 equal annual payments of \$460.45 of principal and interest. Accrued interest to be paid by the purchaser.

The highest or any tender not necessarily accepted.

THOS. MORRIS,
Town Clerk.

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Tenders

Toronto General Hospital College Street

Tenders will be received by the undersigned up till noon,

Wednesday September 7th, 1910

for all the various trades required in the erection and completion of the Pathological Building.

Plans and specifications and all other information may be obtained at the office of the architects.

The lowest or any tender not necessarily accepted.

DARLING & PEARSON,
2 Leader Lane, Toronto.

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City of Regina

Sidewalk Construction

Sealed tenders, addressed to the undersigned City Clerk and endorsed on envelopes "Tenders for Sidewalk Construction," will be received up to 12 o'clock noon, THURSDAY, SEPTEMBER 8TH, 1910, for approximately 140,000 square feet of Concrete Sidewalk.

Particulars may be had upon application to the City Engineer.

A marked cheque for \$1,000 must accompany each tender. The cheques of unsuccessful tenderers will be returned.

The lowest or any tender not necessarily accepted.

L. A. THORNTON,
City Engineer.

A. E. CHIVERS,
City Clerk.

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To Contractors

The Reeve and Council of the Township of Morris, County of Huron, are asking for tenders for the construction of four large municipal drains.

Plans, profiles, specifications and estimates may be seen at the clerk's residence.

The tenders will be opened at the Council Chamber, Morris, on MONDAY, THE NINETEENTH DAY OF SEPTEMBER, 1910, at 2 o'clock p.m.

A. MacEWEN,
Clerk.

Bluevale, August 23rd, 1910.

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Department of Railways and Canals

QUEBEC BRIDGE

Tenders for Superstructure

Notice to Contractors

Extension of Time for Receiving Tenders

The time for receiving tenders for the superstructure for the Quebec Bridge advertised to be received up to the 1ST OF SEPTEMBER, 1910, is hereby extended for one month, viz.: up to the first of October, 1910.

By Order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 9th August, 1910.

Newspapers inserting this advertisement without authority from the Department will not be paid for it.

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To Contractors

Sealed tenders addressed to H. F. McNaughten, Secretary Public Works Department, Parliament Buildings, Toronto, will be received at this department up to noon on THURSDAY, SEPTEMBER 8TH, 1910, for the

Plaster Work

in connection with the reconstruction of the west wing of the Parliament Buildings. Plans and specifications can be seen at the office of Mr. E. J. Lennox, architect, 164 Bay Street, and at this department. An accepted bank cheque, payable to the order of the Minister of Public Works, for 5 per cent. of the amount of the tender and the bonafide signatures and addresses of two sureties, or the name of a guarantee company approved by this department prepared to give a bond for the due fulfilment of the contract, must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance. The department will not be bound to accept the lowest or any tender.

J. O. REAUME,

Minister of Public Works, Ontario.
Department of Public Works, Ontario,
Toronto, 27th August, 1910.

Newspapers publishing this advertisement without authority will not be paid for it.

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Assignees Sale of Cement Plant

The Assignee of the Grey and Bruce Portland Cement Company of Shallow Lake, Limited, will offer for sale by public auction at the Seldon House, Owen Sound, on the 15TH DAY OF SEPTEMBER, 1910, at 2 o'clock p.m., all the lands, plant, machinery and chattels of the said company. For further particulars apply to A. D. Creasor, Owen Sound, Solicitor for Assignee. 35

City of Regina

Pavement Construction

Sealed tenders, addressed to the undersigned City Clerk and endorsed on envelopes, "Tenders for Pavements," will be received up to 12 o'clock noon, THURSDAY, SEPTEMBER 8TH, 1910, for approximately 33,000 square yards Pavement and approximately 19,000 lineal feet Curb and Gutter, and 3,000 lineal feet of Curb.

Particulars may be had upon application to the City Engineer.

A marked cheque for \$6,000 must accompany each tender. The cheques of unsuccessful tenderers will be returned. The lowest or any tender not necessarily accepted.

L. A. THORNTON,
City Engineer.

A. E. CHIVERS,
City Clerk.

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Positions Vacant

Advertisements under this heading two cents a word per insertion. B x No. ten cents extra

SALESMAN WANTED—To sell insulating varnishes, either alone or as a side line. Must have good connection with electrical trade. Write Box 129 "Contract Record," Toronto, Ont. 35

Miscellaneous

Advertisements under this heading two cents a word per insertion.

CONTRACTOR'S OUTFIT FOR SALE—Six Wheeler, No. 3, concrete line plant, nearly new. Owner going into another line of business. Joseph Patterson, Box 114, St. Marys, Ontario. 35

STEAM HOIST FOR SALE—Fifteen H.P. Steam Hoist, two cylinder, single reversible drum, manufactured by Georgian Bay Engine Works, complete with wire cable. Will accept reasonable offer for immediate sale. STINSON-REEB BUILDERS' SUPPLY COMPANY, Limited, 904 Eastern Townships Bank Building, Montreal, P.Q. 36

It is stated that Jude E. Boudreau, planing mill, Rogersville, N.B., has assigned.

Verret & Desautels, contractors, Sherbrooke, Que., it is reported, have dissolved.

The MacGregor-Gourlay Company, Limited, Galt, Ont., have sold out to Canada Machinery Corporation, Galt, Ont.

Hespeler Machinery Company, Limited Hespeler, Ont., have sold out to the Canada Machinery Corporation, Galt, Ont.

It is reported that inspectors have been appointed to wind up the estate of the F. C. Hunt Plumbing Company, London, Ont.

Miscellaneous

(Continued from page 27)

dwellings, Indian road, \$8,000; Wm. Hewitt, 2 detached 2-sty. and attic brick dwellings, Algonquin and Indian road, \$7,500; J. Ellis, pair 2-sty. semi-detached brick dwellings, Booth avenue, \$3,800; Hayward & Whitehorn, pair 2-sty. semi-detached brick dwellings, Lansdowne avenue, \$4,000; Campbell & Co., pair 2-sty. brick dwellings, Yarmouth road, \$4,500; G. A. McTaggart, 2-sty. brick store and dwelling, Roncesvalles and Pearson avenue, \$3,900; W. W. Stephen, 1½-sty. brick dwelling, near Kingston road, \$4,000; Charles Parker, 2 pair 2 detached brick dwellings, corner Davenport road and North Brunswick, \$7,200; Consumers' Gas Co., 2-sty. brick washing machine house, Berkeley street, \$10,000; Jas. Hewlett, 2-sty. brick dwelling, Balmoral avenue, \$3,400; Geo. J. Bryan, 2½-sty. brick dwelling, Russell Hill road, \$7,000; W. H. Wright, 2-sty. brick dwelling and dairy, Symington avenue, \$2,800; St. Mary's R. C. Parish, 2-sty. brick addition to club house, Bathurst street, \$40,000; Charlie Ling, 2 attached 2-sty. brick dwellings, 237, 239 and 241 St. Helens avenue, \$6,500; J. Singer, 1-sty. brick theatre, near Brock avenue, \$3,500; Geo. Heintzman, 1-sty. brick addition to dwelling, Ellis and Connery, \$4,000; Galena Signal Oil Co., 2-sty. brick co-operation and storage, Royce avenue, \$12,000; Geo. T. Robinson, 2-sty. brick building, Armstrong avenue, \$6,000; A. & A. Grand, pair 2-sty. and attic semi-detached brick dwellings, \$6,000; Ed. Corner, 2-sty. brick dwelling, 698 Manning avenue, \$4,000; J. L. Owen, 2 detached 2½-sty. brick dwelling, 323 Perth avenue, \$4,000; American Abell Co., 1-sty. brick addition to factory, corner Abell and C. P. R. tracks, \$5,500; W. C. Santo, 2½-sty. brick dwelling, on Rowanwood avenue, \$4,000; D. J. Moore, 2-sty. brick store and dwelling, Rhodes and Queen, \$4,000; F. G. McBrien, 1-sty. and attic brick dwelling, near Castle Frank avenue, \$7,000; J. F. Jefferson, 2½-sty. brick dwelling, near Argyle street, \$3,000; Rector & Church Warden of St. Bartholomew, church, corner Wilton avenue and Blair, \$10,000; Geo. Marshall, pair 2-sty. semi-detached, brick dwelling, Berkeley and Queen, \$4,500; Wm. H. Moore, pair 2½-sty. semi-detached brick stores and dwellings, near Lee avenue, \$5,000; John McKnight, 2-sty. and attic brick dwelling, 39 Walmer road, \$9,000; Dr. L. F. Millar, 2-sty. and attic brick dwelling, near Whitney avenue, \$8,000; W. R. Johnston, Jr., 1-sty. brick living room, corner Elm avenue and Nanton Crescent, \$4,300; V. K. Bryce, 2½-sty. brick dwelling, near Heath street, \$5,000; McFarlane Ladder Works, 2-sty. galvanized iron work shop, River street, \$3,000; Christie Brown, Limited, 1-sty. brick shipping room, George street, \$3,750; The Modern Construction Co., Ltd., 2 pair semi-detached brick dwellings, Montclair street, \$9,000.

Winnipeg, Man.

Five tenders for well drilling machinery were received by the board and referred to the city engineer for consideration. Two out of the five will probably not be considered at all as they do not conform to the regulations specified by the city.

Recent building permits include: G. Edgett, Wilton avenue, \$5,000; E. W. Perry, house, Atlantic, \$4,000; A. W. Trickey, house, Lenore, \$3,300; three stores and warehouse for the D. R. Dingwall Company, Albert street, \$35,000; Westminster Church, northwest corner Maryland and Buell, \$22,000; warehouse for the David

son Manufacturing Company, May street, opposite Heaton avenue, \$17,000; dwelling for J. Milovitch, Mulvey avenue, \$24,000; dwelling on Lilac, between Mulvey and Fleet, \$9,000; stores and apartments for F. Cohen, King street, \$15,000; dwelling for Mrs. S. C. E. Crawford, Roslyn road, \$25,000; J. C. McNabb, terrace, Bannerman, \$4,000; W. McIntosh, dwelling, Home avenue, \$4,200; E. H. Perry, dwelling, Atlantic, \$4,000; J. Edgett, dwelling, Harvard, south side, \$5,500; St. John's College, dwelling, Anderson, between Main and Aikins, \$5,000; A. W. Trickey, dwelling, Lenore, east side, \$3,300; J. T. Watson, dwellings, Burnell, east side; Arnold, south side, between Pembina and Nassau; Hetherington, west side, between Nassau and John, \$5,400; West End Realty Company, dwelling, Ruby, \$4,000; T. K. Moore, dwelling, Home, east side, between Sargent and Ellice, \$4,000; A. McCance, dwelling, Horne, west side, \$2,500; C. M. Bull, dwelling, Oakwood, west side, \$5,000; W. J. Sullivan, dwelling, west side, Hespeler, \$2,500; J. McDonald, dwelling, Wolseley, \$5,000; H. Hirst, dwelling, Redwood, \$4,500; M. A. Cameron, dwelling, Home, west side, \$4,500; L. R. MacRae, dwelling, on Lansdowne, \$2,700; H. J. Morgan, dwelling, west side, Ashburn, \$2,500, and dwelling, east side, Ashburn, between Classic and Wolever, \$2,500; C. W. Fanthorpe, dwelling, north side, Alexander, on Worth, \$2,600.

New Companies

The Steelton Brick & Tile Company Limited, Sault Ste. Marie, Ont., capital \$100,000. Incorporators, Arthur W. Holmsted and James L. Ross, barristers-at-law Toronto, Ont.

The South Shore Lumber Company Montreal, Que., capital \$20,000. Incorporators, Harold E. Walker, advocate, and J. R. Walker, manufacturer, both of Westmount, Que.

Sheet Metal Products Company of Canada, Limited, Toronto, Ont., capital \$5,000. Incorporators: Robt. H. Paterson, and Thomas E. Moberly, barristers-at-law, and Herbert H. Loosemore, banker, all of Toronto.

Russell Shale Bricks, Limited, Ottawa, Ont., capital \$300,000. Incorporators: Angus W. Fraser and James G. Gibson, barristers-at-law, Ottawa.

Dominion Mosa-Tile Company, Limited, Montreal, Que., capital \$100,000. Incorporators: Joseph G. Dupont, physician, Montreal, and Theodore Daoust, architect, Montreal.

National Paving and Contracting Company, Winnipeg, Man., capital \$100,000. Incorporators, John A. Thompson, lumberman, and Robert W. Hugg, barrister-at-law, both of Winnipeg.

International Peat Engineering Company, Limited, Windsor, Ont., capital \$20,000. Incorporators, Gustav E. Carlsson, peat engineer, and Leo B. Lincoln, manager, both of Farnham, Que.

Power Economies, Limited, Montreal, Que., capital \$20,000. Incorporators: Richard T. Heneker, K.C., and Alexander H. Duff, advocate, both of Montreal, Que.

McLaughlin Paint Company, Limited, Ottawa, Ont., capital \$15,000. Incorporators, John A. Craig, druggist, and Frederick H. Honeywell, barrister-at-law, Ottawa, Ont.

Charles Gate & Sons Company, Limited, Winnipeg, Man., capital \$50,000; incorporated to carry on the business of general contractors and builders. Incorporators:

Charles E. Gate and Henry Gate, plumbers, and steamfitters, Winnipeg, Man.

St. Lawrence Bridge Company, Limited, Montreal, Que., capital \$500,000. Incorporators, Robert C. McMichael and Rennie O. McMurty, advocates, Montreal, Que.

National Motor Company of Canada, Limited, Montreal, Que., capital \$75,000; incorporated as engineers, steam, electrical and other engine manufacturers. Incorporators: Louis A. David, advocate, and J. E. Charbonneau, notary public, both of Montreal, Que.

Le Credit Hypothecaire Canadien, in corpore, Montreal, Que., capital \$1,000,000, incorporated to carry on the business of builders, contractors and furnishers of material. Incorporators, Messrs. T. Bin-fret, advocate, and Victor E. Beique, student-at-law, both of Montreal.

Canadian Power & Paper Company, Limited, Toronto, Ont., capital \$10,000,000; Incorporators, Frank H. Phippen, K.C., and Gerard Ruel, barrister-at-law, both of Toronto.

The Eastern Townships Lumber Company, Limited, Sherbrooke, Que., capital \$50,000. Incorporators, Edward C. Goodhue, lumber dealer, and Harold E. Goodhue, lumbermen, both of Sherbrooke.

The Skeena Timber Company, Limited, Toronto, Ont., capital \$1,000,000. Incorporators Adam W. Ballantyne and Charles F. Ritchie, barrister-at-law, Toronto.

The Balmoral Brick Company, Limited, Winnipeg, Man., capital \$40,000. Incorporators, John B. McLean, salesman, Winnipeg, Man., and John H. McClure, brick manufacturer, Balmoral, Man.

Howick Telephone Company, Limited, Gorrie, Ont., capital \$7,000. Incorporators, Richard Carson, Chas. L. Andrews and Robert H. Stephens, all of Gorrie, Ont.

Alnwick Rural Telephone Company, Limited, Roseneath, Ont., capital \$3,790. Incorporators, Edgar W. Hayden and Fredrick A. Aylesworth, physicians, Alnwick, Ont.

Stone Lumber Company, Limited, Sault Ste. Marie, Ont., capital \$100,000. Incorporators, John A. McPhail, barrister at law, and Samuel G. Stone, both of Sault Ste. Marie, Ont.

Claremont & Ashburn Telephone Company, Limited, Claremont, Ont., capital \$10,000. Incorporators, Robert W. Ward and Ralph Brodie, physician, Pickering township, Ont.

It is stated that Woods, Limited, Winnipeg, Man., manufacturers of lumbermen's supplies, etc., have sold their Winnipeg branch to Finnie & Murray.

Building permits issued at London, Ont. during July, 1910, represented a value of \$37,700, as compared with \$17,808 for the corresponding month of 1909. For the first seven months of 1910 and 1909 the totals were respectively \$490,166 and \$631,597.

The B. C. Gazette gives notice of the incorporation of the following companies: Bettischen & Higgins Company, Limited, capital \$100,000, incorporated as architects, timber merchants, manufacturers of iron and brass work, etc.; British Empire Timber Company, Limited, capital \$1,000,000; Canadian Boxing Company, capital \$20,000, incorporated to carry on a general contracting and construction business; Otis Fensom Elevator Company, Limited, capital \$400,000, incorporated to erect elevators and hoisting machinery; Empire Lumber Company, capital \$5,000,000; Public Works Engineering Company, capital \$15,000.

Montreal's Improvement Schemes

The Metropolitan Parks Commission of Montreal at its meeting last week discussed several important matters, including the appropriation of large blocks of land throughout the city for playgrounds and parks and the adoption of a general plan of procedure by the Commission. The latter suggestion was brought forward by Mr. D. V. Middleburg, architect, who favored the foundation of zoological and palm gardens, to be completed in 25 years. A boulevard scheme was propounded by Mr. George Mathys, ex-Belgian vice-consul, who touched on the restriction lines question. This brought from Mr. Lighthall the declaration that he was surprised at Montreal's long silence on this subject. The city should at once pass an ordinance prohibiting building over a certain depth from the sidewalk. The Commission went into private session without arriving at any decisions.

Contractors Busy on Canadian Northern

The contractors on the Canadian Northern Railroad extension have begun active operations near Smithville, Minn.

The right of way is being cleared, a large crew of men having been set to work. Several of the engineers employed by the road have taken residences at Smithville, and from now on it is expected that the work will be rushed.

The contract for the road between Duluth and Virginia has been sublet in sections of from five to ten miles each. Foley, Welsh & Stewart are the general contractors, and E. M. Olsen & Company, of Duluth, have been given the contract for the erection of section houses along the way.

H. T. Hazen, chief engineer of the road, says that the preliminary work is progressing nicely. Mr. Hazen says the line will cost about \$35,000 a mile. There will be 500 feet of rock tunnel at Short Line Park, according to the chief engineer.

No trouble is experienced by the line in getting engineers and laborers. Several lines have been laying off their help, and it comes at a time to be of help to the Canadian Northern.

Missisquoi Marble Company

At a meeting of the Missisquoi Marble Company, of Phillipsburg, Que., Mr. J. W. McConnell, of Montreal, and Mr. Geo. R. Crowe, of Winnipeg, were elected directors.

Rapid progress is being made by the Missisquoi Marble Company in the development of their property. The new addition to the plant which has been under construction for some months, will treble the company's production capacity.

The directors in attendance at the meeting were: Harry Richardson, Kingston, Ont., president; Jas. Playfair, Midland, Ont., and Robert J. Dale, Wm. Mann, S. H. Ewing, W. J. Morrice, Henry Timmis and J. W. McConnell, Montreal.

C. N. Bell, secretary of the Winnipeg Board of Trade, who returned last week from a visit to the Pacific coast, states that business conditions throughout the whole of western Canada are excellent.

The fiscal year of Allis-Chalmers ended June 30th, was a considerable improvement over 1909. It is understood that the net balance after allowing for about \$1,700,000 of interest and depreciation was between \$400,000 and \$500,000.

Officials of the Canadian Pacific Railway have concluded negotiations for the purchase of nearly a mile of river front property at Kamloops, B.C., on the North Thompson river, at a cost of approximately \$100,000. On this property the main running tracks of its line will be constructed, and also yard and terminal facilities. The total cost of this new construction work is set at approximately \$200,000.

Vancouver and the Coast

The machine shops of Vancouver and New Westminster were visited lately by agitators from San Francisco unions, with the result that the men went on strike for shorter hours and higher wages. In this connection it may be well to quote the words of a leading paper of the Golden Gateway city: "San Francisco is suffering from her subservience to labor. To-day it costs nearly 40 per cent. more to manufacture goods here than in any eastern city. To-day there are but one or a few successful local manufacturing plants where a decade ago there were almost hundreds."

F. A. McDiarmid, the new city solicitor of Victoria, has warned the city council that debentures cannot be issued for any longer period than the life of the work to be covered by said debentures. This is contrary to the practice in the past, and aldermen are greatly disturbed as a result.

Superintendent Steve Madison, Secretary Boulton and Engineer Burwell, of the Vancouver Waterworks Department, were delegates to the recent irrigation convention at Kamloops.

The expert employed by the Water Commissioners of Victoria to report upon a new source of water supply is opposed to the Sooke lake proposition. He estimates that it will cost \$30 a foot to bore a tunnel for a pipe line through the Sooke hills, and this is considered prohibitive.

The city of New Westminster is forging ahead at a rapid rate. At the present time the public works commenced or authorized aggregate the sum of one million dollars.

Vancouver is easily a lap or two in advance of most cities in the application of auto equipment to the city service. Its fire department autos have been the envy of visiting aldermen; the auto police patrol and ambulances have demonstrated their worth, and now the city garbage is collected and delivered at the city incinerator in two auto scavenging wagons procured in England. Their capacity is double that of the ordinary wagon, and the cost of maintenance and operation is much less than the horse-drawn equipment. Auto watering carts will follow.

Vancouver is to have a modern dry dock which will cost about \$1,250,000 to construct. The Dominion Government has agreed to bonus the new dock to the extent of 3½ per cent. on its cost for 25 years. The lifting capacity of the structure will be 15,000 tons. The operating company will also have a ship repair and construction works and car shops, which will cost about \$500,000. This department will not share in the bonus.

The authorities of Victoria are endeavoring to arrive at the actual cost of producing power for street lighting purposes. There is a strong impression that when the B. C. Electric Railway plant at Jordan river is completed it will be possible to purchase from the company 1,000 h.p. daily at about one-half the cost at which the city can produce its own power.

What is claimed to be the biggest gypsum deposit in the world has been discovered near Kamloops. A Vancouver company is likely to undertake the development work, in connection with another big scheme for the irrigation of a large area of land in the vicinity.

The city council of Victoria is experimenting with calcium chloride as a layer of dust. Ten tons will be used on the leading thoroughfares.

Vancouver spent over \$70,000 in the construction of new sewers during the month of June. The whole appropriation for sewers will at the present rate be expended in about three months.

The death occurred last week of Mr. Samuel Adams, one of Ottawa's best known building contractors. The late Mr. Adams was born in Armagh county, Ireland, in 1849.

Contract Record

ESTABLISHED 1886

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Municipal Progress, Advance Information

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No. 35

A Superabundance of Red Tape

The case is reported of a contractor who, between June 1st and the third week in August, executed \$11,000 worth of work for the city of Toronto and was only paid \$300 on account. From inquiries made we can only conclude that this is a somewhat extraordinary experience and that instances of this kind are not common in contracting circles. At the same time there seems to be a greater supply of red tape in civic quarters than is demanded by common sense requirements. The average contractor is no modern Croesus, and aldermen and city councillors should know that the contractor's greatest problem as a rule is the financial end of the work. The contractor has to meet big bills for labor and material and is entitled to the closest co-operation in regard to prompt payment. It seems to be a somewhat unreasonable precaution to demand that the entire work be completed and approved before the deposit is returned or any payment made. In many cases it would be more equitable to allow payment for a proportion of the work executed or at least for the material put into the job. Why a paving contractor, for instance, should not have a cheque on account upon the delivery of, say, 50,000 approved brick is hard to understand. Such material is always worth its price and the city would be on the right side in paying for it. Probably a little discretion would have to be used in such matters, but certainly the point is a good one. It is all very well for our city councillors to insist upon every precautionary measure under the sun, and so earn a reputation for shrewdness and business acumen among their too often misguided constituents, but it is another matter to reflect that too

much stringency of this kind means restricted competition. Ask many a good firm why it is not bidding on municipal and public works, and what do you hear: "Too much red tape."

Failures of Roof Tanks

Failures of roof tanks, which have been altogether too numerous during the past year, have brought out a great deal of discussion concerning the strength of supporting walls and columns. It is to be hoped that the agitation will result in more careful designs for new tank supports and in examinations of existing construction with a view of strengthening that found to be weak, says the "Engineering Record." There is one point relating to designs of tank supports that seems to have received no consideration in the discussion and it is of such importance that some attention should be given it. Roof tanks are frequently set on two I beams and in the design of these beams the effect of insufficient lateral support for the upper flange appears to be commonly overlooked. For example, if the beams have a span of 35 feet, a top flange width of 7 inches and no transverse bracing is provided, the ratio between the unsupported length and the width of the compression flange is 60, which, according to best practice, would require an allowable unit stress of only one-half that permissible with flanges properly braced. In other words, if the section modulus is determined by an average unit stress of 16,000 pounds per square inch, which is frequently employed, the maximum fibre stress in the compression flange will be very much greater. In fact, the maximum unit stress may be so great as to be dangerous; especially so since wind pressure causes additional forces to act on the beam in a direction in which it is weakest. Obviously, the beams should be connected by lateral bracing so that the ratio of unsupported length to width of flange will not exceed 20

Irregularities in Municipal Circles

Irregularities, and rumors of such, are heard in all municipal circles from time to time, but the palm for this sort of thing must be awarded to Montreal. It was discovered in that city last week that Nolan street, apparently the property of the C.P.R., had been macadamized at a cost of \$20,000 by the authority of someone unknown. The following extract is word for word from the Montreal press:

"The controllers have questioned Mr. Barlow, city surveyor, and he has informed them that the street does not belong to the city. Who had given orders to have it paved he could not say. Certainly he had not. He had not even known the macadam was laid.

"Mr. Howard, assistant surveyor, was also questioned, but was unable to throw any light on the strange circumstance."

The expenditure of \$20,000 upon a doubtful job, by a nameless firm, upon unknown authority,—a "strange circumstance." Ye gods!

Science of Economy in Municipal Service

Amount of Improvement made in Recent Years not Altogether Satisfactory—Little Advance in Water Purification and other Departments

Although scientific study of the purification of water was some years ago considered to be in advance of that of sewage, there appears to have been a failure during a period of several years to introduce any new methods or any improvements except some minor ones in construction details of filters. It was for some years held that slow sand filters were the only practical means of purifying water for potable purposes. Several years ago it was demonstrated that rapid sand filters were of great value in removing suspended matter, and also that a high degree of bacterial purification could be obtained by them. Further advance lagged, however, except for the introduction of preliminary treatment by means of pre-filters and sedimentation—an important improvement in the art.

Within the last two or three years there have been developed to a physically and commercially practical point and recognized as scientifically sound several methods of treating water for the destruction of bacteria and other vegetable and animal growths, such as the use of copper sulphate of algæ, and bleaching powder and ozone for bacteria. In spite of the apparent failure of ozone treatment at Lindsay, this failure—if such it is—is probably one of mechanical details only, and there is now no dispute of the fact that ozone is theoretically one of the best means of destroying bacteria, although much yet remains to be done in the way of perfecting mechanical details and decreasing cost.

When slow sand filtration was the only recognized method of purifying water for a potable supply the only question to be settled was whether there was sufficient necessity for purification to warrant the expense of such filters, the difference in structural features between two plants being frequently such as to be noticed only by the expert, in many cases determined by the preference of the engineer rather than any scientific reasons therefor. Now, however, the matter is much more complicated, and not only efficiency, but economy, demand that the design of a purification plant be placed in the hands of one who is absolutely up-to-date in his knowledge of what has been found and proven concerning the various methods and devices of water purification.

How many and what of the several methods available it is desirable to adopt will depend to a very great extent upon the character of the water, and to a perhaps less extent upon the uses to which it is to be put. Suspended matter may be removed by plain sedimentation, coagulation, or roughing filters. Finer suspended matter not susceptible to economical removal by these methods can be removed by either mechanical or slow sand filters. Bacteria can be destroyed by hypochlorites, ozone, etc., or by sand filters; the water can be softened by plants adapted to that purpose; iron can be removed by oxidation and filtration, and in general any objectionable animal, vegetable or mineral substances can be removed or neutralized by physical, chemical or biological treatment.

While double or triple treatment of sewage and of water is now practically recognized as being in many cases not only the most effective, but the most economical also, apparently little has been done toward introducing multiple treatment in street cleaning, if we except the practice common in some cities of going over the

business streets with a horse-drawn sweeper during the night and keeping the white wings busy throughout the day over much of the same area. Inventors are busy, however, with all sorts of mechanical devices for removing street dust and dirt. The horse-sweeper is objected to because it does not clean the dirt out of the joints between blocks, does not get down into holes and depressions in the pavement, etc. Pneumatic or suction machines which draw up into bags or other receptacles the dirt swept from the pavement would seem to be almost ideal, but they do not handle wet or damp dirt successfully, and most of those so far constructed have been heavy to draw and expensive both to construct and operate. Flushing gives clean streets, but is seriously objected to by the sewer department in many cities because of the amount of dirt washed into sewers.

The manufacturer of each appliance very naturally argues that his machine is the best under all circumstances. It suggests itself to us that here, also, multiple treatment may yet prove to be the most economical. If flushing machines do wash too much dirt into the sewers, let us confine their services to that in which they particularly excel—the removing of slime and of dirt from joints and depressions—and remove dry dirt and that upon the general surface of the pavement by means of the ordinary horse brooms or pneumatic sweepers. As these machines are at present designed this would apparently mean double expense, but if it were understood that each was to be confined to the services above suggested we believe that the cost and speed of operation might both be improved, and it certainly seems probable that the efficiency would be. This is a suggestion of but one combination of several which should be possible with known appliances and methods, and with the demand for others and a scientific study of conditions we do not doubt that new and improved ones will be devised.—Municipal Journal and Engineer.

Failure of a Cast Iron Column Connection

The small five-storey commercial building at the corner of Park Place and West Broadway, New York, had iron or steel floor beams supported on the long street front by cast iron columns, of which two intermediate ones were cylindrical with diameters of about 10 inches, and those at the corners had rectangular cross sections. Recently the upper floors suddenly settled about 3 inches and the walls were badly cracked and sprung, but the building did not wholly collapse and no lives were lost. An examination was immediately made and the building was found to be unsafe and its removal was ordered.

It was at first believed that the trouble might be due to the settlement of the column foundations, which had perhaps been undermined by leakage from pipe mains in the adjacent streets. When the brickwork and superstructure were removed the foundations and the lower sections of the column were found intact and not displaced, and the wall girders were in inclined positions, with the ends at the corners of the building at the original elevation and the opposite ends, over the intermediate columns, depressed about 15 inches, but still seated on their cast iron connections.

The connections consisted of square cast iron bearing

plates about 3 inches thick, which received the lower flanges of the I-beams and were seated on the upper surface of hollow bottomless cubical cast iron boxes about 15 inches high, with metal about 1 inch thick. These boxes had telescoped down over the tops of the two intermediate cylindrical wall columns, the latter bearing against the under sides of the tops of the boxes. One vertical side of each box had broken off, showing the apparently uninjured column top inside the box. Small pieces of lugs remained attached to single small bolts passing through each column a little below its upper end and were at first thought to have been connections transmitting the load from the box to the columns, but from their dimensions and position it was afterward concluded that this was not the case and that they might have served as connections for the framing of the store front or for transverse connections.

In the absence of any drawings or other data of the original constructions, and on account of the confusion and loss of some materials in the accident and subsequent wreckage, it is so far impossible to say positively what was the exact detail of connection between the top of the column and the superimposed hollow box, but the obvious and extremely probable construction was that of a cast iron bearing plate centered on the square flangeless top of the column and receiving on its upper surface the lower edges of the hollow box. Such a connection is entirely consonant with the details at the top of the box and with the fact that there is no evidence of any other connection, as would certainly have been the case had there been a steel or wrought iron bottom plate. In the latter case it is not likely that the plate would have suddenly failed after several years' service, and if it had failed it could not have disappeared, while the cast iron plates might fail at any time and might break into several pieces, all of which could easily be lost in the wreckage. It is thought, however, that when the lower sections of columns are removed small pieces of the cast iron plates may be found in their interior.

As West Broadway was considerably widened a few years ago and a number of the buildings had new fronts put in them, at this time it is quite possible that such was the case with this building and that in the reconstruction the original cast iron columns were found too short and were extended by the insertion of the hollow boxes between the first and second storeys, thus affording a cheap and convenient means of utilizing them.

A remarkable feature is that the cast iron columns themselves should have endured the impact of the upper part of the building falling several inches and should have arrested the movement of the floors and masonry after it had been fairly commenced. The escape from total collapse doubtless prevented a serious loss of life.

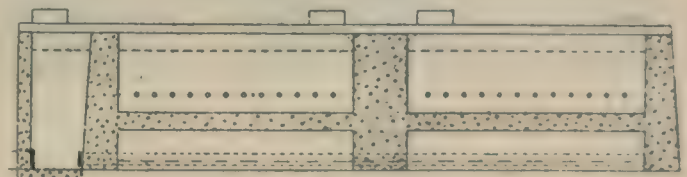
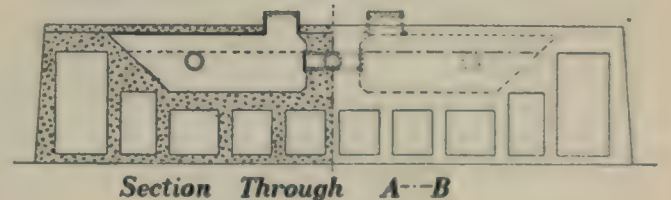
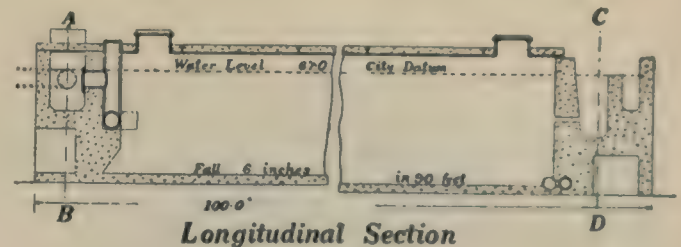
The square columns at the corners had full direct bearing and no failure occurred at them.—Engineering Record.

Two miles of concrete poles have been recently erected by the Auburn Mutual Light & Power Company as an experiment, more to determine the cost of erection and planting than anything else, for the service of poles of this character is practically assured. The poles range from 38 to 60 feet in length and are of octagonal shape reinforced with four rods. The cross trees are of galvanized metal. The 40-foot pole contains about 200 pounds of metal and four sacks of cement, and weigh from 2,800 to 3,000 pounds. The average cost of the pole ready to set was \$7.65 and the cost of setting amounted to \$3.30. These figures are somewhat lower than shown by the experience of other companies.

Septic Tanks in Ottawa

What is known as the south drainage system of Ottawa was constructed in 1909, although considerable remained to be done to the system during the present year. This system, in which are used reinforced concrete, brick and tile sewers, drains an area of 150 acres with an outlet into the Rideau river. As the provincial authorities would not allow untreated house sewage to be discharged into the river it was decided to provide septic tanks, and construction on these was begun Sept. 1, 1909.

Slow progress was made at first with the excavation, as water was found one foot below the surface of the ground, necessitating continuous pumping to allow the men to work. The tanks are 90 feet long, 14 feet wide and have an average depth of 7 feet, with a grit chamber at one end and an aerating weir and effluent channel at the other. The tanks were constructed entirely of concrete, the mixture being 1 cement, 8 of sand and 6 of stone. For the reinforcement of the roof standard 56-pound railroad rails were used as cross-beams, the in-



Sections of Ottawa Septic Tanks

intermediate spans being reinforced with expanded metal. The general construction of the tanks is shown in the accompanying sections.

Access to the tanks is obtained by six standard man-holes. As the sewers are on the combined system, a storm overflow is provided, 24-inch vitrified pipe being used, which extends to the Rideau river, at the bank of which it is continued by a 24-inch steel pipe which extends into the river for a distance of 120 feet and discharges through an outlet 12 feet below the surface of the water. The construction of the tanks was completed about the first of December.

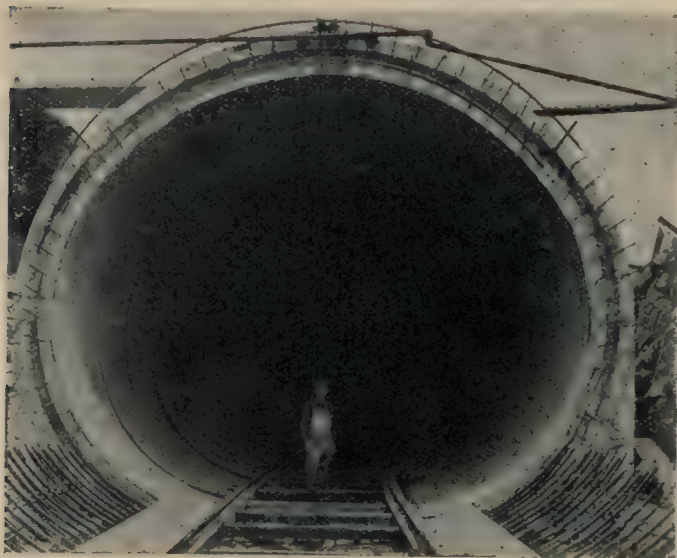
There is a scarcity of bricklayers at Brandon, Man. where it is reported that one employer has been offering 75 cents an hour for men. The supply of labor generally is far short of the demand.

An 18-foot Reinforced Concrete Conduit

The new 18-foot reinforced concrete conduit of the Ontario Power Company in Queen Victoria Park, at Niagara Falls, is of much interest as it is the first example of the application of reinforced concrete to pressure pipe construction of anything like this magnitude anywhere in the world. Although the conduit is completed and ready for service, it has still to be covered, by the re-filling of the trench in which it is laid. On the completion of this work the surface of the park will appear as usual, the conduit being entirely concealed.

The conduit, which has an effective internal diameter of 18 feet, is 6,300 feet long, connecting the company's headworks at Dufferin islands with its distributor just below Table Rock. Its walls have a thickness of 18 inches, and are composed of reinforced concrete, both longitudinal and circumferential bars being used. It is of oblate form, the flattening being more pronounced on the bottom than on the top, this form being used for both engineering and economic reasons. It rests throughout its length on a concrete foundation.

An interesting feature of the work is the fact that all the materials used have been of Canadian origin or manu-



The 18-foot Reinforced Concrete Conduit of the Ontario Power Company.

facture, the cement and the steel having been purchased from two of the power company's own customers, the Canadian Portland Cement Company and the Ontario Iron & Steel Company.

The primary purpose of this conduit, which is the second the company has constructed (the former being of steel), is in connection with the extensions which are now in progress in the company's generating station. It is connected, however, by by-passes, with the first conduit so that a portion of its power is immediately available through the apparatus already in operation.

Capacity of the Horse

Some interesting data relative to the working capacity of the horse is given in a comparison between the horse and the gas traction engine made in a paper read by Mr. L. W. Ellis at the annual meeting of the Gas and Gasoline Engine Association. Mr. Ellis says:

Endurance is the horse's weakest point. Ten hours a day is often assumed as his working period. Authorities claim that eight hours is better, or that six under a

heavier load will accomplish to same volume of work, with less tear and wear on the horse. The average farm horse cannot be depended upon for more than 13 to 15 miles of pull a day, nor more than four to six hours of work per day, as an average of even the busiest months.

Properly handled, working about six hours a day, well and carefully fed, a horse may have a working life of ten years of 1,000 hours each. The average farm horse will do well to develop 500 horse power hours per year or 5,000 in ten years.

About 20 per cent. of the horse's weight may be taken as his maximum sustained draft, and six to eight miles per hour his maximum sustained speed for anything more than an hour or so per day. The draft horse ordinarily gives the largest volume of work per day at about one-half his maximum load, and one-third his maximum speed.

One reason for the great flexibility of the horse is the fact that he works most economically at about 1 pound of draft for 10 pounds of weight, or from 50 to 20 per cent. of the rate he can exert in a pinch.

Cost of Sewer Construction by Day Labor

The cost of day labor work in the sewer division of the Boston street department is illustrated, in one of the reports of Messrs. Metcalf & Eddy to the Boston Finance Commission, by force account records which are compared with estimates of what the work might reasonably have cost had it been performed by contract. Portions of work in three separate districts were studied, and although the results show an increase of efficiency in 1908 over 1907 of about 25 per cent., the work done in 1908 cost about 36 per cent. more than the reasonable estimate of cost contained in the report. Messrs. Metcalf & Eddy conclude that the cost of the work done by the city by day labor, therefore, is from one-third to one-half greater than it would be under contract work.

One of the comparisons is for two pieces of work in the Dorchester district, one at Talbot avenue and the other at Oakland Brook. The Talbot avenue sewer included 1,458 feet of trench, 1,372 feet of structure; the depth of trench varied from 12 to 27 feet, and averaged 17.3 feet. There were in all 4,785 cubic yards earth excavation, 2,932 cubic yards rock excavation, 1,372 lineal feet of brick work, requiring 210,362 brick. The costs of this work as actually performed and the costs estimated by Messrs. Metcalf & Eddy are given in table 1

Table 1—Talbot avenue Sewer—Day labor and estimated contract costs.

Item	Cost per ft. of Trench.		Unit costs per cu. yd.	
	Actual	Estimated	Actual	Estimated
Excavation, earth	\$13.52	\$ 5.28	\$ 4.30	\$ 1.67
Excavation, rock	8.84	11.40	4.45	5.75
Carting away surplus ..	2.19	0.49	1.28	0.29
Brick work	5.48	4.73	21.50	18.50
Concrete	1.79	2.40	7.20	9.70
8-inch underdrain	0.43	0.88	0.42*	0.88*
Total	\$32.25	\$25.18		

*Per lineal foot.

The estimated cost given in table 1 includes 15 per cent. to cover contingencies and 15 per cent. profit. The actual cost of the job was \$46,352 and the estimated cost \$36,016; the excess being about 28 per cent.

During 1907 the same gang which was employed on the Talbot avenue work in 1908, built a conduit 8½ x 5½ feet on a concrete foundation. This job cost \$28,650 or \$43 per lineal foot, or about 45 per cent. more than Messrs. Metcalf & Eddy's estimate of \$29.50 per lineal foot. On the Talbot avenue sewer the report states that the excessive cost of earth excavation ex-

hibits the inefficiency of the labor forces due to lack of discipline, foresight, and business management on the part of those in charge.

In the South Boston district a sewer was built in First street during 1908, the trench being 19.3 feet deep and 7 feet wide. The cost per foot for 190 feet of this work on which force account was kept was \$41.29. For purposes of comparison Messrs. Metcalf & Eddy present the unit costs given in table 2.

Table 2.—First Street Sewer.

Item	Cost per cu. yd.	
	Actual	Estimated
Earth excavation	\$ 4.10	\$ 2.14
Concrete	11.73	11.20
Brick	28.85	21.00
Underdrain	0.18*	0.47*

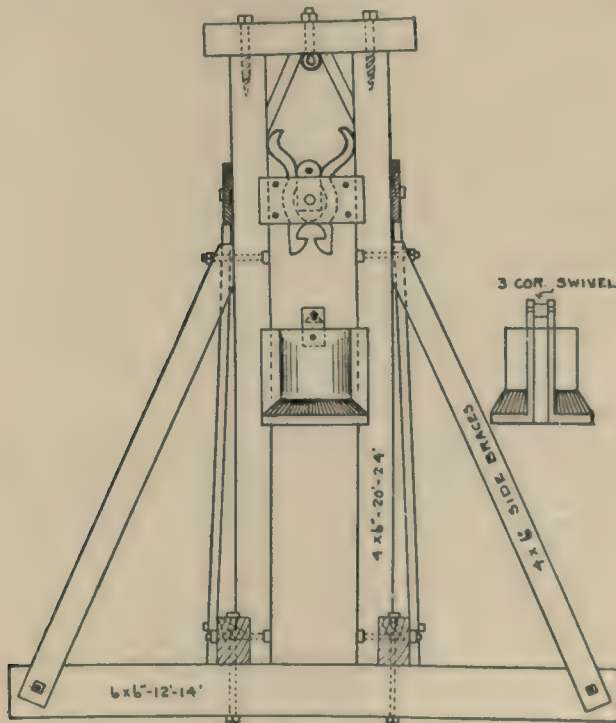
*Per linear foot.

In the West Roxbury district a 7-foot circular concrete conduit with a 4-inch brick invert for a portion of its length was built during 1908; this work cost \$84.90 per foot as against Messrs. Metcalf & Eddy's estimated cost of \$30.05. The length of structure was 1,137 feet.

The conclusions which Messrs. Metcalf & Eddy draw from the data which they present are that sewer construction by day labor in Boston is not economical. They recommend, therefore, the discontinuance of day labor in favor of contract work.

How to Make a Pile Driver

The cut of the driver is not to scale, but as dimensions are given, I trust it will do to build from. One like it was built right on the place where used, in fact, they must be, unless "taken down" for transport. The size of uprights depends on width of slide in hammer; this one used a 4 by 6 inch. I was told the hammer weighed 900 pounds. The bolts must be flush, so as



Front View of Pile Driver.

not to interfere with hammer and snatch-block. Uprights should be straight and set just far enough apart to let hammer slide easily. The side braces, 4 by 6-inch, keep uprights from springing sidewise. The top plate

may be fastened by using lag screws or by boring in a bolt and nut. The loop or eye-bolt at centre is for pulley, which should come as near top as possible to make sure that snatch-block trips, and these parts must be strong if the hammer is heavy.

The snatch-block is made of two pieces, best of hard-



Side View of Pile Driver.

wood for wear; is bolted together and must slide very easily. The jaws are not easy to make, because they have to be made of half thickness in centre, so as to be straight for each other above and below block. The clevis in centre is of flat iron and is outside of jaws, but inside of block, using same bolt.

The trip braces need not be heavy, 2 by 4's laid flat at a steep pitch are all right.

The 6 by 6 foundation timber, 12 or 14 feet long, is set back a couple of feet or so, to allow room for hammer, and to this the side braces are fastened. The 4 by 6-inch cross timbers, 12 feet long, are gained into uprights at bottom (or if you prefer the uprights to reach down more, then make the gain accordingly; but such ends might be in the way, too, if long). Then bolt on the 4 by 6 cross timbers square out from 6 by 6 foundation timber; centre the 4 by 6-inch foundation timber, 8 feet long, and bolt at outer end, leaving ends of 4 by 6 to project to each side. The ladder part is of 2 by 8's with 2 by 4-inch rungs set about 16 inches apart, nailed on.—A. O. Stein.

The waterworks of Vienna, which have been under construction for about ten years, are now nearly completed. Supplies are derived from mountain springs and brought to the city by an aqueduct, 113 miles long, built mainly of concrete and measuring 6 feet 10½ inches high by 6 feet 8 inches wide. Numerous tunnels have been driven on the line of the conduit, one of them at Gostling being 31½ miles long, while the total length of the tunnels aggregates nearly 53½ miles. As a general rule, valleys have been crossed by siphons with a collective length of 13 miles, but there are also about 100 bridges accounting for some 5 miles of the aqueduct. The new aqueduct will bring into Vienna an auxiliary supply of more than 50,000,000 imperial gallons daily; the yield from the existing works ranges from 35,000,000 to 26,000,000 imperial gallons a day.

Data on Estimating Labor and Material

Excavators', Bricklayers' and Masons' Quantities—Some Practical Directions Relating to Their Measurement—Tabulating the Work

The detailed dimensions are first of all "taken off" the drawings, and written down in columns, in the order of the length, breadth and depth, with an abbreviated description of the work to which the dimensions refer. When this has been done the next operation is "squaring the dimensions," to obtain either the cube or superficial measurements resulting from each set of dimensions. These results are collected together in the "abstract" for each trade; the total "collections" in each abstract are then placed in their proper order in a "bill of quantities"; the bill is ruled so that a price and a total may be placed against each item; the sum of all the totals will give the total proposed cost of all the work mentioned and described in the bill of quantities. This is termed the "estimate."

The following are some general notes relating to the measurement of the various items of labor and material, under the proper trade headings:

Excavators' Work

General digging, at per yard cube. Beyond 6 feet deep, keep separate and divide into stages of 6 feet each; wheeling over 20 yards keep separate, and divide into runs of 20 yards each; basketing out, keep separate, if no concrete take digging 6 inches wider than base of footing; describe if dig and cart away; dig, wheel, and spread, or if dig and part fill in and ram. In trenches the space occupied by the concrete and wall is dig and cart or dig, wheel, and spread. The remaining space is dig, fill in, and ram.

Concrete at per yard cube generally; if under 12 inches deep at per yard superficial. State proportions of materials to be used if in lime or cement, etc.

Wells, at per yard cube, stating diameter, depth, distance to be removed and description of soil.

Surface digging, at per yard superficial, if 12 inches deep or under.

Spread and level, at per yard superficial, with description of average depth.

Hard brick rubbish, at per yard superficial, if 12 inches deep or under; above, at per yard cube.

Clay puddle at per yard super, describing thickness.

Shoring, strutting, and planking at per foot super, to trenches under 6 feet wide at per foot run.

Drains at per foot run, to include digging, laying, jointing, concreting, filling, and ramming. Take a running dimension over all pipes and connections. When the latter are taken they are charged as extra only upon the cost of this item. State size of pipe, with description, how jointed and enclosed, and the average depth of the trench.

Length of drain upon which there is any additional labor should be kept separate and so described, such as "deep digging," "tunneling," "strutting to trench," etc.

Bends, junctions, traps and gulleys are numbered, and having been measured in the length of the drain are described as "extra only" upon the cost of the drain. Manholes are numbered and described.

Piles are numbered. State size and description of timber and length to be driven.

Number the rings, shoes, pointing, and cutting off heads when driven; state weight of ironwork.

Memoranda—The following is the ratio of the increase in bulk of the undermentioned earths when excavated:

Earth and clay	about $\frac{1}{4}$
Sand and gravel	about $\frac{1}{12}$
Chalk	about $\frac{1}{8}$ to $\frac{1}{2}$
Rock	about $\frac{1}{2}$ to $\frac{4}{5}$

In the mixing of concrete the bulk is about two-thirds of the volume of dry materials before mixing; for instance, a cubic yard of concrete in situ requires about $1\frac{1}{2}$ cubic yards of cement, gravel and sand.

Bricklayers' Work

Brickwork, where used in large masses as for engineering works, is sometimes measured per foot cube. The usual method is as below:

The following is measured superficially:

Brickwork in mortar, at per rod of 272 superficial feet, $1\frac{1}{2}$ bricks thick, all thicknesses to be reduced to this standard.

All half-brick walls are measured similarly but priced separately.

Brickwork in cement, measured as above, but usually included in the brickwork in mortar, and described again separately as "extra only in cement."

Keep all above 50 feet from the ground separate, only all built in small pieces.

Facings are measured at per foot superficial, as "extra only" upon the cost of the general brickwork, allow 3 inches below the ground and 3 inches at junction of roof with gable wall.

Fair face and point, at per yard superficial, where the same kind of bricks are used in face and body of wall.

Fair and rough cutting all over 6 inches wide at per foot super.

Damp course at per foot superficial.

Arches in walls in lime mortar are measured in with the ordinary brickwork. Rough arches in cement, axed or gauged arches, are described and charged as "extra only" upon common brickwork; all extra necessary labor and material above those required in the common brickwork are charged for in all arches, such as fair or rough cutting, turning pieces, etc.

Trimmer arches and vaulting at per foot super, describing and stating thickness.

The following work is all measured by the superficial yard: Brick paving, brick nogging, rough rendering, cement floated face, cement or tar paving, asphalt paving, and tiling on brick.

The following is measured per foot run:

Fair and rough cutting, if under 6 inches wide.

Birdsmouth, squint quoin, cutting and pinning.

Chase for pipes, cutting, toothing, splays, chamfers.

Cement fillet, lime and hair filleting, joints or groined arches, rake and point flashings.

All the following to be numbered, with a proper description: Mitres and stopped ends of cornices, strings, etc., bedding and pointing door and window frames: flues, parge, and core, stating average length; ends of sills cut and pinned, holes cut for pipes, coppers, and settings; all stoves and setting; chimney pieces and

fixing; brick seatings to W.C. traps, trimmer arches leveled up for hearths, rendering chimney backs in cement, air bricks and fixing.

Memoranda—To reduce cubic feet of brickwork to rods, $1\frac{1}{2}$ bricks thick, deduct $1/9$, and divide by 272.

Facing requires about 7 bricks per foot superficial; a rod of brickwork with a $\frac{3}{8}$ -inch joint requires 4,356 bricks and $3\frac{1}{30}$ cubic yards of mortar. Allowing for waste and consolidation this will mean 4,500 bricks, $1\frac{1}{2}$ yards of lime, and 3 yards of sand, or 4,500 bricks, 1 yard of stone lime, and $3\frac{1}{2}$ yards of sand, or 36 bushels of cement and 36 of sand to bricks as before, or 30 bushels of blue lias lime to 60 bushels of sand. A ton of Portland cement is 11 sacks. There are 21.09 striked bushels to 1 yard, 30 bushels of lump to 1 ton of quicklime, 26.6 bushels of ground lime to 1 ton of quicklime.

In the mixing of lime and cement mortars of the usual proportions the final volume may be taken as about two-thirds of the volume of the dry materials before mixing, as may be deduced from the quantities for $3\frac{1}{30}$ cubic yards of mortar required for a rod of brickwork.

A striked bushel equals 1.28 cubic feet; therefore a cubic yard equals 21.09 striked bushels.

Masons' Work

Take all stone at per foot cub including hoisting and setting. If the hoisting is over 40 feet in height, take an extra to, and divide into heights of 20 feet, as 40 feet to 60 feet, 60 feet to 80 feet, etc.

All labors to be taken separately and to be measured at per foot super. The final labors include all preparatory labors.

Half Sawing or Haif Plain—This labor is taken to all faces upon which no other labor is taken, such as the back of ashlar work, the back of a cornice, etc.—National Builder.

Bituminous surfaces, according to the experience of the Massachusetts State Highway Commission, as set forth in its last annual report, should have less crown than the ordinary macadam road. While the customary crown on macadam roads is $\frac{3}{4}$ -inch to the foot, a crown of $\frac{3}{8}$ -inch or less has been found to be probably sufficient and possibly more desirable than a greater crown on bituminous surfaces. Experience has also shown that with both automobile and horse traffic on a bituminous road it is advantageous, particularly with roads made by mixing or grouting tar in the top course, to apply a surface sealing coat, preferably of asphalt, as that seems somewhat less slippery, gives a better appearance, and, at present writing, shows indications of longer life than a surface coating of tar.

Flat bundles of empty cement sacks suffer greater damage and cause more trouble in shipment than do the rolled bundles, according to the Universal Portland Cement Company. Flat bundles are not stiff enough to hold their shape when stood on end, and the ropes with which they are bound slip off easily, with the attendant loss of sacks from the packages. The advantage of tying the sacks in rolled bundles is that the resulting package is stiff and compact and can be handled in practically the same way as a log of wood.

Incorporation has been applied for by a company which proposes to establish large cement works near Princeton, B.C. It is stated that the plant will involve an expenditure of \$250,000. Its initial capacity will be 1,000 barrels per day. L. W. Shatford, M.P.P.; John George, J. A. Harvey, K.C., and L. W. Stone are among those interested in the project.

Proposed Bank of Ottawa, Vancouver

On September 1st operations will be commenced at the southwest corner of Seymour and Hastings streets, Vancouver, for the new eight-storey building of the Bank of Ottawa. The plans for this structure, which is to cost in the neighborhood of a quarter of a million dollars, have just been completed by Architect W. Marbury Somerville, 43 Exchange Building, Vancouver. The work will be finished by the end of May, 1911, and the building is expected to be ready for occupancy early in June next.

The plans call for ground floor space 52 feet by 120 feet, the base to be of granite and stone, with brick and stone trimmings above on reinforced concrete. The whole will be absolutely fireproof. There will be 16 offices to the floor, with the exception of that on the street level, which will be occupied by the owners, the Bank



The 8-storey building to be erected at Vancouver by the Bank of Ottawa.

of Ottawa, for banking premises. On this floor also will be the elevators leading to the upper storeys. The entrance to the vestibule and lobby will be handsomely done in marble, while the floors above will be trimmed throughout in birch and finished with mahogany.

Other features of this latest addition to Vancouver's tall buildings will be a vacuum heating system throughout, hot and cold water in all the offices, the Durham plumbing system, mail chute equipment, vacuum cleaning system for all the offices, and commodious toilet rooms on every floor.

O'Brien, Fowler & McDougall, contractors on the Transcontinental, have removed their headquarters from Fort William to Lake Superior Junction.

Construction of the Hollow Core Fill Dam

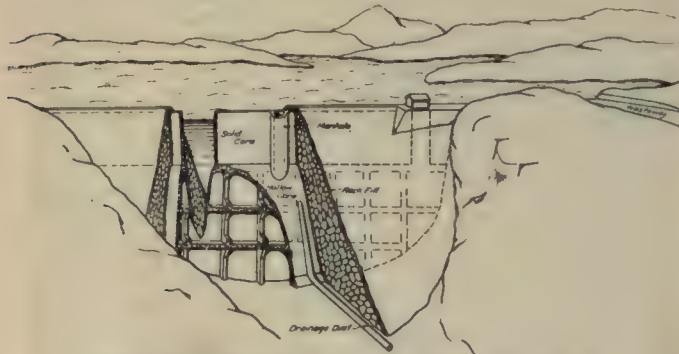
A Type which Increases the Practicability of these Structures—Its Several Advantages and Special Applications*

BY FRANK R. GILBRETH

The salient features of a fill dam as a type are: its range of adaptability, the utilization of available materials and the ease and economy of construction. Any new features which add to the advantages of this important class of dams are worthy of consideration.

The centre core-wall type of fill dam is the one in most general favor, due in part to the ease and economy of construction, notwithstanding the fact that the weight of the reservoir fill is partly lost through submergence. Solid centre core-walls have been constructed of generous dimensions which were expected to provide ample provision against leakage and, regardless of this fact, leakage too frequently does occur.

In localities where the run-off for water supply is scarce or intermittent, any leakage through a reservoir dam, however small, is a serious one in loss of revenue. When leakage does occur through a solid core fill dam, the location of the leak cannot be definitely determined for the position of the fill which covers the core of the



Fill Dam with Hollow Concrete Core Wall

dam makes that part of the dam inaccessible and the means for repair are slight and an expense which at the time is too great to warrant immediate attention.

To meet this condition and to provide access to the vital portion of the dam there is designed a type, the hollow core fill dam, wherein the core is made hollow, that is, of two walls cross-braced with division walls with means for access to the interior of the core thus formed. This hollow feature permits of an inspection of the interior of the core and to the seal of the core along the foundation. By this method of construction the condition of the interior of the structure is always known and any defect can be definitely located, and if leakage does occur at the seals or through the core wall, repair of the defect is possible. The hollow feature can be constructed to any part of the height of the core wall, making the upper portion of the core solid and the lower portion hollow, thereby allowing access to that portion of the dam which is subjected to the greatest pressures, and resulting in a combined solid and hollow core-wall.

The small extra cost of hollow construction of the core is offset by the advantages of making the critical part of the dam open to inspection and repair and in addition thereto it has an increased strength and stability of core, due to the enlarged shape and greater

base. The enlarged section of the core also reduces the amount of necessary fill without sacrificing any features of design, due to the resultant of force on the sloping reservoir face falling more within the base of the core.

The rear wall of the core is constructed to receive the rock pressure only which is transmitted to the reservoir wall, which in turn is designed for both strength and impermeability. The division walls crossing between the core walls are arranged so as to divide the interior into compartments which are provided with separate drainage to conduct any leakage away from the core and lower fill, and thereby avoid flooding of the interior of the core.

The increased size and shape of the hollow core is a feature in the strength of the dam for the materials are placed where they serve to the best of advantage as to the practicability of the entire structure.

In localities where the country is extremely arid the torrential run-off has been phenomenal and a present condition is not a criterion of possible conditions. Wasteways become blocked, and even with open bays and the counteracting effect of the reservoir above, with water near the high water level, a cloud burst or the failure from a reservoir above places all computations of possible discharge as nothing and any feature which adds to the strength and safety of this class of dams is to be desired. A dam is a structure which should be built for the life of the reservoir and scarcely any dam is constructed which does not have a community interest below it and this interest should be granted all the protection possible against disaster from failure of the dam.

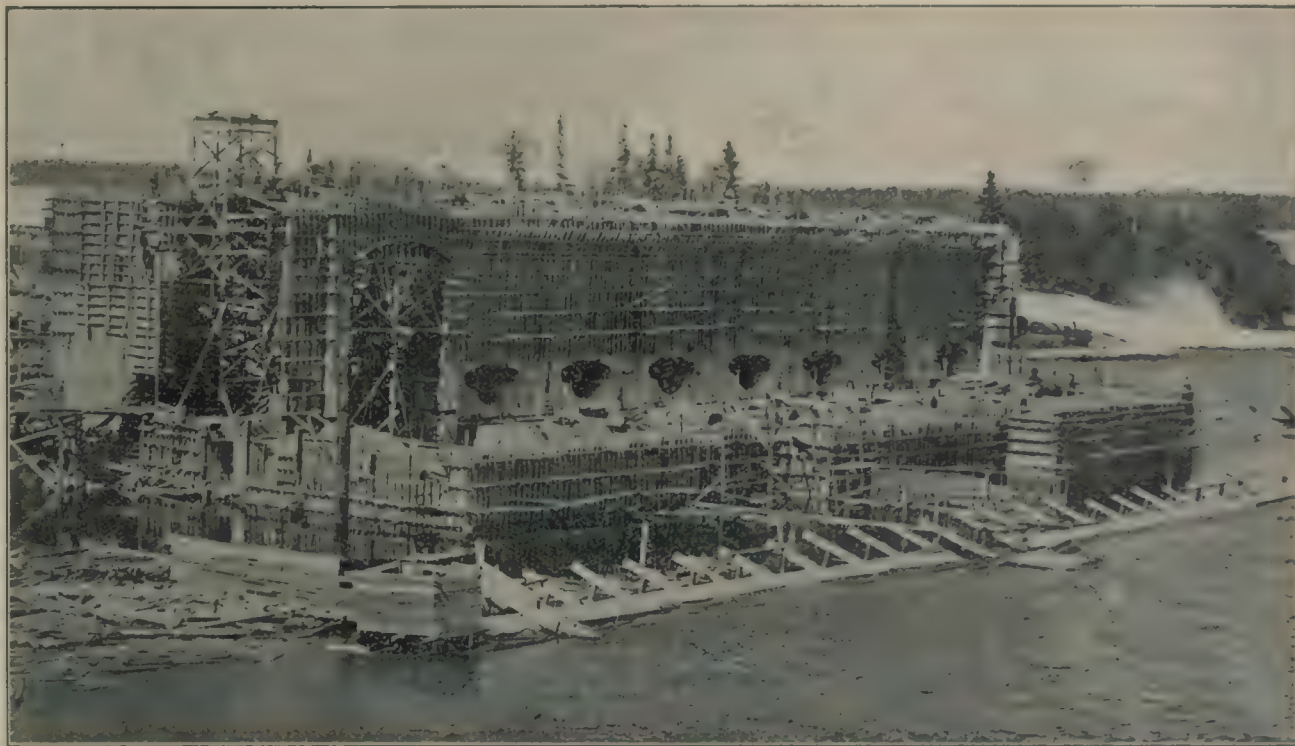
In localities where the water supply is abundant the question of leakage, while not one of direct revenue, is one that should be avoided. In a reservoir fill dam a continual leakage is a detriment and in this type of dam only a bottle tight condition should be considered. Permissible leakages due to hydrostatic pressures do not apply to this class of dams.

Fill dams have a wider range of application than any other type, being suited as an adjunct to a constructed overflow type, or where the foundations will not permit of a structure of great weight; where the materials of construction at hand are not suited to another type of dam; where the site is remote from transportation and when the feature of economy of construction is all important. These features make the fill dam more universal in application than any other type of dam and the hollow core fill dam increases the practicability of this important class of structures.

Unfilled Voids in Concrete Foundations

Unfilled voids in party wall caissons were recently discovered in the course of the erection of a 20-storey office building in Chicago. These caissons were constructed some years ago for another building. An examination showed that the outer 2-foot ring of one caisson contained hardly any cement, so that a man with no other tools than a hammer could dig a hole 2 feet deep into any side of the caisson without much trouble; in fact, broken stone fell out of the concrete on removal of the planking surrounding the pier. To fill these voids

* Reprinted from Engineering-Contracting.



First Section of Winnipeg's Municipal Power House at Point du Bois, where 60,000 H.P. will be Developed

in the caissons appeared at first a very difficult task, but was executed in the following manner, as described by the Engineering Record:

First, a 6-inch hole was drilled down to the top of the caisson bell, about 50 feet from the top of the caisson. A pipe was to be inserted in this hole, reaching nearly to the bottom; the top of the hole sealed around the pipe, the latter connected with pumps, and cement grout pumped in under pressure to fill the voids.

Two pumps had to be provided so as to ensure continuous work. In the work on the first hole it was found necessary to case the hole, as the drilling progressed, with a 6-inch pipe in order to prevent the loose material from falling in. This pipe was left in place. A two-way connection was made at the top leading to the two pumps, which were connected with a vertical receiving tank placed in the basement near them. Directly over this receiving tank on the first floor were placed two mixing tanks, in which were paddles operated by an engine for the purpose of keeping the mixture agitated at all times. The mixing was done in alternate tanks so as to provide a continuous supply. There were ten 8-foot caissons which needed this injection of cement to make them what they should have been in the first place, a solid homogeneous mass.

Basing the amount of cement required on the outer 2-foot ring of the caissons having 40 per cent. voids, it was estimated that 700 bags of cement would fill the voids. It took from 800 to 1,300 bags to accomplish the desired result in each caisson. The explanation of the use of more cement than was estimated may be either that the ring was more than 2 feet in some cases, or the bell as well as the shaft of the caisson contained a great many voids in some cases. Upon completion of this operation an examination was made of one of the piers down to a depth of 30 feet below the top of the pier, and

all the voids were found to be completely filled with cement.

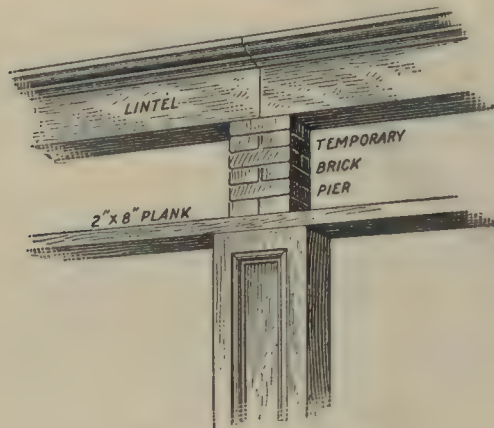
In conclusion it may be stated that these caissons had been executed by a reputable contractor under a percentage contract. It is, therefore, not likely that there had been any intentional slighting of the work or saving of cement. Giaver offers the following explanation as to how this defect could occur:

It is customary to use a pipe in filling caissons with concrete. It seems very likely in this case that the pipe was allowed to hang approximately in the middle of the caisson and that as the filling proceeded the pipe was shortened but not moved around so as to distribute the concrete at different parts of the pier. It is therefore, natural that a conical deposit would occur and that the grout would remain in the centre of this cone while the stone would roll to the outside. That this was the case was indicated by the examination, which showed, after going in about 2 feet, that in the centre of the caisson there was a very compact mass of concrete.

The Office of Public Roads, United States Department of Agriculture, in 1907 built an experimental road at Bowling Green, using rock asphalt as a binder and to fill in the voids of a fresh macadam surface. In a circular just issued it is stated that the road was inspected during the latter part of May, 1909. A heavy rain had been falling for some hours before the inspection was made, and there was more or less soft, sticky mud on the roads adjoining the experimental road. The surface of the rock asphalt was clean, smooth and compact, with no ruts, and had much the same appearance as a first-class asphalt city street. The thin surface course of rock asphalt has worn down in a few spots to the crushed stone, but the individual crushed stones were tightly bound together and not a single loose stone was found.

Makeshifts in Building Construction

Sometimes it is necessary to make use of a temporary expedient when certain details are slow in coming on the job, and a case in point is illustrated by means of the accompanying sketch. As shown, the makeshift consists of a small brick pier intended to hold up the



Temporary Brick Pier

stone lintels or facias over window openings until the arrival on the job of the stone brackets, which rest on top of the stone mullions or separating columns. The sketch so fully tells the story that extended comment would seem to be unnecessary.

Hints on Making Good Concrete

The water for mixing good concrete must be clean and entirely free from matters in suspension, says Mr. Spencer Sills in his paper read before the Institution of Municipal Engineers. Stagnant pond water is most unsuitable, as it is frequently swarming with animal and vegetable life and chemical impurities. Concrete requires about 25 per cent. to 30 per cent. water to form a homogeneous mixture, and the mass should be well turned dry until the whole is thoroughly mixed, and turned again quickly when wetted, several times, until of a uniform color. When deposited, the concrete should show just wet upon the surface. More water than this floods the cement, and washes it away from the aggregate, and less water does not allow of the full reaction of setting. If the aggregate is of a porous or absorbent nature, such as broken brick or stone, it should be well soaked before mixing; otherwise the aggregate will absorb water when deposited, and impair the setting operation, and in these circumstances it is quite possible to get a weak concrete, although using the full quantity of cement.

Accurately measured gauges for apportioning quantities upon the works is of the greatest importance, and their intelligent use a matter for close supervision. The sometime method of filling the aggregate, gauge levelling up, and placing a bottomless cement gauge on the aggregate for filling, leaves too much to chance in the variation of the quantity of cement. A more accurate gauge for cement is a metal vessel, but undoubtedly the correct way is to apportion the cement by weight, taking 100 pounds weight as representing one cubic foot of sand voids.

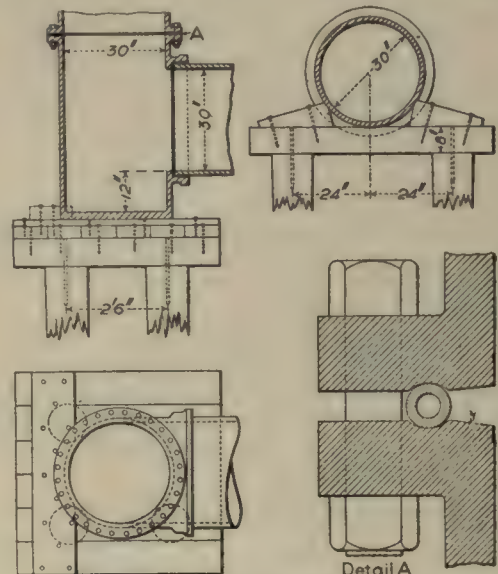
The secret of success in concrete work lies in the knowledge of what to avoid, and may be briefly summarized as follows: Avoid an unknown cement, cement delivered in unbranded sacks or casks, or one of foreign manufacture. British made is good enough, and is branded. Avoid lumpy or caked cement. Avoid a

quick setting cement. Avoid accepting the first aggregate to hand; choose the best obtainable for the purpose. Avoid the acceptance of an aggregate on sample; see it in bulk. Avoid the use of a natural aggregate without knowing its history, and insist upon screening and apportioning sand. Avoid muddy water or water of a decided coloring. Avoid slovenly methods of gauging and mixing. Avoid sloppy concrete or semi-dry mixtures. Avoid mixing quantities of concrete which cannot be immediately disposed of. Avoid the use of dead concrete. Avoid frost, and carefully protect finished work. Avoid laying concrete in water. Avoid heavy or long continued ramming. Avoid earth and rubbish falling upon and mixing with concrete. Avoid weak shuttering or sparse timbering. Avoid the removal of centering, shuttering, or timber until the work is hard. Avoid the temptation to generalize in specifying.

Laying a 30-Inch Pipe Line

A 30-inch pipe line was laid recently across the Pequonnock river at Bridgeport, Conn., at a point where the width of the stream was about 600 feet and the greatest depth below mean low water about 15 feet. There is a rise and fall of the tide amounting to about $6\frac{1}{2}$ feet and it was required to locate the pipe line 23 feet clear below mean low water. On the shore ends of the line 30-inch risers were carried down vertically to grade and supported on four piles, driven to form a square and spaced $2\frac{1}{2}$ feet on centres. The lowest section of the riser had a bell opening in its side to receive the spigot end of the pipe laid horizontally beneath the stream bed.

The method adopted in laying the line across the river consisted in placing the pipe in sections 48 feet long; each was made up of four 12-foot lengths, two bell and spigot pipes, one bell and flange and one spigot and flange. The connection between successive sections was made by bolting the two flanged ends together with 28 bolts and compressing a gasket of $\frac{5}{8}$ -inch AAA lead pipe between corresponding grooves in the faces of the abutting flanges, as shown in one of the accompanying



Details of Submerged Pipe Line

drawings. The pipe was supported below the stream bed by a row of timber bents, composed of two piles and a cap; one bent was placed under every joint between successive lengths of pipe, which were prevented from rolling sideways by spiking to the cap two cleats made by sawing diagonally an 8 x 10 x 21-inch block.

The channel in which the piles were to be driven was

first dredged by a dipper dredge to a depth of 20 feet below low water. The trench filled up rapidly so the piles were driven close behind the dredging, using an orange-peel bucket operated from a derrick boat to remove material which had slid into the excavation. Wooden bulkheads were put in the ends of the 48-foot sections of pipe, and air under a pressure of 20 pounds per square inch was pumped into each closed section to facilitate their handling by the derrick boat.

The bell and spigot joints were made at the surface by caulkers and the flanges between 48-foot sections were bolted together by divers.

Ceramic Tile for Floors and Walls

Without floors that act as a fireproof covering, there will be an increased danger of at least some damage to an otherwise fireproof structure, and it makes possible a further loss by a spread of the flames. While it is admitted that with hollow tile arches, there is not much cause for alarm from fire, even with the floor of lumber, yet it is undesirable from several other standpoints, as well as being a possible avenue to fire.

Durability and sanitation are of so much importance in the construction of modern buildings that where it is possible to have materials that possess these qualities as well as being fire resisters, they deserve consideration from all thinking architects and others who have any part in the construction of buildings. By actual proof, made ample by years of service, ceramic mosaic tile has demonstrated its superiority in the above respects over all other materials. As a fireproof, durable and sanitary floor material, ceramic tile has no equal.

There are many imitators, whose chief merit is in their low cost as compared with ceramic mosaic, but they are not sustaining this claim, because the cheapest structural commodity is always that which will prove durable, and by this is meant the ability of a material to withstand any possible test. Marble mosaic tile, glass tile, rubber tile terrazzo and metal tile, made to imitate clay tile, have come within the past few years. A careful inspection of any of these lines of material will soon prove their weak spots. In fact, they have already been proven on numerous occasions, and for this reason the claim made that they are cheaper is sustained only if we are looking for cheapness without any consideration for quality.

Ceramic tile is of such duration that it was used centuries ago, and still remains intact. The clay being burned at a high temperature ensures durability, so that there is no likelihood of any element affecting it in the least. The surface is so hard that there is no perceptible change made in it after years of constant wear. This is not possible with any of its substitutes.

When we build to-day, as we are now doing, structures that are supposed to embody the highest possible ideas with regard to protection from the ravages of the flames, then we should embody in these structures every possible fire resistant known, so that the buildings will be fireproof in fact as well as in theory.—Brick.

Toronto's new by-law for the purpose of affording greater protection to men working on scaffolds and structural steel work is a timely measure and one that is well worth consideration in other cities where there are lax regulations pertaining to this work. Only last week a Toronto jury found that a plasterer had come to his death directly as the result of injuries received from falling off a scaffold improperly constructed.

A Contractor's Criticism of Architects

In the interest of the building trades in general and the carpenter trade in particular, I would like to ask if it be possible for the contractors' and builders' organizations to devise ways and means to curb the arbitrary power of the architects. The way some architects act is almost beyond the endurance of the contractor. We all like to make a good job and the architect, as representative of the owner, has a right to expect it, provided his drawings and specifications call for such, but if he specifies No. 2 material he has no right to expect No. 1. He usually wants a first class job in material and workmanship at the expense of the contractor.

Suppose, for instance, that the specification calls for No. 2 flooring or sheathing; he has no right whatever to expect the contractor to cut out knot holes, bad places or dead knots, except when so stated in the specifications. As a rule, however, this is not done. No. 2 lumber is specified and the architect wants the contractor to make No. 1 out of it. For the contractor it would be cheaper to use No. 1 at the start, but if he figured accordingly his figures would be too high and he would fail to get the job. It is the same with the siding. The architects want "B" or "C" in the specifications, but require "A" on the house, and so we might continue from basement to roof.

The plans and specifications are the expression of the owner and his architect and they can and have a right to expect everything that is written or drawn in there, but not a blamed thing more. It is certain that where plans and specifications call for a first class job both in material and workmanship, the contractor's figures will be correspondingly high, and that is what the architect tries to avoid by trickery and he generally succeeds. On the other hand, the architects will claim that the contractors try to skin the job, and I am sorry to say this is also true in some instances, but they have to do it in order not to be swamped, for the architects and owners are so exacting that the contractor is trying to pull his end of the rope. This sort of game, started by owner and architects, sometimes results in their being beaten at their own game.

If the architects would start out to do right, I will wager they will be treated right by the contractors. As an example: Architect "A" has a plan for Mr. So-and-So and he wants "Builder B" to figure on it. "Mr. B." after studying the plans and specifications, gives the architect a reasonable figure. In the meantime the architect has secured figures from "Builders C" and "D," and tells "Mr. B." his figures are too high and that he must try to do it for less, so "B" throws off a hundred or so and the architect tells him to call again after a few days to get his decision. With this lowered bid of "Mr. B." he goes to "C" and tells him the same thing he told "B"; as a consequence "C" lowers his bid in order to get the job, and is told by the architect to wait a day or two to get his decision. Again with the lowered bid of "C" he goes to "D" and repeats the same story, with possibly some additions to it—that the job has to be cheap, even if the material should be of a little less quality. "D" comes down and finally gets the job. As the architect knows that he has at last the bottom price, "D" is started on the job and has material of less quality as the architect told him he could use, but now the trouble commences, for such and such material is specified and has to be used. As a consequence "D" is skinning the job wherever possible.

Instead of opening the bids at a set hour and place in the presence of all contractors and giving the job to the lowest or most able builder, they try to get the better of

the contractors and everybody else, which in my opinion is most reprehensible practice. Then, again, they occasionally have another game up their sleeves, which is, that details will be furnished as the work progresses. This is a very unfair practice, as the details are almost always more elaborate than the general drawings indicate. Again the contractor or millman gets the worst of the bargain, but he will try some way to squeeze out or resort to some other trick to get even. It must be insisted upon by the contractors that plans and specifications should be complete before they are to figure on them and should be so plain and correct that no verbal explanation of the architect should be necessary, for it seems to be the habit of the architect to explain it only from his point of view or according to his opinion, at the cost of the contractor's pocket book. According to the general rules in most standard specifications the architect's word is law and final. This is wrong and should be remedied—the sooner the better.

We have in all our large cities contractors' associations. Could they not do something to relieve contractors of this burden?

Again, there is something else that I would like to bring before the readers of this department, which is this: Are the contractors going to stand any more of the architects' mistakes? It is enough to stand for their own and they should not be obliged to be responsible for those of the architect or anybody else. The architects take refuge behind the obnoxious "General Conditions," with which every contractor is familiar. This in my opinion is very unfair and ought to be changed.—J. H., in the Building Age.

Concerning an item in a recent issue of the "Contract Record" that railway contractors on the National Transcontinental Railway were experiencing difficulty in securing a supply of men for the construction camps, Messrs. Nadel & Adler, 375 St. James street, Montreal, write us that there are plenty of good laborers all over the United States, most suitable for construction work, and that they are willing to come over to Canada in masses if their transportation would be advanced. During the month of August they brought over 380 men from the United States, and placed them with various contractors.

Grooved wood block paving was laid last year on a 6 per cent. grade at Hamilton, Ont. In each block was a groove, $\frac{1}{2}$ -inch wide and 1 inch deep, which was laid at right angles to the centre line of the street. On the level approach to the incline the blocks were laid with cement grout, but on the grade an asphalt filler was used. The crown was laid very flat, according to Mr. Andrew F. Macallum, city engineer, rising only about 2 inches in the centre. It is stated that with this type of pavement heavily loaded teams are enabled to get a good foothold.

Little is being done as yet in the way of building permanent structures at Campbellton, N.B., but it is probable that a better and more substantial town will arise out of the ashes next season. At present contractors are offering all sorts of inducements to prospective builders. In some cases the prices quoted are so low that the difference between brick and frame construction is very slight. There are about 350 temporary shacks now standing.

Burnaby, B.C., is now expending \$200,000 on good roads.

Importance of Systematized Construction Work

The importance of keeping cost records of construction work has come to be quite generally recognized, particularly by concerns engaged in undertakings of considerable magnitude. While such records, if properly kept, furnish excellent data upon which to predicate future bids and determine the cost of construction from day to day, they are of decided value in other directions, as in cases of litigation, particularly where questions of extra work are involved. A contractor supported by authentic records of this kind is in a position to maintain his rights in the event of disputes arising and, more particularly, where litigation ensues. Not only are such facts valuable as evidence but the disclosed fact that the contractor knows exactly what he has done and at what cost, makes a most favorable impression upon a jury, who are not partial to guesswork.

Such a system is not expensive, as records can readily be made by foremen and others without much loss of time. One who knows the exact cost of the work he is doing is possessed of a decided advantage over one who does not, and this manifests itself in many ways, including a knowledge of the efficiency of individual employees. Cost records on construction work ought to be more generally kept than they are, even by those who are operating in a small way.

Cost of Granolithic Finish of Concrete Floors

The following figures of cost for the finished surface of granolithic concrete floors are average results obtained by a Boston construction company during their long experience in laying this class of floor.

For a one inch finished surface laid integral with and at the same time as the structural concrete, finishers being paid 50c and laborers 20c per hour, costs figured for 100 square feet of finished surface:

Finishers' time	\$1.00 to \$1.30
Mixing and placing concrete	.42
Cement 1 11/100 barrels	1.40 1.55½
Sand, 3½ feet at \$1	.12
Fine stone, 3½ feet at \$2	.25

\$3.34½ to \$3.64½

If laid after structural concrete has set and not integral with it, the total cost of the floor will be about \$1.50 more per 100 square feet. If finished surface is reinforced with $\frac{1}{4}$ -inch steel bars 12 inches on centres to prevent cracking, add extra labor for mixing and placing concrete 40c., and extra labor finishing 30c., or 70c. per 100 square feet, and for placing steel, 50c. per 100 pounds, with cost of steel about \$3 per 100 feet laid down.

Bricklayers imported from England to take the place of strikers are being prosecuted by the Montreal Builders' Exchange for refusing to carry out the terms of their contract after arriving in Montreal. Upon reaching Quebec the men were met by representatives of the strikers who successfully beguiled them into their cause. The men were engaged on the specific understanding that they should commence work on August 20th and continue until the beginning of winter.

It is expected that the next four years will see the addition of 120,000 tons of shipping on the St. Lawrence route. Members of the Shipping Federation are directing the attention of the Government to the immediate need of a 35-foot channel and various other improvements to the route.

Bituminous Roads—Mixed and Poured

The Merits and Demerits of Penetration Methods—Hand Versus Machine Mixtures—Proper Proportioning of Mineral Aggregates*

While the writer is commercially interested in a special form of bituminous pavement and road construction known as "Bitulithic" in its application to city streets and "Warrenite" in its application to country roads in the United States and Canada, and laid in Great Britain and the Continent in a modified form known as "Quarrite," he hopes to accomplish an unprejudiced discussion of this subject.

In the year 1909 the New York "Herald" and Atlanta (Ga.) "Journal" offered premiums of \$1,000 for the best, \$500 for the second and \$250 for the third best section of country road between New York City and Atlanta, Ga., one of the southern of the United States of America, covering a distance by air line of about 750 miles. The first premium was awarded to Mercer county, in the State of New Jersey, of which Frank I. Eppel is county engineer. In an excellent paper on the subject of "Future Highway Improvement" published in a current paving journal, Mr. Eppel says:

I think the statement can be made that already the problem has been solved in part and that road engineers have practically agreed that the principles of construction which provide for the broken stone or other road metal used to sustain the wear, and some bituminous product applied in conjunction with same, possessing in a high degree the necessary binding and dust preventive qualities, will be the basis for adoption of a method for future highway construction. If this be true, I think we can logically conclude that a majority of road engineers will favor a method of construction that ensures a perfect coating of bituminous binder to every particle of road metal being used, and before same is spread upon the highway, to one that provides for the application of a binder to the surface of the material after same has been spread upon the work either by a method of pouring, sprinkling or spraying, and then depending upon the penetration qualities of the binder to give a uniform and perfect condition of coated work. Were it not for the question of cost involved, I am sure that a form of construction involving the use of a mechanically coated material, for at least the top course, or wearing surface of a road, would be adopted; but even taking into consideration this question of first cost, would not this increase be more than balanced by the condition of the roadway together with the wearing and other improved qualities of the same after construction?

From an article in the same publication we extract the following:

It is safe to say that a grouted road is not as satisfactory and long lived as a mixed road. As the desirability of accurate proportions in a bituminous macadam is great the batch mixer will probably prove most satisfactory. The best results in Massachusetts have been obtained with broken trap rock $2\frac{1}{2}$ inches to $\frac{1}{2}$ -inch in size, having 40 per cent. or less voids. If this percentage of voids is lessened by more small particles in the aggregate, say from $2\frac{1}{2}$ inches to $\frac{1}{4}$ -inch, still better results obtain. I believe that when a softer rock is used the slight crush which takes place during the construction draws in more bitumen and produces a denser pavement. Experiments have shown that bituminous surfaces having the voids filled with bitumen and trap pea stone are to be preferred in every case.

A mixture of $2\frac{1}{2}$ -inch to $\frac{1}{2}$ -inch trap stone with 40 per cent. $\frac{3}{8}$ -inch sand well mixed dry and then coated with bitumen should prove to be a very permanent road matrix.

The question naturally arises:

If a mineral aggregate varying from $2\frac{1}{2}$ -inch to $\frac{1}{2}$ -inch having 40 per cent. or less voids is good, and if running the fineness of the stone down to $\frac{1}{4}$ -inch is better, and if the voids are filled with sand, the mixture is still better, why should not the "ne plus ultra" be provided by going a little farther in the scaling down process as to sizes and using scientifically determined and accurately proportioned mineral

aggregate down to the finest obtainable (impalpable powder) in which mixture the voids can be reduced as low as 10 per cent. and all the voids thoroughly filled?

Pouring or penetration methods have the following advantages:

Pros and Cons of Pouring Methods

(a) Very little investment in plant.
(b) The cheapest possible method of application. The following are the disadvantages of the pouring methods:

(a) After the stone is rolled the portions of the surface of many of the individual stones are in such contact with each other and many of the voids are so small that the bitumen cannot penetrate into many of the spaces and consequently cannot thoroughly coat the particles of stone. This objection rapidly increases as the minimum size of the stone used and the voids decrease.

(b) If the bitumen used is not hard enough and of a character sufficiently cementitious to bind the particles of stone together the road will gradually ravel if subjected to even a moderate traffic.

(c) Unless enough bitumen is used to thoroughly fill the voids to the greatest extent practicable the particles of aggregate are not even approximately bound together and satisfaction is only temporary.

(d) If the voids are filled with bitumen as much as practicable then the roadway has a surplus of bitumen or rather it is not properly distributed through the mass and the free and nearly pure bitumen in the large voids oozes to the surface under traffic during hot weather, making a sticky unstable and undesirable surface which ruts and rolls badly under traffic.

Very good examples of the two last mentioned disadvantages and inherent weakness of construction are found on sections of Huntington avenue, in Boston, Mass., which were laid under the most approved penetration methods during the summer of 1909. From the east side of Gainsboro St. to the east side of Bryant St. the spaces between the stones were filled very full with bituminous binder. To facilitate and make more thorough the filling of the voids the precaution was taken, after rolling the stone, of heating it with a large gasoline flame confined under a sheet iron hood resting on the surface of the rolled stone. The apparatus used was that known in the asphalt paving business as "surface repair heater." Between east side of Bryant street and east side of Ruggles street less bitumen was used and consequently the voids less thoroughly filled. In both sections bituminous cements were used of a grade of hardness which required heating to a temperature of about 275 degrees F. to liquify and consequently cementitious and of the "true binder" class as distinguished from liquid oils and tars often called "binders" although in the writer's judgment more properly classed as "dust layers." Both sections presented a fine appearance during the summer and fall of 1909 and the spring of 1910 and the intervening winter except that in spots in both sections where the bitumen had not penetrated well into the surface; ravelling began in the early spring. At this writing (June 13, 1910) on the section in which the voids in the stone were least filled the bitumen has disappeared from over one-third of the surface and we have on such portions practically a macadam road (as if no bitumen had been used) which is already ravelling and promises at an early date to require entire resurfacing. This section of the street shows great irregularity in amount of bitumen

*A paper by George C. Warren, President Warren Bros. Co., Boston Mass. Written for the International Road Congress, Brussels, Belgium, July 31-Aug 7th, 1910.

used, as there are many places from two feet to ten feet in length where there is an excess of bitumen which has been pumped by traffic to the surface and now is much too rich, showing deep calk marks and an unstable surface. On the section where the greater quantity of bitumen was used the surface is now so very soft that automobile and other vehicle wheels and horses' hoofs press into the nearly pure bitumen and unstable mineral aggregate at the surface to a depth of over one-half inch and the surface presents a very sticky and undesirable condition. In describing the rutting and marking of vehicle wheels and horses' hoofs, reference is made to moving horses and vehicles in the centre of the roadway and not to the still greater marking from standing vehicles and horses near the gutter.

The mixing methods are of two general classes as to hardness of bitumen, known as "cold process" and "hot process," and two classes as to method of mixing, known as "hand mixing" and "machine mixing," which will be treated in the order named.

The "cold process," meaning the use of a mixture of stone and bitumen of such a character that the ingredients can be mixed and laid without artificial heat, that is at the temperature of the air. This necessitates the use of bitumen of a character which is liquid when cold and, as above referred to, in connection with "penetration methods" is necessarily deficient in cementing strength unless the bitumen is made liquid by the use of a volatile temporary liquifier which will evaporate soon after the roadway surface is laid. The "cold process" is also necessarily subject to the weakness that the moisture has not been evaporated from the aggregate before adding the bitumen which seems to be bad practice, to say the least.

In the writer's judgment, other things being equal, the "hot process" gives the best results but is necessarily more expensive both on account of the more or less expensive plant required to heat and mix the ingredients, and also the greater amount of labor required to heat and roll the much tougher, denser and harder surface mixture. The "hot process" has the great advantage of providing a surface which is "set" hard as soon as compressed and chilled to the temperature of the air.

Hand Versus Machine Mixtures

Hand mixtures have the following advantages over machine mixtures:

- (a) Comparatively little expense of plant installation on account of which it is applicable for use on roadways of less area than practicable by machine methods.
- (b) No cost of fuel and consequent saving.
- (c) Some writers say machine mixing labor is less than hand mixing, but taking all items of cost, including plant installation and delivery of materials to and from the mixing plant, and labor, mixing and laying into consideration, the writer believes as a rule the reverse is the real condition.

The disadvantages of the hand mixing processes are:

- (a) Manifestly less thorough mixing and less accurate proportioning and uniform distribution of ingredients and consequently greater variability of results than with a properly constructed mixing and heating plant.
- (b) Because of greater ease in hand mixing a marked tendency toward use of a softer bitumen.
- (c) Impracticability of getting a thorough mixture without more power than can be executed by hand mixing if the combination of ingredients are as dense as they should be to produce the best results.

Machine mixing methods may be sub-divided into several classes, as follows:

- (1) Mixing without accurately proportioning or heating ingredients for which ordinary concrete mixers either of the "continuous" or "batch" types will answer. This method has the advantage of least expense in plant and labor, which,

in the writer's judgment, is very much more than counterbalanced by the disadvantages of using bitumen of a grade so soft as to be liquid at normal temperature and of less accuracy and uniformity of results.

- (2) Mixing by heating without accurately proportioning the ingredients which, in the writer's judgment, is better than the last named method but still inherently defective.

- (3) Using a well planned mixing and heating machine specially constructed for the purpose, which will produce the following essentials to a maximum degree of success.

- (a) Uniformity and accuracy of proportioning of ingredients both as to varying sizes of mineral aggregate and amount of bitumen.

- (b) Sufficient heat in the ingredients when mixed and laid in the work to evaporate moisture and permit the use of bitumen hard enough to furnish a "true binder."

- (c) When compressed in the work a solid dense voidless, dry bituminous concrete wearing surface which will to the greatest possible extent prevent penetration of moisture (the enemy of all road surfaces) and withstand the troublesome automobile and other traffic without shifting or presenting undesirably soft surfaces.

Proportion of Mineral Aggregates

A word here on the subject of proportioning of mineral aggregates in bituminous wearing surfaces may not be out of place. The writer believes from his wide experience and observation as well as from theoretical reasoning that the following are necessary essentials to the best construction:

- (1) That the sizes of stone or mixture of stone and sand composing the mineral aggregate of the wearing surface shall be scientifically and accurately proportioned varying from the coarsest size permitted by the thickness of the surface (at least $\frac{1}{2}$ -inch less than the depth of compressed surface desired) down to an impalpable powder, each size to be proportioned as to reduce the voids to the greatest practicable extent, which in practical work can be as low as 10 per cent. to 15 per cent. of the volume. To practically produce this result a mixing plant designed to proportion and control the sizes of the aggregates is essential.

- (2) That sufficient bitumen shall be used to thoroughly fill the remaining voids and evenly but thoroughly coat every particle of aggregate, large and small, with a thin coating of bituminous cement of a grade which when cold provides a high degree of cementing strength and solid construction of bituminous concrete which (as is practically possible) when thoroughly compressed on the road foundation has the density and within about 5 per cent. of the specific gravity of solid rock of the character used in the wearing surface. This difference in specific gravity represents the difference between the specific gravity of the stone (say 2.8) and the bitumen (say 1.0-1.25) used in the construction and not voids or lack of density or stability in the compressed bituminous concrete wearing surface.

The route of the Grand Trunk Pacific line from Regina, Sask., westward has been located as far as Moose Jaw. The officials of the Grand Trunk Pacific are now only awaiting a settlement of its terminal matters with the Regina city council to let a contract for the construction of this line westward, and also to finish up the link from the city southward to its grade on the line to the boundary. Every effort is being put forth to rush construction on the line from Balcarres to Regina, but the contractor, Mr. J. D. McArthur, is badly handicapped owing to the difficulty of securing sufficient men and teams for the work.

The Transcontinental Railway Commissioners leave Ottawa early next month for an inspection of the line from Superior Junction to Winnipeg. They will also go over the Grand Trunk Pacific.

Estimating Plumbing Work

In estimating plumbing work the question often arises as to who is to profit by an estimator's or contractor's skill in design, economy of management or closeness in buying. That is, suppose by rearranging fixtures an estimator saw where he could save \$500 on an operation; should he figure on the work as planned and pocket the difference between the cost as originally laid out and as rearranged, or should he estimate on the lower cost of the work and give to the owner the benefit of the saving?

There is no doubt but that if an estimator knew positively that he alone possessed sufficient skill to lay out the work so economically he would be perfectly justified in reaping the reward of merit and add to the profit account of his ledger the money saved by economical design. But right there is where the stumbling block lies. No man is so clever but others will be found who can show equal results, and the estimator who figures that he alone can lay out work economically will learn to his sorrow that other minds are equally bright, and many of the choice contracts he hoped to carry off will go to rival shops. The only safe way is for an estimator to assume that his competitors are more clever than he is, and that in order to bid lower than the others he must find the very lowest cost he can satisfactorily do the work for, then know the profit he is willing to do the work for, add it, and be satisfied whether he wins or loses. If he wins the profit is his. If he loses it is with the knowledge that he could not have taken off another dollar, so he has nothing to regret.

A writer in "Modern Sanitation," states an estimator must not assume, however, that because he could not do work cheaper the competitor who took it at a lower figure will lose money. Perhaps his skill in design is greater than yours, or he has some other method of procedure which enables him to do the work at a lower price. It is a good plan for an estimator when he has lost a contract for being too high, after he has figured his lowest, to inspect the work of his competitor from time to time as the installation progresses, to see if he can discover either in design, workmanship or materials wherein the difference lies between his cost for a certain piece of work and his competitor's.

The Percentage of Profit

The percentage of profit to add to an estimate will depend greatly upon the character of the work. If the work is hazardous, where there is danger of losing considerable if everything does not go right, with but little chance for profit even under the most favorable circumstances, a percentage of from 50 to 60 per cent. would be considered a fair profit. For example, suppose a house sewer and water pipe were to be extended from the old work just inside a cellar wall to the sewer and water pipes in the street; that the soil to be excavated through was treacherous, likely to cave or give other trouble, and the street was a busy thoroughfare where accidents might happen due to having the street open. In such a case, if the cost of doing the work were \$200, a profit of 50 per cent. or even 60 per cent. would not be excessive.

In ordinary work within buildings, however, no such percentage would secure work. Ordinarily, on all work in small cities, and on small installations in large cities, the allowance is from 15 to 20 per cent., while on large work in large cities the allowance is from 8 to 10 per cent., according to the nature of the operation. For instance, in an operation where most of the cost is for fixtures and very little for labor, as is the case when the fixtures are well bunched together, an allowance of 8 per cent. might be all that an estimator could allow with a chance of winning. Take, for instance, a toilet room, or a couple of toilet rooms, at an institution where 80 fixtures, each averaging \$35, are to be installed and where three workmen in 30 days can install the material. In such a case the cost of labor, which is the un-

certain element in a plumbing estimate, bears but a slight proportion to the entire cost, and the signing of such a contract is almost like selling the goods on delivery. That being true, and there being no delay for the money, the contractor could better afford to do the work for a profit of 8 per cent. than he could other classes of work where the cost of labor is the chief item for a profit of 10 per cent.

Clean Surface for Painting Essential

In the repainting of some rooms it has been found that the paint did not dry out as quickly as it should, in fact, there appeared to be a tackiness that could not be gotten rid of. It perhaps was due to greasy conditions which had not been thoroughly cleaned. Paint will not dry over a greasy surface. An employer who instructs a man to clean down the work thoroughly before applying the first coat of paint, cannot be at the workman's elbow all the time to see that this is really done thoroughly. If the paint of a door dries everywhere excepting those portions above the lock, which are marked by the hands, I should have very little hesitancy in saying that the work was not properly cleaned off. In the same way if the seats in a public hall, a church or school, when renovated do not quickly dry, the probability is that they are more or less greasy. It may be well to point out here that the hardening of an oil paint takes place not by evaporation, as is the case with whitewash or distemper, but by the linseed oil absorbing oxygen from the atmosphere. Grease, however, is a great bar to oil paint drying, and a thoroughly clean surface is essential to good work in this respect. As to the cure of paint work which will not dry, if it is due to an excess of driers, there is nothing to be done but to remove the coat of paint and give another; but if it is due to another cause, such as dirt or grease, a cure may be sometimes effected by mixing a little gold size with turpentine, say in the proportion of three of the latter to one of the former, and giving a coat of this over the affected parts. Another cure which is often useful is to mix an earth color, such as ochre or sienna, with water, and give a liberal coat of this without adding any binding material, such as size. This coat should be left on some days—a week is not too long—and if at the end of that time the work is hard and dry, it will be due to the fact that the "tacky" paint or varnish has been practically absorbed by the ochre or sienna. A final coat of a good hard varnish may then be given, and the work will stand permanently.

An Amendment to Toronto's Building By-Law

In order to provide better protection for men working on scaffolds, City Architect Macallum, of Toronto, has prepared an amendment to the building by-law, the provisions of which are as follows:

As soon as the walls or structural steel on any building have reached the level of the first floor, the joists on such floors shall be placed and permanently secured in position, and the joists covered temporarily in a manner satisfactory to the building inspector.

All buildings over three storeys in height shall be provided with temporary plank stairs from the bottom of the roof of the building.

Outside scaffolds, either supported by continuous supports from the ground up, or upon thrust-outs from window or door openings, shall be provided from the second floor up, with tight plank floors and ten-inch curbs and two by four-inch hand rails, 34 inches high, with not less than two by four standards and braces and when such scaffolds are used on buildings over 60 feet in height the space between the hand rail and the curb shall be filled in with wire netting.

Planking shall be erected above scaffolds, over the heads of workmen, to protect them from falling material or tools on buildings more than two storeys high.

All scaffolding or temporary supports of any kind which is or are used during the erection, alteration, or the making repairs to any building, shall be of sufficient strength to carry safely the load to be placed thereon.

New Proposal for Montreal Water Supply

Summary of Interesting Report Submitted by Engineers Hering & Fuller — Extensions and Filtration Plant to Cost Several Millions

The report on the Montreal water supply as prepared by Messrs. Hering & Fuller, of New York, and submitted to the city council of Montreal, is of considerable interest. A comparison is made of the scheme for obtaining a supply from the Laurentian Mountains and the present service. The installation of a filtration plant at a cost of \$1,500,000 is advised, also the immediate enlargement of the aqueduct and extension of the intake. The report is summarized as follows:

It is not possible to secure an adequate supply of good water from artesian wells or other underground sources on the Island of Montreal or vicinity.

A gravity supply from the Laurentian mountains might be secured from several sources, by far the most favorable of which is the watershed of the River Ouareau, above Rawdon.

The quality of the untreated Ouareau river water is not such as to give regularly a suitable water supply. The water is quite highly discolored by vegetable matter and the numerous lakes upon the watershed contain at times quite heavy growths of algae and other forms of microscopic life which are liable to produce objectionable tastes and odors in the water.

There is sufficient population in the villages and near streams and lakes on the drainage area to make very doubtful at times the hygienic quality of the water in its raw conditions.

Expropriation of the entire drainage area seems to be prohibitively expensive and even such a step would not eliminate the sanitary danger from persons temporarily visiting the lakes and streams of the watershed.

Taking all of the evidence together we are firmly convinced of the necessity for filtering the water of the Ouareau river in order to make it a suitable source of supply for the city of Montreal.

The cost of delivering into the city reservoirs 50 and 100 million imperial gallons of water per day from the Ouareau river, is estimated at \$12,050,000 and \$18,032,000 respectively, after making moderate allowance for damages due to the diversion of water used for water purposes and for interference with lumbering industries.

Montreal is fortunate in having at its door one of the largest rivers on this continent, and which offers favorable opportunities for water power development. At the same time, the St. Lawrence river provides a source of water supply which as to quality in its raw condition is far better than that supplied to many large cities elsewhere. In speaking of the quality of the St. Lawrence water in this manner we refer to water drawn some distance from shore so as to exclude the influence of local shore pollution.

We approve of the project of enlarging the power canal or aqueduct, the cost of which for all present developments, together with water wheels, pumps and wheel house needed in the near future is estimated to be in the neighborhood of \$2,250,000. This is a sound business proposition based upon the fact that the interest on this investment is very much less than would be the cost of fuel to generate steam for an equivalent amount of power for pumping water, developing electricity or for other purposes and for which the city would no doubt find a ready market.

We approve the proposition to extend the intake some 1,200 feet or more from shore and connect the same to the head of the present closed conduit. This will give a much better quality of water than is now drawn from shore, both as regards appearance and hygienic quality, and also give a water which is easy to filter.

We do not anticipate any serious trouble from frazil at such an intake, but it may be that water will have to be drawn occasionally from near shore.

The only feature upon which the St. Lawrence water, from the proposed outer lake, compares unfavorably either with the shore water at the present intake or water from the Ouareau river, is with respect to hardness. We do not consider this to be an unsatisfactory feature because during the winter months the city of Montreal has been accustomed to using this water with satisfaction. Furthermore,

it is a very similar water, as to hardness, to that used satisfactorily by various cities and towns located on the Great Lakes, and it is practically as soft as is the softened water at several places where, in the middle west, softening works have been introduced to improve the quality of waters of excessive hardness.

The most suitable method of filtering the St. Lawrence water from the proposed outer intake is by double filtration. For a plant having a rated capacity of 50,000,000 imperial gallons daily it is estimated that the investment cost, exclusive of land, will be \$1,445,500, and that the annual cost of operation and maintenance, including the fixed capital charges on the investment, will be \$130,900 for this quantity of water.

The filtered water from the St. Lawrence river, pumped by water power, will give an improved supply of a quality as satisfactory as a filtered gravity supply from the Ouareau river and at very much less cost.

In conclusion, we recommend that steps be taken to carry out promptly the construction of the proposed outer intake with connecting pipes, that the necessary appurtenances be installed for the utilization of the additional power to be developed by the enlargement of the power canal or aqueduct now in progress, and that double filters, substantially as described in this report, be built on land near the foot of the aqueduct and adjacent to the present low level pumping station.

As to the date of completion of the filtration works, it is feasible to build them under favorable conditions, in about 30 months, if the preparation of plans is promptly authorized, so that the principal work may be placed under contract in the early spring of 1911. In the meantime construction may proceed on the new intake and some other appurtenances, with the safe quality of the water supply assured by the careful maintenance of the present sterilization plant.

Sulphur-sand joints were used for the small sanitary sewers of the new sewerage system of Louisville, Ky. Joints of a mixture of sulphur and fine moulding sand in equal parts were first tried; these developed radial cracks, and 12 hours after pouring the entire joint loosened. After tests of various mixtures the one which proved most satisfactory, according to the report of Mr. J. B. F. Breed, chief engineer, and Mr. Harrison P. Eddy, consulting engineer, to the Sewerage Commission, consisted of 6 parts fine moulding sand, 4 parts screened Ohio river sand and 10 parts sulphur. The river sand was passed through a No. 20 sieve. With this mixture the joints did not loosen, and the radial cracks occurred rarely. It was found that the mixture began to melt at 201 degrees Fahr., was fluid at 261 degrees, was slightly viscid at 302 degrees, and would not pour at 315 degrees. The material hardens rapidly, and while still warm is coated with hot tar pitch as a further precaution against leakage. The practice at Louisville has been to pour joints in three or four pipe lengths in cradles on the ground surface and those between sections of jointed pipe in the trench. An asbestos jointer with spring clamp was used. Briquettes made of sulphur and sand of the proportions used on the work showed a tensile strength of 520 to 640 pounds per square inch.

J. B. O'Brien, of Renfrew, Ont., who has a contract for the construction of 800 miles of the National Transcontinental, was in Toronto last week purchasing supplies. Mr. O'Brien has built 436 miles in northern Ontario.

Mr. D. P. Roberts, city electrical engineer, of London, Ont., has been appointed electrical expert and inspector for the British Columbia Government.

Clearance and Grade Requirements for Carrying Highways Over or Under Railway Lines.

The physical laws for grade separation are summed up in two:

1. The structure carrying the upper line of traffic must be sufficiently high above the lower traffic way to clear all objects passing on the latter;
2. The grade on either traffic way, approaching the crossing, must be practicable for the traffic thereon.

The maximum height of loaded vehicles and any objects thereon on city streets or country highways has been accepted as 14 feet. This height is also sufficient to clear regular street railway traffic. While higher objects are moved along roads occasionally, it is properly not considered necessary to endanger the practicability of crossings under railways to accommodate them.

The vertical clearance, top of rail to bridge, required over railway tracks, is in most cases much higher than over highways, and this constitutes, in the great majority of cases, the insurmountable obstacles to grade separation. The highest fixed projection on an ordinary railway train is the locomotive smoke stack, and passenger cars project higher than the great bulk of freight cars; but some, comparatively extremely few, special freight cars are higher than either passenger cars or locomotive stacks. The extreme clearance requirement is for height, top of rail to running board, of highest car, height of brakeman added thereto, and a further allowance for contingencies, among which may be height of load of light material on an open car exceeding maximum box car height.

There are, at the present time, on the railways of standard gauge in the United States, Canada and Mexico†, about 2,377,282 freight cars of all kinds. They classify as to height, rail to running board, as follows:

	Per cent.
Under 12 feet, including flat, gondola and tank cars..	63.1
12 feet to 13 feet	23.4
13 feet to 13 feet 6 inches, inclusive	11.9
13 feet 6 inches to 14 feet, inclusive	0.65
Over 14 feet	0.95

Limits of car dimensions are fixed by clearance outlines on the various railways. A composite clearance limit diagram for 90 railways, including all Canadian trunk lines, has a height of 14 feet 6 inches, limiting "over all" height of cars to this figure and practically limiting height of top of running board of freight cars to 14 feet. In the St. Clair tunnel, Grand Trunk Railway, the clearance height at width of 3 feet is 14 feet. It is true that on many divisions or branches of the lines considered, the clearance is somewhat greater than shown in the composite diagram referred to, while on the other hand, it is less on a number of main lines, and on many branch lines.

The limit of grade, approaching crossings, can for railways be taken as between 0.5 per cent. and 1 per cent. For city streets a grade of 5 per cent. is in most cases extreme and it should be so for main country highways. A preferable maximum grade for roads is 4 per cent., and 3 per cent. is materially better. This works out as follows:

- For 5 per cent. grade $20 \times 2 = 40$ feet length of approaches for every vertical foot of clearance.
 For 4 per cent. grade $25 \times 2 = 50$ feet length of approaches for every vertical foot of clearance.
 For 3 per cent. grade of $33 \text{ feet } 4 \text{ inches} \times 2 = 66 \text{ feet } 8 \text{ inches}$ length of approaches for every vertical foot of clearance.

Any gain, by curtailment of vertical clearance requirement, or by change of railway grade, or by both, means corresponding shortening of road approaches, at the high ends. Such a gain of 1 foot may greatly reduce the cost of a given grade separation, making it practicable when it would not

otherwise be so. A vertical gain of 2 feet would mean a very large addition to the number of practicable grade separations.

The extreme allowance that should be made for brakeman on a car must not exceed 7 feet: 6 feet 6 inches will clear any brakeman unless he should be over 6 feet tall, and 6-foot brakemen are not common, to say the least. The necessity for brakemen on the tops of cars is becoming less and less, and has in many cases disappeared, rules and regulations of railway companies to the contrary notwithstanding. The air brake is now universally used in train control.

The Pennsylvania Railroad makes it a rule to avoid all grade crossings on new work, and has within the last nine or ten years eliminated over 50 per cent. of all its grade crossings on main lines. To do this clearance must be made as low as possible. Overhead bridges are as low as 16 feet 6 inches above the top of rail, while many are 18 feet 6 inches and less. Twenty-one feet, the standard for signal bridges, is recognized as the highest clearance for which there can be any need. In New York State many overhead bridges are only 18 feet above the top of rail, and this is the case also in Massachusetts and in other States. The New York Central & Hudson River Railway has asked for 16 feet or $16\frac{1}{2}$ feet clearance for all overhead bridges within the electric zone, extending 16 miles from the Grand Central Station, in the city of New York.

It is submitted that with conditions as they are and more so with regard to the future, 20 feet ($13\frac{1}{2}$ feet for car and $6\frac{1}{2}$ feet for man), is a reasonable vertical clearance. It has been shown that $13\frac{1}{2}$ feet covers the height to running board of all but a very small percentage of freight cars now in use, and that cars higher than 14 feet to running board, i.e., higher than 14 feet 6 inches "over all," or to top of brake rod, can only to a limited extent traverse beyond their home railways. That higher cars will be economical or practicable is as little probable as that the gauge of railways will be widened or their entire structure changed. For a vertical clearance requirement greater than 21 feet (14 feet plus 7 feet), there can, in any event, be no conceivable rational need.

In Massachusetts there is a special Grade Crossing Commission. The minimum clearance required by this commission is in general 18 feet. Connecticut and Rhode Island also specify 18 feet. In New York the Public Service Commission requires 21 feet clearance where practicable, many lower bridges are built throughout the State, some, as already stated, are as low as $16\frac{1}{2}$ feet. New Hampshire, Ohio and Indiana require 21 feet. The only States requiring more are Illinois and Vermont, where 22 feet is specified, but exception is made where this height is not practicable.

In Canada, the Dominion Railway Act of 1904 specifies a minimum clearance of 22 feet 6 inches, above rail level (allowed to mean base of rail) for bridges over railways, with no deviation except by leave of the Board of Railway Commissioners; and this board has hitherto not allowed a deviation in any case.

Nova Scotia Civil Engineers' Convention

The fourth annual convention of the Nova Scotia Society of Civil Engineers was held recently in Halifax.

The papers read included: "Water Powers of Nova Scotia," by W. G. Yorston, C.E., and "Recent Developments in Technical Education," by F. H. Sexton, Director of Technical Education, Nova Scotia.

Mr. Sexton referred to what was being accomplished in the United States and at Halifax, N.S. Excellent evening courses in engineering are provided by the Cooper Union, New York, and the Polytechnic Union, at Brooklyn. Degrees are obtainable in this way at both institutions. The Technical School at Halifax is planning to emulate the example of the universities of Chicago and Wisconsin by es-

* From a paper by W. H. Breithaupt, M. Can. Soc. C.E., read before the Canadian Society of Civil Engineers.

† Official Railway Equipment Register.

tablishing correspondence courses. These courses will afford the opportunity for training to students in remote districts who would otherwise, perhaps, have no chance of taking up the work. An interesting feature of the work at the Halifax Technical College is a course in highway construction in which attention is concentrated mainly upon the practical side of road building. The subjects considered are the location of roads, road building, road maintenance, road machinery, culverts and small bridges. Investigations of cost are an important branch of this work.

The following officers were elected for the ensuing year: President, J. W. MacKenzie, Halifax; 1st Vice-President, P. A. Freeman, Halifax; 2nd Vice-President, W. G. Yorston, Sydney; Secretary and Treasurer, J. Lorne Allan, Dartmouth.

Among the events of the session was a visit to the municipal lighting and stone crushing plant at Dartmouth.

The R. A. I. C. at Winnipeg

Many Important Subjects Discussed at Annual Gathering—Protecting the Interests of the Canadian Architect

At the annual convention of the Royal Institute of Canadian Architects held last week in Winnipeg, the following officers were elected: President, F. S. Baker, Toronto (re-elected); Vice-Presidents, J. S. Resther (Montreal), Edmund Burke (Toronto), S. Frank Peters (Winnipeg); Hon. Sec., Alcide Chausse, Montreal; Hon. Treas., J. W. H. Watts, Ottawa.

President F. S. Baker touched upon some vital matters in his annual address. He made special reference to the subject of protecting Canadian architects. Mr. Baker said in part: "Among the important questions you will be asked to consider will be the federation of the provincial associations with the institute; the employment by Canadian capital of architects practising in the United States, who have no other interests here than the commission which they derive from their plans. The work of the skilful gentlemen may have assisted the architects of Canada, but we feel that the time has arrived when Canadian architects can do the work. The only evident manner in which this object can be attained is through placing a heavy import duty on the services of foreign architects. With us this is purely a matter of self-protection. We are always ready to meet and welcome visiting architects, but I think that it should be the object of this institute to protect its members as other bodies protect theirs."

The Canadian Manufacturers' Association promised co-operation if Canadian material were specified by the architects.

A topic which provoked much discussion during the ses-

sion was the seizure by the Customs officials of the plans for the new Bank of Montreal at Winnipeg. These plans were brought into Canada from the office of the architects, Messrs. McKim, Mead & White, of New York, via Montreal, and had been in the Winnipeg office in the McArthur building since last March.

According to Mr. J. N. Semmens, the Winnipeg representative of the New York architects, all Customs duties and fees were paid at the port of Montreal, but the Customs officials were not satisfied.

A resolution was passed requesting the Dominion Government to raise the duty on the plans of foreign architects to be used in Canada. It was also decided to apply for amendments to the charter of the institute to provide for the federation of all provincial architects' associations under the auspices of the institute.

Railroad Construction and Poetry

Poetic effusions from railroad construction camps are not what one would expect, but, according to "Engineering and Contracting," nearly all such camps had their hobo poets before the Irish and other foreign laborers drifted into the cities and became ward politicians and policemen. These artists usually selected some smooth board or plank that happened to be lying around the camps, the sides of wagon boxes, bottoms of new wheeled scrapers and the surfaces of any other tool or board about the camp that a lead pencil could be worked over. These verses would be the talk of the camps for weeks, and all the "men of letters" 'about the camps could repeat them by heart; but they seldom got into print, and the rains, sand storms and natural wear on the equipment soon blotted out all records.

The following stanza, signed "Sub-Contractor," has a Miltonian essence about it that will appeal to anyone of aesthetic tastes:

Who comes with Faber sharpened keen,
With profile long and sober mien;
With transit, level, book and tape,
And glittering axe to swat the stake?
The Engineer.

The manner in which one of the engineers "came back" at "Sub-Contractor" will appeal to even those whose tastes are not aesthetic:

Who is it that cusses the engineer,
And says that the classification is weird and queer;
Who signs a contract dashing, gay and bold
And later swears specifications stale and old?
Who takes Class "D" at a sure losing price,
And wants it called "A" so his profit will be nice?
The Contractor.

Tenders

A few dollars spent in advertising
your proposals in

The Contract Record

would result in additional competition,
which might save your city or town or
your client many hundreds of dollars.



The "Simplex" Stone and Marble Cutter

This tool is furnished with adjustable blades for both free-stone and marble, the blades being replaced when worn. The new blades are cheaper than sharpening the solid tools and save a lot of trouble. They give perfect satisfaction. We also supply double tooth cutters for stone planing machines.

Bailey-Underwood Co., Limited New Glasgow, N.S.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bradford, Ont.

Prof. Day and Engineer Baird gave a very encouraging report as to the feasibility of draining the marsh land.

Belleville, Ont.

Tenders were invited until September 5th for construction of sewers for the following streets: William and Charles, Chatham, and Ann. Jas. G. Lindsay, city engineer.

Fort William, Ont.

See "Public Buildings."

Kingston, Ont.

The council defeated the motion for permanent pavements for this year.

Longueuil, Que.

The town of Longueuil are planning the extension of the present sewer system to meet the requirements of the new military barracks and school.

New Liskeard, Ont.

The waterworks extension by-law was carried.

Ottawa, Ont.

A conference is to be held between the city engineer and the fire chief in regard to the purchase of more hydrants.

Tenders addressed to the Board of Control will be received until September 18th for asphalt pavement on Wellington, Flora, Melgund and Anne. Specifications at City Engineer Ker's drafting office.

Sydney, N.S.

Two hundred feet of concrete sidewalks is to be laid on Dorchester street this month, as well as 1,300 feet combined curb and gutter on George street.

Extensions to the water main at Sydney will shortly be made to the extent of half a mile, under the supervision of D. McD. Cameron, city engineer.

Trenton, Ont.

Tenders addressed to G. W. Ostrom, town clerk, will be received until September 19 for construction of sedimentation tank in concrete and providing and laying sewers: 890 feet of 15 inch, 665 feet of 12 inch, 987 feet of 8 inch. Plans, etc., at the offices of the engineer or town clerk. Engineer, T. Aird Murray, 303 Lumsden Building, Toronto.

Virden, Man.

Tenders addressed to J. F. C. Menlove, secretary-treasurer, will be received until September 15th for grading and gravelling of road, etc. Specifications at municipal office.

Vancouver, B.C.

The following tenders were referred to the city engineer for tabulation: Second avenue paving, Hassam Paving Company, \$61,000; bitulithic paving of Tenth avenue, from Granville street to Laurel ave-

nue, Warren Construction Company, \$35,547; wood block paving Fourth avenue, from Cedar to Maple streets, Palmer Bros. & Henning, \$21,800; M. P. Cotton & Company, \$22,255; two and one-half miles of concrete work, M. P. Cotton & Company, 15 cents per square foot. For sewer pipe, according to specifications submitted:—Evans, Coleman & Evans, vitrified pipe, 3-foot lengths, 10-inch, 29½ cents; 12-inch, 37 cents; 14-inch, 55 cents; 18-inch, 80 cents; 20-inch, \$1.14½; 24-inch, \$1.99½. Dominion Glazed Cement Pipe Company, cement pipe, 2-foot lengths, 10-inch, 39 cents; 12-inch, 50 cents; 14-inch, 75 cents; 16-inch, 95 cents; 18-inch, \$1.20; 20-inch, \$1.50; 24-inch, \$2.25.

City Engineer Celmé has recommended the construction of a pipe sewer of the combined system, varying in size from 12 to 18 inches in diameter, in the lane east of Granville street from Georgia to Pacific, westerly along Pacific to Granville street. (Passed.) A sewer was also recommended to be placed on Glen drive, from Eighth to Fifteenth avenues, varying in size from 18 to 36 inches. Probable cost of this work is \$18,400. A 42-inch sewer will be constructed on Semlin drive, from Triumph to Pandora streets, to cost approximately \$5,000. This sewer will be constructed of brick and tile.

Winnipeg, Man.

The city council will purchase ten or more deodorizers at \$75 each, and will pay 20 cents per day per machine while the machines are under test.

AWARDED.

New Westminster, B.C.

The contract of the Hassam Paving Company at \$62,800 for Columbia street, etc., was accepted.

Prince Rupert, B.C.

Contract for plank roadway was given to La Trée at \$782.45, and the grading to Swanson at \$3,822. In the latter the city engineer tendered at \$4,000.

Saskatoon, Sask.

Harry Welch, this city, was given the contract for laying water mains and sewer pipe at \$1,045, or \$2.90 per lineal foot.

St. Catharines, Ont.

The tender of Thos. Riley for the construction of the following sewers was accepted: Louisa street, \$1,650; Lake avenue, \$1,200; Edmond street, \$644. Manholes for the above sewers, \$9.65.

Toronto, Ont.

The contract for sewer construction in township of York was awarded to John Maguire, Spadina road, at \$4,000. F. B. Goodman tendered at \$4,330; E. J. Elliott at \$4,079.

Railroads, Bridges and Wharves

Brockville, Ont.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until September 21st for the construction of pier here. Plans, etc.,

at office of J. G. Sing, district engineer, Toronto, and on application to local postmaster.

Battleford, Sask.

President Hays, G. T. P., is the authority for the statement that the line from Battleford to Wainwright will be started this fall. Surveys have been made and excellent grades secured.

Bonaventure, Que.

Tenders addressed to S. Poirier, secretary-treasurer, will be received until September 12th for construction of two concrete pillars on the Bonaventure river, in preparation for construction of iron bridge. Plans, etc., on application to the above mentioned, or to the Department of Public Works, Quebec.

Cochrane, Ont.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, will be received until September 14th for approximately 7,543 gross tons of 80-lb. steel rails with the necessary rail fastenings delivered f.o.b. on or before October 1st.

Edison, Alta.

"See Business Buildings, Awarded."

Fredericton, N.B.

Tenders are being invited by Public Works Department for construction of Porter Millstream Mouth bridge in Charlotte county. Chief Commissioner Morrissey.

Galt, Ont.

Tenders were received up to September 2nd for the piers and abutments for a Grand river bridge.

Hamilton, Ont.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until September 28th for construction of wharf and two retaining walls here. Plans, etc., at above Department and at the offices of H. J. Lamb, district engineer, London; J. G. Sing, Toronto, and on application to local postmaster.

London, Ont.

City Engineer Wright has been instructed to prepare estimates of the cost of a bridge at the Wharnciffe road, connecting South and West London, and the council was recommended to submit a by-law to the people next January to raise funds for this purpose.

Montreal, Que.

It is reported that a new wharf will be constructed at St. Helen's Island this fall.

Owen Sound, Ont.

Mr. John B. Tanner, of the firm of Nau, Tanner & Rusk, Cleveland, Ohio, has been here in connection with the project of connecting Menford and this place by rail. Noted previously.

Penticton, B.C.

The by-law granting \$25,000 to the Kettle Valley Railway has been carried. The

measure was passed on an understanding with President Warren that the town would be a divisional point and extensive yards and car shops would be constructed there.

St. John, N.B.

Sir Robert Perks and Hon. Mr. Pugsley will confer here in regard to the site for the proposed dry docks at St. John.

Sydney, N.S.

Tenders have been called by the city for the construction of a 200-foot steel bridge to be built over the river on Whitney avenue.

Victoria, B.C.

(See "Business Buildings.")

Vancouver, B.C.

Plans have been practically completed for the causeway to be built over Coal Harbor, but have yet to be accepted by the council. According to the plans as prepared by the city engineer's office, the causeway will be 150 feet wide, sufficient room to allow of two concrete walks 20 feet wide, two boulevards 20½ feet wide and a roadway of 64 feet. The outer or retaining walls will be constructed of stone, and the centre portion filled with earth. Total expenditure, \$100,000.

Plans and estimates covering the proposed viaducts connecting Georgia and Harris streets and Dunsmuir and Keefer streets, have been placed before the council committee and are as follows: No. 1.—Georgia street to Harris street, with 42-foot clear roadway, two seven-foot sidewalks and double track tramline, \$415,000; No. 2.—Similar to No. 1 except as to provision of 50-foot roadway, \$459,000; No. 3.—Dunsmuir street to Keefer street, with 42-foot roadway, two seven-foot sidewalks and double track tramline, \$350,000; No. 4.—Similar to No. 3 except with provision for 50-foot roadway, \$387,000; No. 5.—Similar to No. 3 with omission of tramline, \$281,000; No. 6.—Similar to No. 4 with omission of tramline, \$313,000. The above estimates are stated to cover the entire cost of the structures, engineering expenses, etc., but do not take into account the expenditure for necessary land or compensation for buildings to be altered, etc.

Wallaceburg, Ont.

Tenders are being called until September 10th for erection of two steel bridges. H. E. Johnson, town clerk. For particulars see advertisement in "Tenders and For Sale Department" of this issue.

West Toronto, Ont.

Plans for the substitution of subways for the level crossings at Elizabeth street, Scarlett road and Jane street have been submitted to the Council of the Township of York.

Winnipeg, Man.

The main plans for the viaduct for the C. N. R. from the new Assiniboine bridge to the present right of way along the Red river have been approved by the civic committee.

AWARDED.

Cornwall, Ont.

Mr. G. R. Phillips, of Cornwall, has been awarded the contract for building a large wharf at Metashquan, Saguenay county, Que., by the Dominion Government. The wharf will be 400 feet long, and 30 x 20 feet in width. The work on the wharf at Metashquan will not be commenced until next spring.

Toronto, Ont.

E. C. Lewis, 16 Close avenue, has the contract for filling and grading the approaches to a concrete bridge over the Humber river at 70 cents a cubic yard for filling and \$1.50 a cubic yard for gravel surface. Messrs. Barber & Young, York county engineers.

Weston, Ont.

E. C. Lewis was awarded the contract for the Weston road viaduct at \$17,066. The city engineer's tender was over \$19,000.

Public Buildings, Churches, Schools, etc.

Antigonish, N.S.

St. Francis Xavier College are building a science building here to cost over \$50,000. It is 100 by 50 feet, 3 storeys, of brick and stone. J. A. Schweinfurth, of Boston, Mass., is the architect, and the contractors are McNeill Bros., also of that city.

Chilliwack, B.C.

Thos. Hooper, of Vancouver, has been appointed architect for the City Hall.

Carleton Place, Ont.

C. J. Burritt, architect, Ottawa, Ont., is preparing plans for a new Masonic hall at Carleton Place, to be of brick, trimmed with stone.

Durham, Ont.

See "Business Buildings."

Fort William, Ont.

Tenders addressed to R. E. Mason, architect, were called until September 3rd for erection of skating and curling rink.

By-laws to raise money for civic improvements will be submitted shortly and are as follows: \$16,000 to improve and enlarge the central and ward four fire halls; \$7,000 for cemetery purposes; \$65,000 for a court house and police station (building and site); \$14,000 for extensions to the water works; \$22,000 for improvements to certain streets; \$12,000 for improvements to the city hall.

Galt, Ont.

Tenders will be received until September 10th for the erection of a vault in the town hall. Edw. O. Fuce, town engineer.

Halleybury, Ont.

Moran, McPhail & Thompson are the architects for a stone church here for the erection of which tenders were called on the 1st inst.

Kingston, Ont.

Tenders are being called until September 20th for the trades required in the erection of the Nicol Building for the School of Mining and Agriculture. Power & Son, architects. Advertisement in "Tenders and For Sale Department" of this issue.

The dormitory at Royal Military College will have to be extended. Present plan of extension disapproved by public works chief architect.

Levis, Que.

Fire damaged to the extent of \$3,000 the east wing of St. Joseph de la Deliverance.

Montreal, Que.

The \$200,000 required for the Notre Dame Hospital has been secured. Judge Loranger is authority for the statement

that the old one will be renovated to be used until the new one seems feasible.

Further extensions and deeper foundations will have to be made in connection with the erection of Montreal General Hospital's new buildings on Dorchester street, and when the work is completed it will cost \$700,000. The extra expenditure will be raised by public subscription. Architects, E. & W. S. Maxwell, 6 Beaver Hall Square. General contractors, John Stewart & Company.

Prince Rupert, B.C.

Plans for the first section of the quarantine station for Prince Rupert are under consideration. Estimated expenditure, \$25,000. Director of Public Health for the Dominion, Dr. Montizambert; Dr. A. T. Watt, Superintendent of William Head Quarantine Station.

Quebec, Que.

Tenders addressed to Hon. L. A. Taschereau, Minister of Public Works, will be received until September 17th for construction of new library annexed to present Quebec Parliament Buildings. Plans, etc., at office of Messrs. Marchand & Tanguay, associate architects, Quebec. Alph. Gagnon, secretary, Department of Public Works.

Saskatoon, Sask.

Architects E. & W. S. Maxwell, Montreal, Que., are preparing plans and specifications for the erection of a Roman Catholic Cathedral.

Swift Current, Sask.

A by-law to raise funds for a hospital here will be submitted to the ratepayers shortly. It is estimated that \$25,000 will be required.

Sydney, N.S.

Tenders addressed to J. J. Curry, secretary, Public School Board, were called until August 29th for work required in Central school.

The congregation of St. Andrew's Presbyterian Church are at present building a new edifice which, when completed, will be one of the finest in Sydney. It is being built of brick, with stone facings. Rhodes, Curry & Company are the contractors.

Alterations to the town hall, Sydney, N.S., are about to be made. The interior will be remodelled and general repairs effected to the exterior.

Toronto, Ont.

Permits for two buildings for the new Toronto General Hospital were issued. One is the emergency building, basement and one storey, to cost \$30,000. The other is the out-patients' building, basement and two storeys, to cost \$100,000. The material will be steel, brick, and terra cotta.

Tenders for construction of bird and monkey house at Riverdale Zoo are being called until September 13th. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders are being called for erection of Manning avenue school until September 9. W. C. Wilkinson, secretary-treasurer. Advertisement in "Tenders and For Sale Department" of this issue.

Victoria, B.C.

Tenders have been invited by the provincial public works department for the erection of new school houses at Langley, Okanagan Landing and Yale Road.

Welland, Ont.

Architect Pont, of Welland, is now engaged preparing plans for a new rink to

replace the one destroyed by fire a year ago.

AWARDED.

Albarni, B.C.

The contract for the erection of an addition and for general improvements to the Albarni public schools has been awarded to B. Woram.

Enfield, N.S.

T. O. Clatworthy Hampton was awarded the contract for erection of school in S. S. No. 15 Darlington, at \$1,900.

P. Pascoe, secretary, writes that work has ceased and the school will not likely be built this fall.

Lethbridge, Alta.

The contract for erecting the Fleetwood school was awarded to Smith Bros. & Wilson, material stone, \$55,050. With concrete blocks the amount would have been \$54,250. Others tendered on stone as follows: W. Rex Virtue, \$56,553; D. E. Wilson, \$59,000; Doyle & Thomas, \$61,624. On concrete blocks, W. Rex Virtue, \$53,128; D. E. Wilson, \$56,000; Doyle & Thomas, \$58,124. The contract for plumbing and heating was awarded to the Standard Plumbing Company at \$12,637. Others tendered as follows: Wm. Head & Company, \$12,699; Western Plumbing Company, \$13,295; Hick-Sehl Hardware Company, \$13,387.

Montreal, Que.

Martineau & Prenoveau have been awarded the contract for alterations to the property of the Fabrique de L'Enfant Jesus. Architect, Joseph Venne.

Moose Jaw, Sask.

The contract for the Market building was given to Navin Bros. for the sum of \$20,100, and the heating and plumbing of the buildings will be carried out by Frost Bros. at a cost of \$2,100.

North Toronto, Ont.

The following is the list of successful tenderers for new school at Bedford Park: Masonry, Mr. H. Jennings, \$8,172; plastering, F. Goulding, \$1,175; heating, Mr. Gray, \$1,143.78; plumbing, Mr. Gray, \$343; painting, Mr. Hubbard, \$315; carpentering, Messrs. Baxter & Skipper, \$4,300; metal sash, \$318; and finishing hardware, \$100. Total, \$16,156.78.

Quesnel, B.C.

John Strand, a local builder, will construct the new hospital. Estimated outlay, \$3,000; The outlay will be about \$3,000, practically all of which has been collected or subscribed.

Toronto, Ont.

The Board of Control awarded the following contracts for the construction of the new telegraph fire alarm building and offices for the Fire Department on Adelaide street west. Alarm Building — Masonry, John McMurren, \$10,373; plastering, Dodge & Son, \$2,510; roofing, Mathews, Limited, \$1,238; painting and glazing, W. H. Johnston, \$838; electric wiring, W. J. Maguire, \$141; plumbing, Fred Armstrong Company, \$493; heating, Bennett & Wright, \$893; tiling, Vokes Hardware Company, \$122; total, \$16,613. For the office building — Masonry, Fussell & Thomas, \$9,611; painting and glazing, H. W. Johnston, \$387; roofing, Reggin & Spence, \$224; plumbing, Fred Armstrong Company, \$772; plastering, Beane & Company, \$1,050; electric wiring, W. J. Maguire, \$129; tiling, Vokes Hardware Company, \$144; total, \$13,084.

Residences

Hamilton, Ont.

The following building permits have been issued: Wm. Lyon, two brick dwellings, Argue street, \$4,400; James Bryers, brick dwelling, Fairleigh crescent, south of Delaware avenue, for C. V. Laings, \$3,200.

Montreal, Que.

Mr. Alphonse Piche, architect, Victoria Building, has prepared plans and specifications and tenders are being invited for the erection of two cottages at Belisle, Que., for Mr. A. Martel.

Ottawa, Ont.

Recent building permits include: Dr. J. E. Taggart, brick and concrete dwelling, Clemow avenue, \$12,500; T. J. Somerville, two detached dwellings, Spadina avenue, \$4,000; Dr. M. O. Klotz, alterations to dwelling and surgery, Somerset street, \$2,000; T. C. James, solid brick dwelling, Canal street, \$12,000; Patrick Finn, alterations to dwelling, Rosedale avenue, \$2,400; H. L. Morrison, brick veneer dwelling, Ossington avenue, \$2,000; O. K. McDonald, brick veneer dwelling, Arlington avenue, \$2,500.

St. Catharines, Ont.

Tenders will be received until September 7th for the trades required in the erection of a residence for Dr. W. J. Chapman, on Church street, and also for improvements on frame house on the same premises. T. H. Wiley, architect.

Winnipeg, Man.

Permit was issued to C. S. Shipman, apartment house, on Bannatyne, \$50,000.

AWARDED.

Edmonton, Alta.

The contract for First Presbyterian Church manse has been awarded to Grant & Company, Strathcona. Wilson & Herald, architects.

Strathcona, Alta.

The contract for a residence here for Mr. J. W. Tipton was awarded to Grant & Company. Wilson & Herald, this city, architects.

Business Buildings and Industrial Plants

Albarni, B.C.

The recently formed merger of four of the largest lumber companies in this province, known as the Canadian Pacific Lumber Company (capital, \$5,000,000), it is stated, will erect at New Albarni a large mill upon the completion of the E. & N. Railway extension from Nanaimo. The following companies are included: Canadian Pacific Lumber Company, of Port Moody, the Barkley Sound Cedar Company, of Port Albarni, the Anglo-American Lumber Company, Vancouver, and the Gibbons Lumber Mills, Arrow Lakes.

Berthier, Que.

Fire caused \$30,000 loss to Mr. J. D. Chenard's saw mills at Berthier, Que., on the 31st ulto.

Dominion City, Man.

The Ridgville Hotel and two unoccupied stores adjoining, were completely destroyed by fire on the 31st ulto.

Durham, Ont.

By-laws granting a loan of \$20,000 and exemption from taxation to the Durham

Furniture Company for extension of their business and one for the purchase of a new market site were carried.

Fournier, Ont.

The store of J. M. Lapointe (loss, \$5,000) with other buildings were destroyed by fire on the 29th ulto.

Hamilton, Ont.

Plans for the new addition to the Pure Milk Corporation's plant have been prepared by Mr. A. F. Peene, architect. Contracts have also been let.

The Hamilton Bridge Works Company has taken out a permit for the erection of a concrete and steel addition to its factory building on Tiffany street, to cost \$10,000.

Kingston, Ont.

Fire destroyed the Moscow Cheese and Butter Factory, owned by F. P. Johnson, on the 2nd inst.

Maisonneuve, Que.

There will be a new shoe factory at the corner of Desjardins and Ernest avenues, owned by Mr. Stobbo, who also operates a factory in Quebec. Mr. Stobbo has been granted exemption from taxes for ten years on the understanding that the factory be commenced this fall.

Montreal, Que.

The stables and grand stand of the Delorimier Park racing track were destroyed by fire on the 1st inst.

Plans and specifications for the new building to be erected for the National Acme Manufacturing Company, Ontario street east, may be seen in the office of Mr. E. L. Baugh, 107 St. James street. Noted previously.

Building Inspector Chausse has received an application from a large firm in Port William, for a permit to erect a grain storage warehouse and elevator on the canal bank at the foot of Dominion street, west Wellington bridge.

Plans for the elevated entrance of the G. T. R. Company to their Bonaventure station are nearing completion and will be submitted to the Railway Commission at an early date. Should this important work go through, it will mean the erecting of a mammoth station to replace the present Bonaventure station which has been contemplated for some time and considered most likely in view of the fact that the company own the adjoining properties on Chabouillez Square, Cathedral and St. James streets.

New Liskeard, Ont.

J. P. McLaren, architect, Ottawa, is calling for tenders until September 14th for a bank building.

The by-law to guarantee the bonds of C. B. Mathews, who was to erect a flour mill, was defeated.

North Vancouver, B.C.

The B. C. E. R. Company will erect a large and commodious barn for the storage of twelve cars. The work will be commenced without delay.

New Glasgow, N.S.

W. P. McNeil & Company, of New Glasgow, N.S., the well-known firm of Eastern Provinces Bridge Builders, are putting up a large addition to their plant which will treble the present capacity. Three electric cranes have been installed in the new building, which are operated by the company's own electrical plant, to facilitate

the handling of stock. This company has a number of large contracts on hand for this year.

Penticton, B.C.

See "Railroads."

Phoenix, B.C.

It is stated that the Granby Company will rebuild their buildings recently destroyed by fire.

Portage la Prairie, Man.

Mr. H. E. Finch, manager of the Rogers Fruit Company, Grand Forks, is the authority for the statement that the postponement of their plans for building here was only temporary.

The plans for the new Hart Parr building have been returned to the architect, Mr. C. H. Mounsey, with the statement that the building will not take place this fall, owing to the time of the year. The contractors of this city who have submitted the tenders have had them returned with their certified checks. Work will be started in the spring of 1911.

Port Arthur, Ont.

Negotiations between the city and T. McAvity & Sons, Limited, of St. John, N.B., for a factory site, have been concluded. The company will receive ten acres of waterfront property free, and exemption from taxation for twenty years, and other minor considerations, in return for which the city obtains an important iron industry to employ 500 hands. A by-law will be submitted to the people in September.

Saskatoon, Sask.

Brown & Vallance, Montreal, are the architects for the new hotel to be erected at the corner of Second avenue and 23rd street. Estimated expenditure, \$250,000.

St. John, N.B.

The Asepto Soap Company have under consideration the addition of another storey on their building.

Four buildings were destroyed by fire on the 2nd inst. The following were the losers: Samuel Seel, Price & Shaw, the Maybee Woodworking Company, and the Maritime Rug Company. Total loss, \$20,000.

Regina, Sask.

Architects Brown & Vallance, Montreal, are preparing plans and specifications for a warehouse and office building for Sir John Laing in Regina.

Arrangements are nearly completed for the establishment of a factory for the Wild Drug & Spice Company, of Minneapolis, Minn. Local capitalization, \$10,000.

Victoria, B.C.

Following the visit of the president of the company, Mr. C. M. Hays, it is probable that the contract for the office building to face Wharf street will be let.

Vancouver, B.C.

Building permits were issued to the Royal Bank of Canada for an addition to its Westminster avenue branch, \$25,000, and another to Dr. D. H. Wilson for the improvement of his property at Richards and Dunsmuir streets at a cost of \$27,000.

Plans for the new Bank of Ottawa, corner of Seymour and Hastings streets, have been prepared by Architect W. Marbury Somerville, 43 Exchange Building, and call for eight storeys. Estimated expenditure, \$250,000.

Winnipeg, Man.

A proposition is on foot to locate a big flax factory here. The site for the factory, it is stated, is assured. F. W. Heubach, C.

N. Bell, W. Barry, of the Canada Paint Company, and G. F. Given, of Chicago, are interested.

Tenders addressed to the Chairman, Board of Control, will be received until September 8th for supply of labor and material for locomotive shed for C. P. R. J. D. Atchison, architect.

AWARDED.

Edison, Alta.

The contract for the construction of roundhouses, machine shops, and passenger station here, the first divisional point on the G. T. P. west of Edmonton, has been awarded to the May Construction Company, at a price approximating \$75,000. Work is to be commenced at once on the new buildings. The station will be a large handsome building, and will cost about \$15,000.

Montreal, Que.

J. B. Gratton, Limited, 8 Mercier street, have been awarded the contract for the erection of one storey factory building on Stadacona street, for Messrs. B. J. Goghlin Company, Limited. Architect, Gordon Mitchell, Royal Insurance Building.

C. E. Deakin has been awarded the general contract for the erection of a factory building on St. Ambroise street for Messrs. Marx-Rawolle Company of Canada, Limited. Architects, Messrs. Saxe & Archibald.

J. & W. Morrison has been awarded the general contract for the rebuilding of property at 12 Jurors street for Honorable Beck. Messrs. Hutchison, Wood & Millar, architects.

North Vancouver, B.C.

The Ferries Company has awarded the contract for its new offices at the North Vancouver wharf to Messrs. Tuck & Brewer, \$5,000.

Walkerville, Ont.

Donaldson & Meier, 1314 Penobscot Building, Detroit, Mich., have let the following contracts for the 4-storey and basement brick addition, 60 x 130 feet, to the plant of Parke, Davis & Company, Walkerville, Ont., cost \$32,000: Masonry, to Thompson Bros., 26 Pitt street, Windsor, Ont.; carpentry to Victor Williamson, Huron and Windsor roads, Walkerville, Ont.

Power Plants, Electricity and Telephones

Edmonton, Alta.

Reports to the Department of Public Works, Ottawa, with reference to the projected waterway from Winnipeg here, are to the effect that 80,000 h.p. can be harnessed at Grand Rapids, where the junction with Lake Winnipeg is effected. It is stated that this power is capable of development without difficulty and that in addition to stimulating local industry, it would be quite easy to transmit the electric energy to Winnipeg. Preliminary reports on the scheme from the eleven parties now in the field, are expected for the next session of Parliament.

Medicine Hat, Alta.

Time for receiving tenders for two d.c. gas engine driven, 125 kw. alternating current units has been extended to September 12th. M. A. Maxwell, consulting engineer.

Ottawa, Ont.

J. B. McRae has been chosen engineer for constructing new dams at the foot of Gull lake and Long lake on the Mississippi

river, Ontario. These dams of concrete will replace the present wooden structures. The power owners at Carleton Place, Almonte, and other points along the river are uniting in the work.

A new contract has been made by the Hydro-Electric Power Commission for the delivery of 1,500 addition horsepower to be used in Ottawa and Hull, the price to be \$15 per horsepower. Some months ago the Power Commission contracted to deliver 1,500 horsepower to Ottawa, and this was used for municipal purposes, such as lighting, etc. Later the order was increased by 1,000 horsepower. The present order will bring the total delivery up to 4,000 horsepower.

Orrillia, Ont.

At a recent meeting of the council it was decided to spend immediately \$10,000 in improving the power plant. A by-law will be submitted to the ratepayers asking them to authorize the expenditure. The installation of a new unit and greater wheel capacity must, however, follow within a year or two, and this will entail a probable expenditure of from \$25,000 to \$30,000.

Pasqua, Sask.

Tenders addressed to C. A. Mills, secretary Pasqua Southeastern Telephone Company, Limited, will be received until September 10th for construction and installing of telephone line of about 11 miles.

Port Burwell, Ont.

The Dominion Gas Company, of Hamilton, have been successful in striking gas three miles from here. The output is estimated at over 3,000,000 per hour. It is proposed to pipe to Tillsonburg and other points.

Regina, Sask.

Extensions to the light and power plant are considered. City Electrician Bull has a report. It is possible much new equipment will be needed.

St. Thomas, Ont.

At the meeting of the council, Alderman Price and Alderman Chant were authorized to continue the negotiations with Port Stanley in regard to the furnishing of that municipality with power.

Stellarton, N.S.

The Acadia Coal Company, Limited, of Stellarton, N.S., are contemplating the installation of a 2,200 kilowatt electric plant at what is known as the Allan Shaft in Stellarton, to be used in driving their machinery and for general lifting purposes. Should the plan mature this will prove the largest electric plant east of Halifax.

AWARDED.

Ottawa, Ont.

The civic commission has awarded the following contracts for the new conduit from the power station in Hull to the distributing station on Laurier avenue: For transformers, Canadian General Electric Company, \$12,000; cable, British Insulated Cable Company, Montreal, \$16,246; conduit pipe, Eadie-Douglas Company, Limited, \$2,704; manhole covers, J. B. MacLaren, Ottawa, 2¼ cents per pound for cast iron, and \$35 per ton for rails.

St. Thomas, Ont.

The tender of the Canadian General Electric Company for supplying new transformers and purchasing 132 old ones for the local hydro-electric distributing plant was accepted, it being the most favorable of three others. The amount involved is about \$15,000.

Miscellaneous

Montreal, Que.

Recent building permits include: Leon Chaput, 83 First avenue, Emard Ward, two houses containing six dwellings, \$9,000; Isaac Denis, 1360 Chapleau street, house containing five dwellings on Papineau avenue, \$4,500; Felix Hurtubise, 1326 St. Hubert street, two houses containing two dwellings on Alfred street, \$3,000; N. Beauchamp, 299 La Salle avenue, two houses containing four dwellings on La Salle avenue, \$4,000; J. Lamoureux, 1697 Cadieux street, house containing three dwellings on Clark street, \$3,500; J. Riopel, 2816 St. Lawrence Boulevard, house containing four dwellings on Clark street, \$4,000; B. J. Coghlin & Company, 432 St. Paul street, a one storey factory building on Stadacona street, \$2,500; W. Signer, 228 St. Dominique street, house containing two dwellings on Boyer street, \$2,500; H. Frey, 1720 St. Urbain street, house containing two dwellings and store on St. Lawrence Boulevard, \$4,000; Jos. Mailloux, 82 Dufferin street, house containing three dwellings on Delorimier avenue, \$4,600; O. Champagne, 600 Labelle street, two houses containing four dwellings on Huntley street, \$4,000; L. Belisle, 1438 Simard street, house containing two dwellings at 532 Simard street, \$2,800; F. Lapointe, 625 St. Catherine street east, house containing six dwellings on Labelle street, \$7,000; L. Paquin, 1093 Cartier street, house containing five dwellings on Cartier street, \$4,000; Wilf Tardif, 115 Wm. David, Maisonneuve, two houses containing twelve dwellings 86 Marguerite street, \$9,000; Marx-Rawolle Company, of Canada, Limited, a two storey factory on St. Ambroise street, \$19,580; Jos. Perron, St. Hubert street, house containing two dwellings on Beaubien street, \$2,500; D. Lesiege, 285 St. Dominique street, two houses containing two dwellings on St. Lawrence Boulevard, \$8,600; Federal Lumber Company, 1017 Ontario street east, house containing six dwellings, 191 Dorion street, \$5,000; Jos. Chartrand, 689 Mount Royal east, house containing five dwellings on Breboeuf street, \$4,000; N. Fournier, 2677 Esplanade avenue, two houses containing four dwellings, \$4,000; A. Chausse, 1337 Delorimier avenue, house containing five dwellings on Delorimier avenue, \$5,000; D. Mainville, 208 Montgomery street, house containing three dwellings, \$3,000; O. Masson, 234 Delorimier avenue, house containing three dwellings on Dorion street, \$3,000; O. Perreault, 998 Lofontaine Park, house containing three dwellings on Dorion street, \$3,000; D. Blay, 89 Dagenais street, four houses containing twelve dwellings on St. Philippe street, \$10,000; Ideal Savings, Loan & Land Company, 292 St. Catherine street west, house containing store and dwelling, Cote Visitation road, \$2,000; A. Leger, 2339 Notre Dame street west, house containing three dwellings on Parc Etienne Cartier, \$5,000; Hon. Adam Beck, London, Ont., rebuilding of property at 12 Jurors street, \$19,000; James Gardiner, 311 Stanley street, alterations to property on Stanley street, \$2,400; Fabrique de l'enfant Jesus, 1257 St. Dominique street, alterations to property on St. Dominique street, \$8,597.

Valleyfield, Que.

Tenders for the construction of a reinforced concrete conduit across Beauharnois canal will be received until September 7th.

Vancouver, B.C.

Recent building permits include: Bratt & Son, 1557 Parker street, \$3,000; Bentley & Wear, 2617 Fifth avenue west, \$6,000; H. Goldie, 2455 Seventh avenue west, \$2,

600; D. H. Wilson, brick building for stores, Richards street, \$27,000; F. A. Thompson, frame dwelling, 365 Twelfth avenue west, \$6,000; W. H. Hareus, frame dwelling, 150 Fourteenth avenue west, \$3,000; R. M. Finch, frame addition, 1535 Vine street, \$2,500; P. H. Alder, frame dwelling, 1676 Eleventh avenue west, \$5,000; Harvey Templer, frame dwelling, 2485 Sixth avenue west, \$2,700.

Winnipeg, Man.

Recent building permits are as follows: St. Stephen's Church, alterations, \$20,000; J. Thom, house, south side Alexander, between Nena and Tecumseh, \$2,200; G. J. Seale, southwest corner Harvard and Rockwood, \$3,900; G. Philip, house, north side Rosedale, between Lilac and Helen, \$1,500; G. McAuley, house, west side of Alverstone, \$3,500; G. F. Crawley, house, south side of Dorchester, between Lilac and Wentworth, \$3,500.

New Companies

The Modern Power Company, \$25,000 capital, Winnipeg. The directors are:—William Lloyd Williams, commercial printer; Victor Clark Parker, commercial printer, both of Winnipeg.

Winnipeg Steel Culvert Company, \$60,000 capital, Winnipeg. The directors are: Percy S. Joel, accountant; Cecil L. Hamilton, clerk; Roy T. Pickard, real estate agent, all of Winnipeg.

Montreal Hydro-Electric Company, Limited, Montreal, Que., capital \$10,000. Incorporators, Edouard F. Surveyor, K.C., Francis E. McKenna, notary, and Wm. R. Ford, clerk, all of Montreal.

The Ivel Motor Company, Limited, Winnipeg, Man., capital \$300,000. Incorporators, James Stuart, merchant, and Edmund L. Taylor, barrister at law, both of Winnipeg.

Winnipeg Steel Culvert Company, Winnipeg, Man., capital \$60,000. Incorporators, Herbert E. Swift, accountant, and John F. Waller, student at law, Winnipeg.

Canadian Railway Materials Company, Limited, Montreal, Que., capital \$50,000. Incorporators, Pearl R. Diamond, manager, Wm. P. Robertson and Darley Burley-Smith, clerks, all of Montreal.

INVERTED MACADAM CONSTRUCTION.

In reply to a correspondent who asks for a description of so-called "inverted macadam construction," our contemporary, "Good Roads," gives the following interesting particulars:

The method of construction referred to is one which was advocated by A. N. Johnson, state highway engineer of Illinois, in a paper presented at a meeting of the Western Society of Engineers in October 1908. It differs from that ordinarily employed in that the first course is composed of fine material, and the wearing course of large pieces of stone to which a small amount of screenings is added after rolling.

According to Mr. Johnson's specifications a layer of crushed stone varying in size from 3-4 inch to 1½ inch is spread on the subgrade in the usual manner. It is then raked or harrowed in order to give the material an opportunity to follow the natural tendency to separate thoroughly compacted with a roller weighing not less than 10 tons.

The second course is made up of stones varying from 1½ to 3 inches in size, spread to a depth, after rolling, of 2 inches on 6-

inch roads and 4 inches on 10-inch roads. Rolling is carried on as before and is completed before the last course is put on.

The finishing course consists of screenings containing all the dust and including stones up to 1 inch. The screenings are spread in the same manner as the large stones, just enough being used to cover the surface.

The road is finished by rolling and watering, only a small amount of water being used at first to prevent its running through the stone and softening the foundation. The process is continued, additional screenings being put on, watered and compacted wherever the large stones appear at the surface.

Several advantages are claimed for this method of construction, among them the following. The principal function of the bottom course being to distribute the load over the foundation and not to withstand the wear of traffic, the cost may be reduced by using a stone of a quality inferior to that required for the wearing course. The arrangement of the metaling with the small particles at the bottom and the large at the top is in accordance with the natural tendency of similarly graded mixtures to so separate, hence it is argued that greater stability obtains. The same conditions makes possible a surface course made up of fragments of nearly equal sizes. As it has been observed that in a wearing surface in which the particles are graded the smaller ones are ground up first, this uniformity would, it is held, result in a more even wearing down. Furthermore the surface course might be expected to disintegrate more slowly both because the separate stones would grind up less rapidly on account of their large size, and because the interlocking of such pieces is more secure than that of smaller ones.

Roads have been built in this way by State Engineer Johnson and by others and are understood to have given satisfaction.

THE HUDSON BAY RAILWAY.

Strong pressure is being brought by the grain growing and other interests of the western Canadian provinces upon the Dominion Government for action which will bring about the early completion of the railway line to Hudson Bay. This matter was made the subject of earnest representations to the Premier, Sir Wilfrid Laurier, during his recent visit to Saskatchewan, the point being urged that what were equivalent to promises of governmental aid for the Hudson Bay project were largely instrumental in securing the adhesion of the western provinces to the Liberal party. Support from the provinces interested has been secured, but there seems to be some question as to whether the Dominion Government will extend its guarantee to the securities of the new road in a manner which will assure the completion of the project. The latter, in fact, is one which would hardly appeal to private capital. At the present time the Canadian Northern Railway Company has completed and operates a branch of some seventy miles from Hudson Bay Junction to The Pas Mission. From the latter point to Fort Churchill, the proposed terminus on Hudson Bay, is a distance of 490 miles, and the surveys of the route, it is declared, indicate that the construction work would be generally light, there being only two bridges of any size to be built on the entire line. One plan already suggested is for the erection at Fort Churchill of two large grain elevators with a capacity of eight to ten million bushels, the estimates for the entire work being that it would cost about \$19,000,000.

Tenders and For Sale Department

Debentures for Sale

Sealed tenders will be received up till noon, WEDNESDAY, SEPTEMBER 14TH, 1910, for the purchase of \$7,500.00 High School Debentures of the Town of Oshawa. Dated August 3rd, 1910, bearing interest at 4½ per cent. per annum and payable at the office of the Treasurer, Oshawa, in 30 equal annual payments of \$460.45 of principal and interest. Accrued interest to be paid by the purchaser.

The highest or any tender not necessarily accepted.

THOS. MORRIS,
Town Clerk.

36

Board of Education

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received until

Friday Noon, September 9th

for the several trades required in the erection of

New School, Manning Avenue

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in the said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH, Chairman of Committee.
Toronto, Ont.

W. C. WILKINSON, Sec.-Treas.
36



Tenders for

Construction of Bird and Monkey House at River- dale Park Zoo

Tenders addressed to the undersigned will be received by registered post only up to 12 o'clock noon on TUESDAY, SEPTEMBER 13TH, 1910, for the construction of a building in Riverdale Park for the City of Toronto, which building will be known as the "Bird and Monkey House."

Specifications may be seen and form of tender obtained, together with all information relative thereto, at the office of the Parks Department, City Hall, Toronto.

The usual conditions pertaining to tendering, as prescribed by city by-law, must be strictly complied with, and envelopes containing tenders must be plainly marked on the outside as to contents.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman of the Board of Control.
City Hall, Toronto, September 2, 1910. 26

Tender for Steel Bridges

Tenders will be received up to and including the 10TH OF SEPTEMBER, 1910, for the erection of Two Steel Bridges, each 50 feet girders and 16 feet in width. Steel piles backed up with concrete and covering of concrete. Plans and specifications to be seen at the Clerk's Office, Monday, September 5th, 1910.

H. E. JOHNSON,
Town Clerk. 36
Wallaceburg, Ont.

To Contractors

The Reeve and Council of the Township of Morris, County of Huron, are asking for tenders for the construction of four large municipal drains.

Plans, profiles, specifications and estimates may be seen at the clerk's residence.

The tenders will be opened at the Council Chamber, Morris, on MONDAY, THE NINETEENTH DAY OF SEPTEMBER, 1910, at 2 o'clock p.m.

A. MacEWEN,
Clerk.

Bluevale, August 23rd, 1910. 36

To Contractors

Tenders will be received at the office of the Registrar, Queen's University, Kingston, up to 6 p.m. of TUESDAY, SEPTEMBER 20TH, for the several trades works required in the erection and completion of the Nicol Building for the Governors of the School of Mining and Agriculture.

Plans and specifications may be seen at the University and at the office of the undersigned. The lowest or any tender not necessarily accepted.

POWER & SON, Architects,
Merchants' Bank Chambers.
Kingston, Ont. 37

Dredging Plant for Sale

The Toronto General Trusts Corporation, Executor of the estate of Charles E. Goad, will receive tenders for the purchase of a dredging plant and other supplies enumerated below:—

1 double drum engine; derrick scow, orange-peel bucket, chain and blocks complete; 1 engine; 1 drum, 1 steel scoop for dredging; 1 anchor; 1 cable, ¾" wire, 750'; 1 cable, ¾" wire; 4 snatch blocks (in all); 1 wire, ¾" (old), 200'; 1 anchor chain; 1 sail boat, 8' x 21'; 1 water pump (force); 3 split pulleys, 6" x 30"; 1 sett chain blocks; 1 winch; 1 split pulley, 12" x 12"; 1 split pulley, 6" x 12"; 1 weed cutter; 1 sett block and tackle.

Tenders to be addressed to the undersigned not later than the 10th of September, A.D. 1910, and to state cash offer.

Highest or any tender not necessarily accepted. For further particulars apply to

THE TORONTO GENERAL TRUSTS CORPORATION,
Executor and Trustee of the Estate of Charles E. Goad, 59 Yonge street, Toronto. 36

Dredging

Sealed tenders addressed to the Chairman of the Canal Committee of the Council of the Town of Dundas, will be received until SEPTEMBER 15TH, 1910, for Dredging the Desjardins Canal, in accordance with the Jennings award, involving the removal of about 27,500 cubic yards of material. The work to be completed by 1st December, 1910.

Tenders must be accompanied with a certified cheque payable to the order of the Chairman of the Canal Committee, for a sum equal to 5 per cent. of the tenders, respectively, as guarantee for the faithful performance of the contract.

The lowest or any tender not necessarily accepted. Plans and specifications may be seen at the office of

JOHN F. ARMOUR, C.E.,
Dundas. 36

Miscellaneous

Advertisement under this heading two cents a

STEAM HOIST FOR SALE.—Fifteen H.P. Steam Hoist, two cylinder, single reversible drum, manufactured by Georgian Bay Engine Works, complete with wire cable. Will accept reasonable offer for immediate sale. STINSON-REEB BUILDERS' SUPPLY COMPANY, Limited, 904 Eastern Townships Bank Building, Montreal, P.Q. 36

Excellent Suggestions for Fighting Fires

The Witness, of Montreal, Que., recently published a suggestion on the subject of fighting fire in large structures, which is of excellent value, and could easily and profitably be put into general use in the larger buildings. It consists of designing a card outlining the buildings, each building to have such a card located in a known place for the benefit of the firemen. This card would show at a glance the location of trap doors, elevator shafts, stairways, heavy materials, valuable stock, dangerous or explosive stock, safes or vaults, gas cocks, electric switches, engine or power plants, and all other information needed in fighting a fire in the building. It would enable the salvage corps to do quick and intelligent work, and would enable the fire fighters to direct their efforts more intelligently, without having to search for the information—a difficult thing to do with a structure full of stifling smoke. The card should be revised whenever there was a change in the position of the stock or fixtures, and in any event should be corrected twice a year. Several copies of the card should be provided, one to be left at some place in the building, one to be sent to the fire department, one to the department of building inspection and one to the factory inspector, in cases of factories. Variations of the plan could be worked out to fit different structures, but the plan has the nucleus of a valuable suggestion.

Menard & Fakstrault, lumber, etc., of Montreal, Que., are stated to have dissolved.

Flowers & St. Leger, Toronto, Ont., sheet metal workers and roofers, are stated to have dissolved.

J. G. Robson, lumber dealer, New Westminster, B.C., is stated to have assigned to S. S. Malcolmson.

Contract Record

ESTABLISHED 1886

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Vol. 24

Toronto September 7, 1910

No. 36

Legal and General Relationships between Architect and Contractor

The paper by Mr. Isaac Campbell, K.C., a synopsis of which appears in this issue, may be read to advantage by all connected with the building trade in Canada. While Mr. Campbell addresses his remarks to the architectural profession, the principles involved and the advice contained therein are just as fundamentally important to the contractor. Indeed, in our extract work we bore this matter carefully in mind with a view to directing attention particularly to those points which are of common interest.

Mr. Campbell makes some interesting observations regarding the relation of the architect to the owner and the contractor. "It is a maxim of high and immemorial authority," he writes, "that no man can serve two masters." In his relation to the contractor he has to bear in mind always that he is serving primarily the interests of his employer. These are to produce the desired results at a minimum of cost and time. Emphasis is laid upon the unfairness to the contractor of the architect's having a personal or pecuniary interest in the work without his (the contractor's) knowledge, and it is of interest to note that the contractor is legally entitled to be apprised of such interest. It is not difficult to understand the necessity for this when it is considered that it is not an uncommon thing for a contractor to agree to leave decisions solely with the architect. It would be manifestly unfair for him to do this if the architect had other than a working or professional

interest in the work. The manner in which the consequences of omitting to furnish the contractor with all such information may re-act upon the architect are set forth in the cases of *Kimberley vs. Dick*, and *Ludlam vs. Wilson*, particulars of which are given.

The need for the contractor's familiarizing himself very closely with every detail of the contract is well illustrated in the section relating to defective plans. It is a too common occurrence for contractors to be over anxious for a certain job and submit an estimate before they have mastered the details of the work or even the wording of the contract. The first question that arises in a court of law in disputes of this kind is, What is the contract? The principle is well brought out in the case cited.

Inconsistency may sometimes be detected between the copies of the plans and specifications furnished contractors. This point is covered in Mr. Campbell's paper as are also several miscellaneous points of interest to the architectural profession. Doubtless there will be those whose success in keeping out of the law courts will lead them to pass over this article. Apart altogether from its legal aspects, however, it has a real value in establishing the closeness of the relationships between architects, engineers and contractors and in emphasizing the need for understanding the letter of the contract.

Should Contractors Pay for Mistakes in Estimating?

The idea of robbing Peter to pay Paul is exemplified in a recent dispute at Ottawa, where it was proposed by an alderman to release the successful tenderer for a new fire station on the ground that he was a "citizen and a taxpayer." The contractor in question had made a mistake in computing his estimate and wanted to withdraw when he made the discovery that he had been "successful." He urged without avail that he had made a mistake in figuring.

Now the only object in calling for tenders on any contract is to secure the lowest price compatible with the specifications which are furnished all intending bidders. The deposit demanded in all cases is to prevent any lapse on the part of the successful tenderer. To allow any withdrawal as soon as the figures are published would be to make a farce of civic contract work and inevitably result in a loss of money to the city. The average contractor would soon cease to tender on civic specifications, and eventually the corporation would be compelled to pay whatever estimate was furnished it by any contractor who cared to take up the work offered.

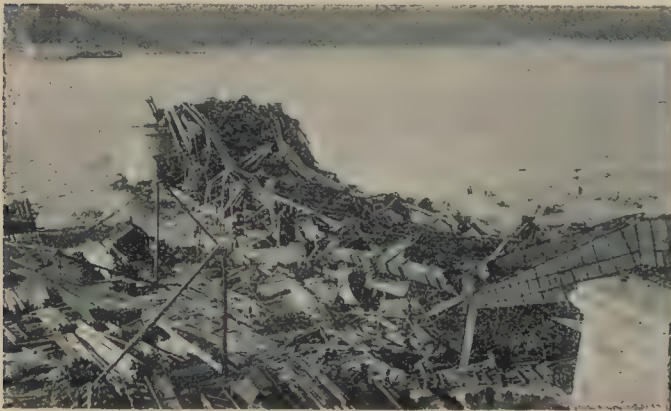
The "successful" bidders in such cases as these have our sympathy, but we cannot think that they should be relieved of their obligations except in very rare instances. We hold no brief for the municipality. We say this in the interest of contractors as a whole. It is hard to have to pay hard cash for one's mistakes, but after all it is only what is experienced in every walk of life.

Progress of Quebec Bridge Construction

Detailed Account of Methods Employed by the Contractors—Plant and Machinery Required for Substructure—An Interesting Comparison

Prepared expressly for this Journal by our Montreal Representative

The north shore site of the new Quebec bridge is at present the scene of great activity. Approaching the site of operations from the St. Louis road, which leads from Quebec City, the railway yards are encountered. Here the contractors, Messrs. M. P. & J. T. Davis, have a large staff of workmen employed in laying extensive tracks and sidings for service in handling and storing supplies when the work of constructing the bridge proper begins. Further on another gang of men are engaged in



The old structure after the disaster

widening the approach to the bridge, for the centre of the new structure has been shifted slightly to the west.

From the crest of the hill a general view of the works is obtained. Across the river lies the wreckage of the former bridge, a grim reminder of the disaster of 1907. This debris can be seen exceptionally well at low tide.

The Big Caisson—Interest centres around the work of Messrs. M. P. & J. T. Davis, who have contracted to construct the substructure for the new bridge. Their present work consists of sinking into place the enormous caisson which is to form the footing for the north main pier. The amount of plant that must necessarily be placed in position, the enormous work involved before the actual work of sinking the caisson can be com-

menced, are features that cannot fail to impress the onlooker.

The big caisson was built at Sillery, a small village about two miles to the west and on the same shore. Here again it was necessary to make elaborate preparations for construction and launching. Work was first commenced early in April of the present year and a large shed, approximately 200 feet by 70 feet, was erected to ensure steady progress, regardless of weather conditions. For a short period the contractors were delayed pending alterations to the plans, but on July 8th work was well advanced and the launching from the ways was successfully accomplished. To aid in this latter work, concrete piers had been constructed to better control the movement of the caisson until it reached the water.

On August 1st the caisson was towed out and placed in position. Taking advantage of the period between tides, the caisson was floated in between two rows of piles, with a small clearance of two feet at each end. A staging was afterwards erected, closing off the entrance-way. Both up and down stream the caisson is securely anchored by cables attached to heavy oak beams weighted in position by rocks. The number of cables will be augmented as the caisson goes down and the pressure increases. When launched the big structure drew only five and a half feet of water, the floor having been false-bottomed to give this effect.

The site of the new north caisson is five feet south of the existing caisson and is to be sunk to an elevation four feet, or much lower than the old one. The centre line of the new north main pier will be 57 feet off shore from the centre line of the old pier and will be also 15 feet west of the centre of the old north pier, to accommodate the shift of the new south pier. The anchor pier and abutment will also shift the same distance to the west, but details of these have not yet been settled.

Caisson Construction—The caisson for the north main pier embodies several unique features in caisson work. In giving this important work to Messrs. Davis, the Board of Engineers left the design to the contractors, stipulating only that it should be most modern in every respect and that the final plans should be subject to the Board's approval. Caisson work is not new to



General view of M. P. & J. T. Davis' plant at Sillery.



The big caisson just after being launched at Sillery

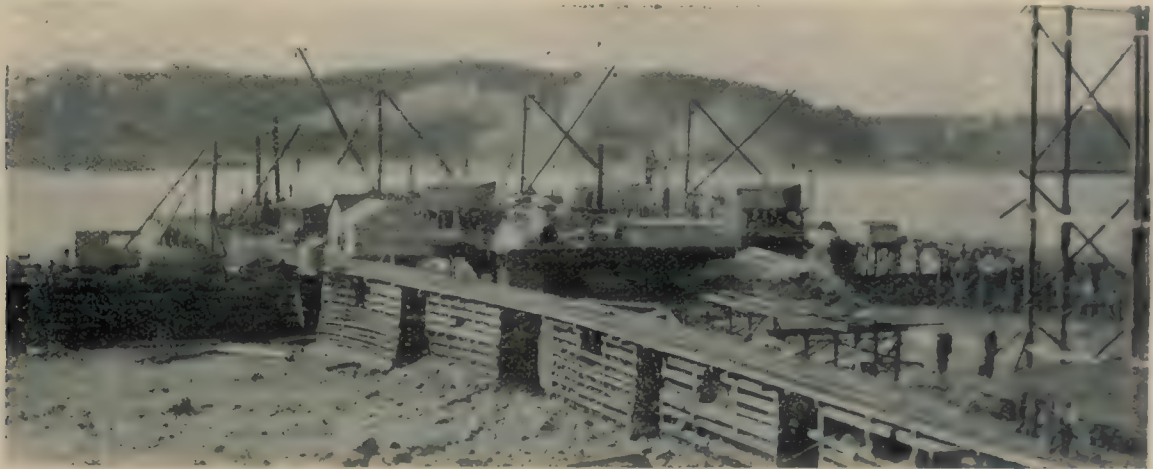


Big caisson at Sillery ready to be towed out into position

Messrs. Davis, and it may be said that in planning this structure the experience of years was available. The dimensions of the caisson on the cutting edge will be 180 feet 6 inches by 55 feet 6 inches. In the main wall construction, 12 feet by 12 feet, Georgia pine timber is being employed, while for the cutting edge, 30 feet by 30 feet, British Columbia fir has been adopted. The wall seams are being well caulked with oakum, pitch and tar to render them water tight. The heavy square timber forming the walls will be kept in place by

By this arrangement the weight will be carried directly to the cutting edge instead of falling on the roof. The additional strength gained by the use of the steel girders will enable the contractors to load the caisson as desired, where in ordinary caisson practice it is customary to equalize the hydraulic pressure and the load. In this instance the girders were close at hand, but in any event the steel construction would probably have proved a profitable venture. It is often found necessary in sinking caissons to keep the concrete to quite a depth below the water in order to prevent the caisson becoming too heavy. The effect of the girders in withstanding the heavy hydrostatic head would be invaluable in this instance.

The total weight of the caisson is estimated at about 1,700 tons. Approximately 70 tons of bolts, 50,000 barrels of cement and 3,000,000 feet of timber will be required for its construction. The method of excavating material for the working chamber will be along the usual lines employed in caisson work. The contractors, to facilitate operations, employed a dipper dredge on the site of the caisson, and dredged the bed to a considerable depth. When the cutting edge reaches the river



View of contractors' plant from east of elevator

thickly interspersed drift bolts. In order to minimize friction in sinking caisson the walls will be cased with two layers of 3-inch tongued and grooved sheeting, laid vertically.

The working chamber, which is both air and water tight, is divided by eight bulkheads and has a comfortable working height of eight feet. The roof or deck of the working chamber consists of two rows of 12-inch by 12-inch pine timber, separated by two layers of 3-inch tongued and grooved planking. The whole is well supported and knee braces are placed at frequent intervals.

For the cutting edge the usual steel shoe has been discarded and is in this construction replaced by a wearing timber consisting of a solid piece of oak, 12-inch by 6-inch and which is easily replaceable. It is estimated by the contractors that this arrangement will be more serviceable, since the usual steel shoe, once it becomes twisted or broken, is no longer useful and cannot be replaced, whereas the wooden timber can be renewed without difficulty, as required.

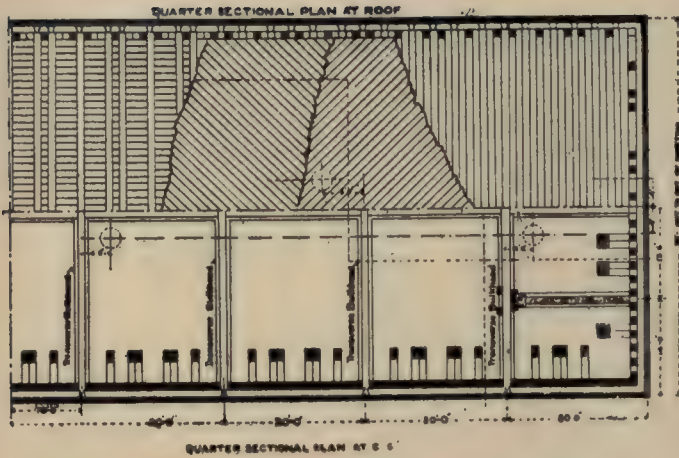
By a remarkable coincidence the seven-ton girders which were to have formed, in the old bridge, the floor beams for the railway section of the bridge, were found to be of just sufficient length (55 feet) to be of service in supporting the walls of the caisson.

The first row of 17 girders has already been placed in position about 15 feet above the deck of the caisson.

bed the lighter material will be blown out, all the chambers being piped. This operation consists of simply allowing the compressed air in the chamber to escape, carrying with it the material, which has been shoved up against the valve. Jets of steam can also be blown into the chamber under high pressure to loosen the sand and gravel. Sinking pumps will be employed to remove



General view of construction work showing steam dredge in operation. (Inset shows where larger view was taken and also sheds containing boilers, air compressors, etc.)



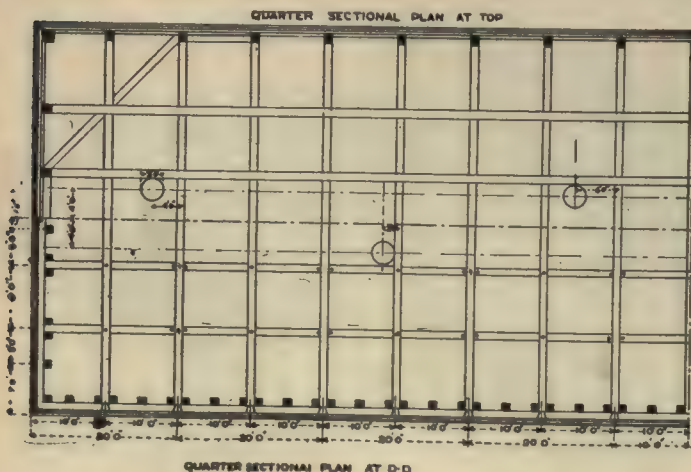
Showing the deck or roof construction of caisson.
Note extensive knee bracing

some of the material while the heavier excavations will be taken out by buckets through air locks. This latter operation takes place as follows: The bucket is lowered by the derrick into the lock, the upper door closing against the cable. After the lock has been filled with air the bottom door is allowed to drop open of its own weight. The bucket is then lowered and filled with material and hoisted into the lock again. Then the lower door is swung up by levers from the outside and the air in lock allowed to escape, permitting the top doors to be opened.

Messrs. Davis have now on hand a large staff of "sand-hogs," by which title the excavators are known. At the lower depths these men will be working at a pressure of about 48 pounds. Two 40-minute shifts in the 24 hours complete a day's work at these depths, for which the men receive liberal pay.

The work of concreting the cofferdam has now been placed under way and from this time on the contractors figure that rapid progress will be made in sinking the caisson. Once the river bed is reached the pneumatic work will be started and the caisson is expected to go down at the rate of one foot to eighteen inches per day. Work will be carried on continually, night and day, until the big structure is sunk to the required depth of approximately 70 feet.

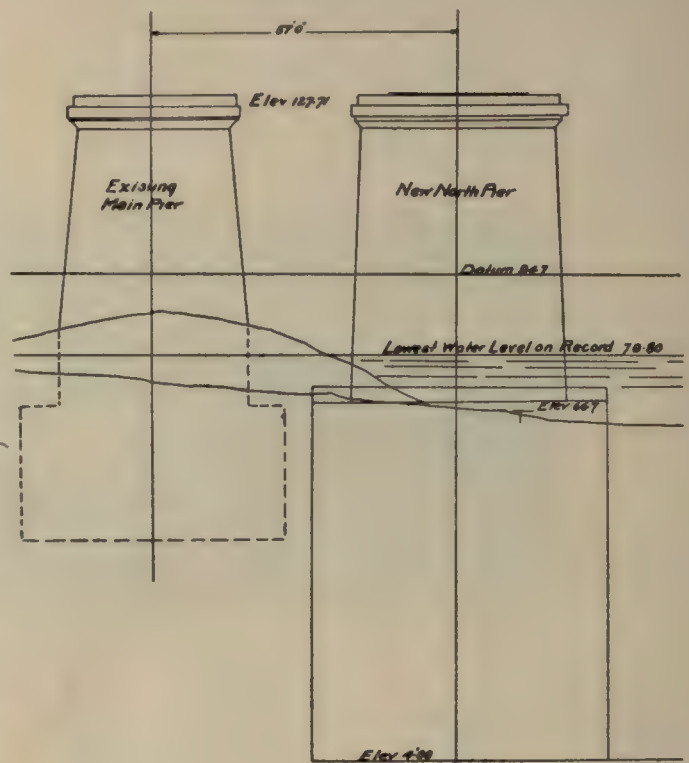
Plant—The machinery and plant required by Messrs. Davis in carrying out their substructure contract is extensive. At the foot of the hill is located the power and boiler house. Here are situated the four large Ingersoll-



Showing the lay out of square timbers forming
roof of caisson

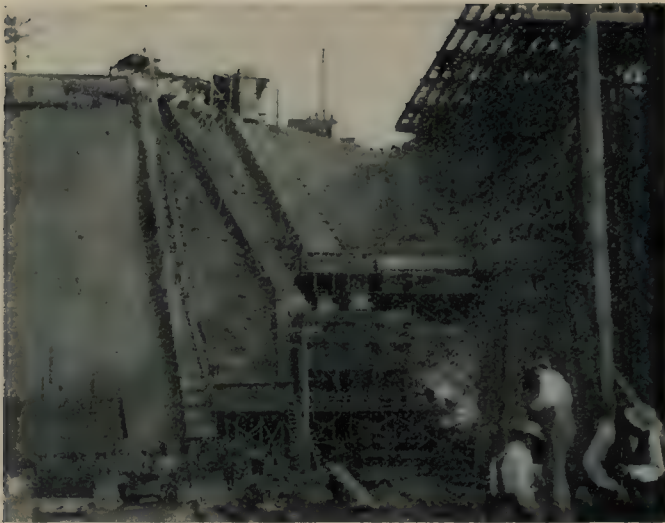
Sargent air compressors with a capacity of 2,240 feet per minute, under 100 pounds pressure. These compressors are driven by a battery of six 125 h.p. boilers, supplied by the John MacDougall Caledonian Iron Works Company, Limited. This air is chiefly for service in the pneumatic caisson work and is carried out to the staging through a 12-inch pipe and fed into the caisson as required. This compressed air pipe is surrounded by a water jacket in order to cool the air and thus render the work of the men more comfortable.

On the top of the hill, a trestle work has been erected. This will enable the dump cars to empty their loads of gravel and rocks into the chutes which have been prepared to receive them. From the hill, the materials to form the concrete are led below by a natural gravity system. The rock passes through to the rock crushers, two in number, supplied by Allis-Chalmers-Bullock, Limited, which are separately steam driven, and from



New North Main Pier

there is fed to the two concrete mixers. The rock bin, it may be mentioned, has a storage capacity sufficient for a 24-hour run, thus minimizing danger of cessation of work. Gravel and concrete are also delivered to the mixers through chutes at the top of the hill and from the mixers a railway carries the concrete to the side of the caisson. The anchor pier of the old bridge, a splendid piece of masonry, is being pulled down by the contractors and the granite obtained from this source will be used in the cofferdam construction. Six derricks, three on the north and three on the south staging, placed so that they will operate equally well at either high or low tide, have been installed to hoist the various materials as required. Messrs. Davis have also installed an electric lighting plant and the whole works will shortly be illuminated by numerous arc lamps. Since the work is to be carried on night and day without ceasing, the necessity for the lighting plant will be appreciated. For the accommodation of the engineers a commodious boarding house has been erected at the foot of the hill, and close to the work. Here the wants of



View of concrete plant from trestle

the men are considerably looked after while the cuisine provided is of the best.

Mr. M. P. Davis personally takes an active interest in the work of superintending construction with Mr. C. A. D'Abbedie, Mem. Can. Soc. C. E., who is the engineer in charge. Mr. Wm. J. Galbraith is also actively connected with the caisson construction.

Office of Quebec Bridge Commission—The Board of Engineers have erected at the crest of the hill a combined office and rooming building where the Government's staff of engineers are established. Mr. J. D. Wilkins, the resident engineer for the commission, is a man of considerable experience in general engineering

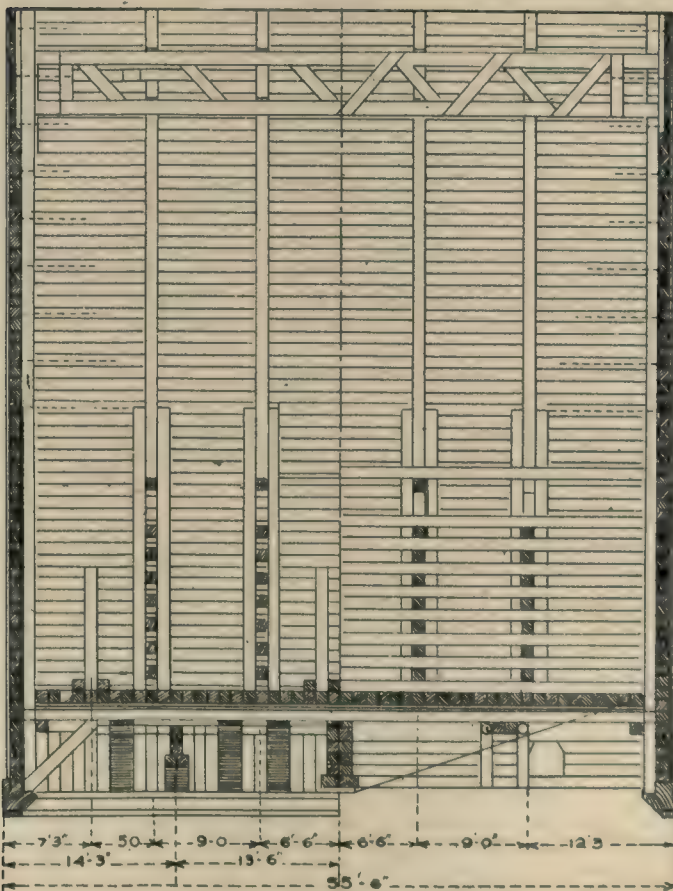


Extent of construction of old bridge on north shore. All the steel will be removed and the granite forming anchor pier will be used in construction of new caisson

practice. Previous to his present position he was commissioner in charge of construction on the famous Queensborough (Blackwell's Island) Bridge. He was also connected with the erection of the Williamsburg Bridge and for a number of years was identified with the engineering interests of the New York Central Railway lines. At the present time Mr. Wilkin's department is engaged in testing the concrete to be used in construction of the large caisson and in generally supervising the progress of the work on behalf of the Bridge Commissioners. Attached to this office also are Messrs. Atkinson and H. E. Bates.

Koenig & Company's Operations—The work of removing the debris of the Quebec bridge has been carried on continually for several months by Messrs. Koenig & Company, of Quebec, and a big pile of wreckage has been taken out and piled on the shore. During the spring two bodies of victims were recovered. In the early operations an oxy-acetylene flame under heavy pressure was used to advantage in cutting up the twisted debris. Latterly the contractors have resorted with considerable success to dynamite to assist them in their work. Heavy charges of dynamite have sometimes to be used. For instance, it required a charge containing 50 pounds to blow the big shoe plate from the anchor pier. The work of dynamiting is not carried on without danger, but a bomb-proof shelter, consisting of heavy timbers, has been provided for the workmen. In some instances fairly large pieces of steel, blown across the river to the north shore, have been picked up by the contractors at work on the caisson. In the operation the sticks of dynamite are simply laid against the wreckage. Good results have been achieved by this method of procedure.

Phoenix Bridge Company's Contracts—The Phoenix Bridge Company, the contractors for the construction of the old bridge, are at present employed on the north shore removing their falsework which had been erected to a considerable distance past the completed approach span. They have about fifty men employed and with the assistance of three derricks are making excellent progress. As fast as the false work is taken down it is loaded on cars and shipped back to the company's plant at Phoenixville, Pa. This company also have the contract for taking down the intact approach spans on both sides of the river.



SECTION B-B

Side elevation of caisson with sheeting removed

A Comparison With the Famous Forth Bridge—A



Caisson ready to launch at high tide

general statement in reference to the new Quebec bridge has been made by Hon. G. P. Graham, Minister of Railways and Canals. A comparison is made throughout with the famous bridge across the Forth:

	Quebec Bridge.	Forth Bridge.
Total length of cantilevers feet	2,930	5,349.5
Number of channel spans	1	2
Length of longest channel span..feet	1,758	1,710
Load per lineal foot bridge is designed to carry exclusive of its own Weight	pounds 13,340	4,480
Total weight of bridge tons	72,000	57,000
Weight per lineal foot for cantilever only	pounds 49,150	21,360
Greatest depth of piers below high water	feet 93	87
Roadways on Quebec bridge: 2 railway tracks, 2 street railway tracks, 2 highways, 2 sidewalks; on Forth Bridge: 2 railway tracks.		

The weight per lineal foot of steel in the Quebec bridge is 2.30 times as great as that of the Forth bridge.



Swinging a girder into position. This construction enables the contractors to load the caisson up to any point required

The load for which the Quebec bridge is designed is 2.98 times as great as that for which the Forth bridge was designed.

The Forth bridge has 4.77 pounds of carbon steel for every pound of live load it is designed to carry.

The Quebec bridge has 3.69 pounds of nickel steel for every pound of live load it is designed to carry.

The prescribed test load for the Quebec bridge is $4\frac{1}{8}$ times heavier than that used for the Forth bridge.

Test pieces of the compression chord of the old Quebec bridge broke at 26,850 pounds per square inch.

Test pieces of similar chords for the new bridge broke at 56,800 pounds per square inch.

The new chords are therefore more than twice as strong per square inch as the old ones.

The maximum section of the compression chords of the old bridge was 843 square inches; in the new bridge the maximum section is 2,037 square inches.

According to the tests the old chords would break under a pressure of 22,634,000 pounds, and the new ones under a pressure of 115,701,000 pounds.

The new chords are therefore more than five times as strong as the old ones, although the live load of the new bridge is only about twice as heavy as the live load of the old bridge.

Problem of Steel Bridge Corrosion

Encasing Steel Arch Ribs in concrete, as used in the Buffalo grade crossing improvement, illustrates one phase of the effort to solve the problem of steel bridge corrosion, says the Engineering Record. The plate girder arches, under construction by the Buffalo Grade Crossing Commission to carry railroad tracks over highways, possess the additional merit of satisfactorily meeting two other requirements which are often overlooked in grade crossing eliminations. In the first place the arch presents by far the most pleasing appearance of any bridge type that could be used in such a location. It should be borne in mind, however, that to secure the best architectural treatment the clearance under the structure should not be too small. Frequently, in fixing the clear headroom underneath the bridge, the minimum is used without giving proper consideration to the effect which this will have on the finished structure. It is, of course, realized that this matter is intimately connected with the question of cost, but in many locations appearance is of prime importance. The second desirable feature which should be possessed by an overhead bridge in a thickly settled community is freedom from resonance due to passing trains. Ballasted floors have solved this problem, but where the ballast is carried on steel construction, as on a trough or flat plate floor, there is the uncertainty of corrosion of steel parts, even though direct contact between ballast and steel is prevented. With a ballasted floor on a concrete deck, and with all metal parts completely covered with concrete, the steel arches should be practically immune from ordinary corrosive influences. A difficulty that is likely to be experienced in the maintenance of such structures, however, is the cracking of the concrete where it is used as a thin veneer on large steel surfaces. The introduction of wire fabric no doubt minimizes this action; nevertheless, care should be taken not to use the veneer too thin, and to have the fabric thoroughly connected to the steel frame.

The Earthwork on the Belle Fourche Dam, South Dakota, is practically completed. This is one of the largest earth embankments in the world, having a length of 6,200 feet and a maximum height of 115 feet. It contains about 1,674,000 cubic yards of earth, and the inside face, which has a slope of 2 to 1, is protected from wind and wave action by 2 feet of screened gravel, on which are placed 4 x 6-ft. concrete blocks 8 inches thick. This structure closes the outlet to a natural basin, and an inlet canal $6\frac{1}{2}$ miles long and 40 feet wide on the bottom carries the waters of the Belle Fourche River into the reservoir thus formed. When the distribution system is all completed, 600 miles of canals and laterals will carry the waters over 100,000 acres of land.

Modern Bituminous Road Construction

Results of Experimental Work of Interest to Engineers and Municipalities—Grouting and Mixing—Material and Labor—Cost Data

As is well known, there are two distinct methods of bituminous construction: grouting and mixing. The general process used in grouting is described as follows by H. C. Poore, in "Good Roads," in an account of the bituminous experimental work of the Massachusetts Highway Commission:

Upon a re-shaped old macadam surface or a four-inch foundation course of new macadam, a two-inch course of No. 2 stone is laid, omitting the customary flushing coat of screenings. This course is well rolled and kept free from foreign materials such as dust and leaves. Upon this prepared smooth surface is poured the hot bitumen of various kinds; about two gallons per square yard for two inches of stone is the usual amount. This bitumen must be distributed evenly and many machines are now on the market to accomplish this. In my opinion the most satisfactory one is a detachable distributor, which has been largely used, and been found very satisfactory. The two gallons of bitumen will usually sink out of sight, as it is too small a quantity to flush up over the top of the stone. Upon this bitumen grouted course one of two things may be done, either an additional painting coat of .5 gallon per square yard may be spread or else the voids may be filled immediately with pea stone or fine sharp gravel. Experience shows that a painting or sealing coat should always be spread immediately upon the application of the bitumen, and rolled as soon as possible in order to press the grit into the bitumen before it becomes set. This final surface should be protected from travel for 48 hours when oil is used and 24 hours when tar is used.

The method of heating the bitumen is important as the cost of heating is a large item, considered in reference to the cost of the bitumen. When an auxiliary spreader is used, tank wagons, heated with steam coils, are economical. The bitumen should be delivered in tank cars at the railroad siding and heated as hot as possible by steam coils in the tank cars. The material is pumped into the tank wagons by a steam or hand pump, or better, when possible, flows by gravity. The coil in the wagon allows the material to be re-heated from the steam roller at work on the road if it is found necessary.

Mechanical Mixing

For a two-inch surface a saving of .5 a gallon of bitumen per square yard can be made by using the mixing method in place of the grouting method. It is safe to say that a grouted road is usually not as satisfactory and long lived as a mixed road. A thorough consideration of the saving in cost of construction compared with annual repairs and the length of life of the road must be made to determine which method is most economical. The following method of hand mixing has been found of low cost and very satisfactory. Upon a mixing board, preferably iron, one-third of a cubic yard of No. 2 stone is dumped in a conical pile, over which is poured the proper quantity of bitumen. During summer weather six men working in pairs will thoroughly coat this stone in fifteen minutes. Each pair turns the stone once. This is true of such materials as asphaltic oil with oil asphalt 2 to 1 and as tarvia X. When the last pair of men finish turning the stone all six men

place the stone upon the foundation; the mixing board is kept about three feet ahead of the finished surface. This method needs only to be tried to see its advantages. Three two-wheeled 100-gallon kettles will be sufficient to keep a supply of hot bitumen sufficient for two such mixing gangs working side by side on a 15-foot roadway. A ten-ton roller can be used on such a surface one hour after laying, and it is best to thoroughly roll all the surface spread before leaving for the day. Hence the roller must necessarily work for some time after the mixing work is completed for the day. After the surface has been brought to the proper cross section and all depressions refilled a very satisfactory painting coat of bitumen is applied by the bucket and broom method. From my experience it is best to paint the road at once after rolling. Other engineers, however, have had good results by allowing the surface to stand before painting.

Mechanical Painting

From my experience, corroborated by others, hand mixing apparently costs four times the cost of mechanical mixing. Very little mechanical mixing, however, has been done in this state in building bituminous macadam. One mechanically mixed oil and stone surface has proved satisfactory and economical. Further than this, we can only judge from the work done on other forms of bituminous pavements.

Concrete mixers for cement concrete are constructed on two lines; the batch method and the continuous method. Both methods are used when mixing bituminous pavements, but as the desirability of accurate proportions in a bituminous macadam is great, the batch mixer will probably prove most satisfactory. Mechanical mixing over hand mixing is desirable because of the rapidity with which the work may be done, the correct proportions in which the materials may be mixed and the very thorough manner in which the ingredients are incorporated together.

Maintenance

A two-inch bituminous surface may most economically be maintained by an additional painting coat during the second, third, or fourth year. Depressions and brittle spots should be removed, cleaned out and refilled with identically the same material used in the original construction. When care is taken a depression may be patched and continue to give service as long as the original surrounding surface. The usual method of tar macadam maintenance is similar to that of asphalt paving maintenance. Disintegrated material is removed, the depressions cleaned out, the cleaned surface smeared with hot bitumen and then refilled with materials similar to the surrounding matrix. When an oil macadam begins to ravel it is difficult to patch or renew by grouting the surface because of the partial lubricating property of asphaltic oil.

Oil Sand Mixtures

Asphaltic oil mixed with gravel by various methods is a newly found form of surfacing. A gravel bank containing approximately 50 per cent. of half-inch pebble and 50 per cent. less than one-half inch will, when mixed with asphaltic oil and spread to a depth of two inches give very good results. A great many experiments with

different materials, quantities and qualities, different methods of mixing and rolling, have been tried and it is found that a two-inch surface of this kind upon a proper foundation is perfect in condition after one year of life. From appearances this surface will be in good condition for three years and at its cost is the most economical surface constructed anywhere in the State. Mixing oil and sand together at random will not give this perfect result, but good results can only be obtained when care is exercised in regard to quantity, sizes of materials and quality of bitumen. Something the same result may be obtained by laying a film of oil upon an old road surface, covering with gravel of proper size, and mixing the two together by some mechanical contrivance, such as a roller, tamper or harrow, and repeating the operation.

The following ten tables give the cost of constructing actual roadways, all within 40 miles of Boston.

Tables 1 to 4 include grouting with both one and two applications. The amount of bitumen in table is the total quantity per square yard.

Tables 5 to 8 include various materials hand mixed with the stone. A sealing coat of oil asphalt was usually applied with pail and broom.

Table 9 is the cost of an oiled sand surface on an old reshaped macadam road. About 250 square yards a day were required to keep the cost at this reasonable figure.

Table 10 is the only large mechanical mixed surface undertaken by the commission to date. A trough mixer was used and proved satisfactory.

All the surfaces for which costs are given are approximately two inches thick after rolling on roadways less than 20 feet in width.

Grouting

	Cost
	10,800 sq. yds. area
(1)—Tarvia X—	
Bitumen, 2.14 gal. per square yard	.161
Stone, .111 tons per square yard	.134
Pea stone, .029 tons per square yard	.037
Labor and incidentals	.176
Total cost square yard	\$0.508
(2)—Tarvia X—	
Bitumen, 1.38 gal. per square yard	.204
Stone, .11 tons per square yard	.138
Labor	.178
Total cost square yard	\$0.520
(3)—Tarite—	
Bitumen, 1.25 gal. square yard	.184
Stone, .11 tons per square yard	.138
Labor	.178
Total cost square yard	\$0.500
(4)—Heavy asphalt oil mixtures—	
Bitumen, 1.83 gal. per square yard	.284
Stone, .11 tons per square yard	.138
Labor	.178
Total cost square yard	\$0.600

Hand Mixing

(5)—Tarvia coated stone, painted with asphaltic oil.	2,000 sq. yds. area
Bitumen, 1.55 gal. per sq. yd.; 19.3 gal. per cubic yard of stone	.125
Stone, .11 tons per square yard	.136
Fuel and incidentals	.045
Labor	.333
	.639

Sealing coat—	
Bitumen, .55 gal. per square yard	.045
Pea stone top, .019 ton per square yard ..	.025
Labor	.011
	.081
Total cost per square yard	\$0.720

(6)—Tarvia A with pitch—	2,000 sq. yds. area
Bitumen, 1.12 gal. per square yard; 14.3 gal. cubic yard of stone	.081
Stone, .101 ton per square yard	.111
Labor	.139
	.331

Sealing coat—	
Bitumen, .62 gal. per square yard	.054
Sand for top, .0012 cubic yd. per sq. yd.	.002
Labor	.016
	.072
Total cost per square yard	\$0.403
(Freight depot within 200 feet of work.)	

(7)—Genasco—	4,800 sq. yds. area
Bitumen, 1.4 gal. per square yard	.182
Stone, .045 tons per square yard	.109
Labor	.181
Heating and rolling	.035
	.507

Sealing coat—	
Bitumen, .64 gal. per square yard	.083
Pea stone top, .012 ton per square yard ..	.014
Labor	.052
	.149
Total cost per square yard	\$0.656

(8)—Tarvia mixed stone, painted with asphaltic oil—	2,500 sq. yds. area
Bitumen, 1.61 gal. per square yard	.145
Stone, .095 ton square yard	.109
Labor	.181
Heating and rolling	.035
	.470

Sealing coat—	
Bitumen, .77 gal. per square yard	.060
Pea stone top, .012 ton per square yard ..	.014
Labor	.052
	.128
Total cost per square yard	\$0.598

(9)—Oiled sand, hand mixed—	
Bitumen, 1.39 gal. per square yard	.0808
Sand, .077 cubic yards at \$0.10 per yard ..	.0077
Fuel, heating sand and bitumen	.0320
Labor, including reshaping old macadam surface	.2602
Total cost square yard	\$0.3807

Machine Mixed

(10)—Genasco—	6,000 sq. yds. area
Bitumen, 1.25 gal. per square yard	.163
Stone, .101 ton per square yard	.126
Labor	.139
Rolling	.019
Supplies, including machine	.070
	.517

Sealing coat—	
Bitumen, .55 gal. per square yard	.0615
Pea stone top, .0125 per ton per sq. yd.	.016
Labor	.0115
Fuel	.006
	.095
Total cost per square yard	\$0.612

Notes on Architectural Jurisprudence

Architect's Relation to Owner and Contractor — His Powers as an Arbitrator—Importance of Detailed Plans and Intelligible Specifications*

By ISAAC CAMPBELL, K.C., Winnipeg.

There is a remarkable paucity of reported law cases in which the architect is directly a party. The contests between owners and contractors are numerous. Rarely does the architect appear except as a witness or as one whose previous exercise or non-exercise of authority is relied upon by any contestant. Let us assume that the absence from the index of the law reports of the heading "architect" is due to the superior qualities of the men who have chosen the profession. I remember the late Dr. Kelly of Brantford, an eminent educational authority, used to maintain that amongst the best means of educating conscience and to secure ethical strength in the character of youth was the careful teaching of mathematics. Some proficiency in the handling of arithmetical figures, mere dollars and cents, might enhance the skill of a future scoundrel, but mathematics, even if somewhat elementary, relating to the eternal and accurate relations of form, the diameter to its circumference, its sphere to its segment, and those concepts upon which the various series of progression are based, demanding accuracy of thought and result, apart from any sordid suggestion of gain to the student, must in harmony with truth itself promote honesty; and while supple arithmeticians give the criminal courts and the detectives a good deal of trouble mathematicians never do so.

Architect's Relations to Owner and Contractor

It is a maxim of high and immemorial authority that no man can serve two masters. As applied to the architect his position under such a rule makes his profession a most responsible one. He is, to begin with, the agent of his employer. He is required to secure certain results by changing labor and material into a finished structure and in doing this to control the contractors, the artisans and workmen who fashion and finish the fabric. As such agent, if authorized, he can do what the employer can do in adding to or subtracting from the work. Certain implied powers and implied duties arise from this agency. He is created a quasi-judicial officer to decide questions of difficulty and dispute between his employer and the contractor.

The architect receives a reward for his work either as stipulated or in accordance with a generally understood rule or scale of his profession. This reward should be paid him only by his employer. The architect should not have a further personal or pecuniary interest. He ought not to be a part owner of the property or of the building or structure to be erected and completed. If he is such then he or his co-owners must give the fullest information to the contractor or proposing contractor concerning the facts.

If, in any specific case, the architect has entered into an undertaking with the owner as, for instance, to what a building will cost, so that in consequence of such undertaking his judicial discretion may be interfered with, that fact should be known to the contractor. The consequences of omitting to furnish such information may not immediately react upon the architect, but where the injustice is gross or palpable the failure to notify the contractor would relieve him from the binding obligation of a contract which committed to the architect the right of final decision and if the court thought that a contractor had not been properly dealt with it would proceed to ascertain how much he

should be paid by the owner or builder. Later on the latter and the architect might have to dispute over the loss between themselves. Let me give you some illustrations of the above principles.

Kimberly vs. Dick, an English case, in 1871.—The architect entered into an undertaking with his employer that a manor house should be erected at a cost not exceeding £15,000, including architect's commission and all expenses, and he engaged the services of a contractor who without being informed of the undertaking and without close verification of a bill of quantities given him by the architect, entered into a contract with the employer for the completion of the work from the architect's plans and under his supervision for £13,700, with power to the architect to order extra work and with a clause providing that all questions arising between the parties should be settled by the award of the architect. On a suit by the contractor, claiming to be entitled to be paid by the owner for all work executed by him beyond what was included in the estimate and for certain extra work, it was held that on the evidence the architect was the agent of the employer, that his undertaking as to cost having been concealed from the contractor the arbitration clause in the contract could not be enforced and the plaintiff was entitled to an account for what was due him for any works executed by him under the architect's direction not included in the contract, and for any works so included in the contract the price for which was therein included, and for any variation made under the architect's direction. In another case, language which scarcely amounted to an undertaking, but which was in the form of a strong assurance, was pronounced sufficient for the same result. An architect should be very careful as to the language he employs in furnishing estimates of cost. Where the written contracts for the work are made for the whole work practical difficulty will not often arise, but even in such cases in view of "changes" and "additions" an architect should exercise care in the representations he makes to his employer, and between the two of them they should let the contractor know of any such undertaking.

The case of *Ludlam vs. Wilson* in the Province of Ontario brought out in evidence that the owner's superintendent was his uncle, who was greatly indebted to him as a result of certain business dealings. These facts were not known to the contractor for a large amount of building material which went into the house. One judge of the Ontario Court of Appeal held directly that this want of knowledge on the part of the contractor would absolve him from the arbitration clause of the contract. The other judge who gave a reasoned opinion referred to the circumstances as being objectionable but based his decision chiefly upon the fact that, after the work was stopped, the owner had discharged the contractor from its completion. As I read the report, therefore, it is not a new authority on the point I have noted, but it indicates, plainly enough, the duty of parties.

Powers of Arbitration.

The architect's powers as a judge or arbitrator arise from contract or agreement. Without that in case of dispute the courts of law must ascertain the rights of the parties as to compensation or damages. By agreement the architect is almost universally appointed as arbitrator, and those who prepared such contracts endeavor if possible to completely oust

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the jurisdiction of the courts. The inconveniences from tendency to bias or otherwise that might arise from this are thought to be less than the inconvenience, delay and loss arising from a trial that might not take place for many months after the work was done and after the evidence on the ground was lost, except so far as preserved in the defective memory of fallible witnesses. Better have the matter decided while it is open to inspection than to delay it long after, when the evidence will depend upon memory and the decision has to be given by a man who cannot be so well qualified as a skilled architect or engineer. From this results a warning which should always be given to those interested: "What is the language of your contract? What is the contract? What does it say?" Only to the extent that it alters the common law does it confer new powers.

As a matter of good practice I would recommend that where the owner or employer has taken an active part in the oversight of his building, and especially where it is known that, either in the presence of the architect or without it, he has discussed questions with the contractor during the progress of the work, then, in such a case, if there be a dispute, or if a dispute be likely, the architect should bring the two parties before him. Let him thresh out the difference, and let him, as a judge, give his decision. In a good many cases such a course will obviate an appeal to any other tribunal.

There must be no collusion between the architect and his employer to the disadvantage of the contractor. The architect must not be submitted to or be subject to any pressure from his employer as to his decision. To act under the orders of an employer in measuring or certifying work would, if accompanied by evidence which left room for the court to draw an inference of unfairness, have the effect of setting aside the architect's decision. What is fraud in such a case has not received a general definition. Each case must depend upon its own circumstances.

Concerning Defective Plans.

The editors of the American and English Encyclopedia of Law state generally as follows:—"In England it is held that where plans and specifications for the execution of a certain work are prepared for the use of those who tender bids for its execution, the person asking for the bids does not impliedly warrant that the work can be successfully executed according to such plans and specifications. In the United States, however, it seems that there is an implied undertaking on the part of the builder (the owner) that the plans and specifications are sufficient for the successful construction of the work, and where the work is constructed by the contractor according to the plans and specifications there is no agreement upon the part of the contractor that the work, when completed, will be safe and fit for the purposes intended."

In the United States there are now some 47 different judicial jurisdictions, each of which is final in itself, and without appeal in matters not involving constitutional questions, and not involving business or works extending over state limits. So that a general statement as to the law of the American States usually means no more than that a large majority of the courts of the several States have concurred in a decided principle. In most of the cases that have arisen there has been something in the language of the contract which affected the decision. In all such cases the first questions were: "What was the contract? What was its language?" The leading English case for the principle referred to is that of *Thorne vs. the Mayor of London*, in respect of the Black Friars Bridge across the Thames. An eminent engineer drew plans for the bridge, including caissons, instead of the usual cofferdams. It was found that, above low water, the caissons could not resist the force of the current. This resulted in great delay and loss to the contractor, who sued for damages on the ground that there was a warranty that the works could be executed accord-

ing to the plans provided. The final court (House of Lords) held "there was no warranty, and that the plaintiff should have elected either to refuse to tender, or should have asked for a warranty if the novel mode of procedure alarmed him."

"What is the Contract?"

Important questions must arise from time to time, which have not been as yet anticipated in the decisions of the courts. Most of them will turn upon the question of what was the contract. The structures to which damage is important enough to lead to litigation are usually provided for by contract. With the increased height and weight of buildings, with the increased loads that warehouses are now required to carry, there is usually provision made, especially in the latter class of cases, from which a warranty is at least implied. Contracts are made from time to time, providing for a cargo or storage load of so many pounds per square foot of floor space. Such a warranty would necessarily extend beyond the final certificate and the time of acceptance of the building. Its nature must be derived from its language, and whatever the contract is it would be enforced. Where, apart from such warranty, a contractor agrees to erect and finish a building, he must erect and finish it. He must fulfil his agreement; and this, I take it, must apply to the cases in the American States. The contractor must at least hand over the building. The contract is there, and must be complied with.

It would be impossible to discuss in a short paper the varying decisions due to variations of language employed in such contracts. Where the contractor is eliminated, and the question of the architect's responsibility to his client comes in question, then the principles of the ordinary law of negligence apply. The contractor may have become bankrupt, leaving a cumbersome ruin on the owner's hands. The architect holds himself forth as a man of professional and superior skill. If natural conditions are unknown to him, he should so report, and let the owner take the risk. In the large cities this question will often be very important. I understand that certain soils vary in their capacity to resist pressure, from 500 pounds per square foot up to as many thousands; further, that it is not merely a question of vertical pressure, but a matter of slipping or of lateral escape that is to be feared, because you tell us that if water could be confined laterally it could be built upon. Therefore, the existence of neighboring heavy buildings will seriously affect the problem. To anticipate exactly what will happen is, therefore, impossible. The architect cannot always know. No matter how he multiplies his margin of safety there may be trouble. He should make the possibility of this clear in any case where there is room for suspicion.

Miscellaneous Points of Interest.

There are a number of points not connected with the personal responsibility of a professional man to his client, and not directly germane to the architect's authority as a semi-judicial officer, which may be of sufficient interest to receive some notice.

Without an agreement, the mere employment of an architect makes him practically only a skilled agent of his client. Such employment would not apply to much more than the supervision and direction of the work to be done. It would not give authority to employ another to do the work.

The architect should be careful not to misrepresent his authority. Where a party holds himself out as an agent for another, with authority to bind him, he is sometimes held to his representation.

Where there is a difference between the contract and the plans and specifications referred to for details of construction, the contract controls.

Where there is an inconsistency between a copy of the plans and specifications furnished to the contractor, upon the faith of which his bid is made, and the contract entered into and the original plans retained by the builder, the former will

control, and the builder (owner) cannot take advantage of such inconsistency to the prejudice of the contractor.

Where there is a variance between the plans or drawings and the written specifications, the latter will prevail. This is upon the principle that the drawings are illustrative of the specifications; but I think that the following rule should apply in such a case, namely, that where there is a variance between the terms of the contract, the plans and specifications should all be reconciled in a practical manner, if possible.

If the contract is ambiguous, great and sometimes controlling weight will be given to the construction which the parties themselves on previous occasions placed upon it.

Written matter will control printed in a case of repugnancy. It is assumed to have been the result of deliberation.

Technical meanings are to be given to trade terms rather than the ordinary meaning of the separate words.

Apart from agreement conferring the authority, an architect has no implied authority to bind other parties by his construction of the contract.

The amount of damages, general or specific, for delay is nearly always a subject for a certificate of the architect; but he has no implied power and this must be provided for by the contract.

The architect may approve of work so as to make his employer liable, without writing. The contract providing for his approval would be satisfied by evidence of his actual approval. For the purpose of preserving evidence, it is always best to provide that the written certificate be required.

Manitoba Legislation.

In Manitoba there is nothing special to report on the legislation affecting architects. Provision was made by 1910 statute for examinations to be conducted by a board appointed by the Provincial Government. The architects in practice at the date of the statute are, by right of that fact, entitled to register with the board without examination.

Of course, architects are affected by the vast body of municipal legislation empowering municipal councils to provide as to the height and strength of walls, the access of light, provision for sanitary appliances, and the multitude of other details which are common in any municipal act and in any body of municipal by-laws. I understand that there is not much difference in the Canadian provinces between either the empowering legislation given by the various provincial parliaments, or in the subsequent civic legislation enacted by urban councils. The city of Winnipeg not long since enacted a very comprehensive by-law. After a good deal of deliberation the draft was submitted to the architects practising in the city, and their suggestions were invited, and many of them were embodied in the by-law finally enacted. It is desirable that architects should not merely give their individual suggestions, but that, in their corporate capacity, they should be consulted freely as to the general body of civic regulations.

Architects in Manitoba are entitled to the benefit of the Mechanics' Lien Act, but, along with material men, they are postponed to mechanics and workmen for the 15 or 20 per cent. rebate, as the case may be, which an owner has to hold back, up to thirty days' wages. This right comes under the statute, and in reading a statute, as in a contract, the question always is, "What does the statute say?" In the American States the rule is not at all uniform. In Pennsylvania, the architect gets the benefit of the statute if he superintends the work of the building. The one, however, who merely draws the plans is not entitled, nor is a consulting architect. They have done no work on the building. But in Manitoba, "Any person who performs any work or service upon or in respect of, or places or furnishes any materials to be used," etc., "in a building, wharf, etc., is entitled to a lien." So that the statute is clear in favor of the lien in this province. There was a considerable amount of interesting discussion in an Ontario case some years

ago, where the language of the statute gave the benefit to "builder or other person," in which the right was found in the affirmative.

The Uniform Contract.

In previous sections of this paper, I have referred to the architect's powers, as usually found in contracts and referred to in the law books. In the city of Winnipeg, what is styled "the uniform contract" has come to be almost invariably adopted. It subjects the architect's final authority to several limitations. Provision is made for arbitration by way of appeal from his decisions in several cases, such as the valuation of work added or omitted, and the amount of expense to an owner who has taken the work out of the contractor's hands, when audited and certified by the architect. The duration of the extension of time to which a contractor in certain contingencies is entitled is also a matter for arbitration, if either party is dissatisfied with the architect's allowance. Loss to contractor by owner's delay in furnishing materials outside of contract to other trades is first fixed and determined by the architect, but is subject to appeal. There is a clause providing that if the work be substantially completed, except in some details, the completion of which, owing to the time of the year, would involve disproportionate delay, the architect shall estimate the actual cost of these, add fifty per centum and issue a final certificate. This clause would seem to have much equitable merit. The owner is made liable for fire or tempest, and is required to insure so as to protect the contractor. Combined with this is a provision giving the owner the right of election as to rebuilding.

Civic Extension.

I had intended to devote the larger part of my paper to a discussion as to future legislation regarding city building, the laying out of streets and parks and providing for separate districts for manufacturing, mercantile and residence purposes. You will all have noticed not long ago that a commission has recently made a report to the government of the city of Berlin, embodying recommendations which anticipate at the end of 40 years a population for that city of 10,000,000. They deal with the railway question and railway terminals with a view of abating railway noise and smoke. I am not sure how they propose as to the manufacturing and other districts, where smoke, noise and offensive odors are inevitable, whether by way of zones from a common centre, or by way of sectors, like the spaces between the spokes of a wheel. They propose to control the right of private property, to interfere to a considerable extent with the views of the individual real estate owner, and they also propose that the administration of their plan shall be committed to a body of skilled men—engineers for the laying out of streets, architects for the buildings, and landscape men for the parks. Probably such a plan would be difficult for general adoption in western communities. Who can anticipate the growth of an urban population? We can see, or think we see, the mistakes made. Could we have obviated them without making worse ones? The right of private ownership, however, should not be an objection. The real estate owner who buys acreage at \$100 and sells it in four or five years at \$5,000, could not fairly complain of such an administration, reasonably exercised. The rapidly increasing value of his land is due to the community, and in most cases to nothing else. If, then, the good of the community requires a modern and enlightened plan for civic betterment, the community has the right to secure it. Delay in securing information, however, has prevented me entering upon a discussion of this Berlin plan. I understand that the proposals have advanced beyond the stage of a mere outline, though authority has not yet been given to make them law. In any such matter the assistance of skilled men should be called in, not merely for advice, but they should be clothed with authority to make their decisions effective.

Canadian Municipalities' Annual Meeting

Excellent Work of the Union as Revealed Last Week at Toronto—Satisfactory Reports from Affiliated Bodies—Some Important Resolutions

The 10th annual convention of the Union of Canadian Municipalities was held in Toronto, Aug. 31st-Sept. 2nd. After registering on the morning of Wednesday, Aug. 31st, a meeting of the executive was held, after which were appointed the members of the committee on resolutions. The proceedings were conducted under the chairmanship of Mayor Evans, of Winnipeg, President of the Union. An address of welcome was delivered by Mayor Geary, of Toronto, who dealt principally with the matter of obtaining an improved service from the railways.

"In some way or other," he said, "the whole question of the control of freight and passenger business should be taken hold of by the union. It should make an effort to present facts to the proper authorities, so that the railways will be compelled to take care of any legitimate business which may arise."

Response to this address was made by Alderman Dubeau, of Montreal, in the absence of Mayor Guerin, of that city. Among other interesting points discussed in his annual address, President Evans dealt especially with the marketing of municipal securities. He claimed that London was the best market for the larger Canadian municipalities. The best results were obtained in London by issues of not less than £100,000. Bonds were regarded in London as a preferable form of security. Securities in large volume were more easily sold than small securities.

Reports of an encouraging character were received from the following affiliated Provincial Municipal Unions: Manitoba, British Columbia, Saskatchewan, New Brunswick, Nova Scotia and Quebec.

The work and aims of the Union were detailed in an interesting manner in the report of the honorary secretary, Mr. W. D. Lighthall, K.C. Noteworthy reference is made in this report to the exploitation of Canadian resources for the profit of foreign concerns. In this connection Mr. Lighthall has the following to say:

Are Canada's Resources in Danger?

"We have found specially troublesome certain large combinations. One was the Bell Telephone Company, which, as regards us, is an essentially United States corporation—a form of the American Bell Company, and follows its methods. After years of contestation we obtained our points and it is now quiet. Another, of Canadian origin, and which has proved the most serious and deftly managed organization the municipalities thus far had to fight, is the Mackenzie-Mann combination, which has pulled Ottawa political wires on a large scale against our cities for many years, and has been said to 'own the House.' Their enterprise is admirable, but some of their methods damnable; perhaps we may expect more agreement with them in the future. But both are now overshadowed by a new combination to which the attention of every Canadian citizen ought to be directed. I refer to the Pierpont Morgan influence, mentioned above. We have it on good authority that this financial organization is so complete that all the principal city franchises, water powers and great resources generally of Canada are mapped out in New York for systematic invasion, on the same lines as those of the United States. Consequently, terminal bills and power and canal bills on a vast scale, scientifically directed, have been appearing on the horizon with powerful New York backing for the past

three years, and constitute one of the most formidable questions affecting our national heritage."

After a resumé of the specific results accomplished by the Union since its organization, Mr. Lighthall concluded by summarizing the principles for which the Union stands.

1. The Canadian people shall not be ruled by any irresponsible monopoly.
 2. They shall not submit to methods of fraud or corruption.
 3. There must be no perpetual franchises.
 4. Our heritage of natural resources affecting municipalities must not be sold, but leased, if not publicly operated.
 5. One generation cannot legislate away the rights of another.
 6. Municipalities must control their streets (subject to reasonable passage for through lines).
 7. Each Canadian shall have a fair deal from all who are granted corporate or other public privileges.
 8. Some court or council must always exist free and equipped to enforce the fair deal.
 9. The life of the poorest citizen must be made worth living, through his share of the best civic conditions and services.
- An eloquent tribute was paid to the efficient service rendered by Mr. G. S. Wilson, of Montreal, the assistant secretary.

Mr. J. W. McCready, of St. John, N.B., in reporting on the work of the Union of New Brunswick, of which he is honorary secretary, took occasion to emphasize the loss entailed by the Campbellton fire, which is estimated at \$7,000,000. The Dominion Government has been asked to finance the town debt.

The Hydro-Electric Power Commission.

Mr. W. K. McNaught, M.P.P., addressed the delegates on the subject of the present status of the above body, and paid a tribute to the work done by Hon. Adam Beck and Chief Engineer Sothman in the movement for cheap electric power for the province. He referred to the cost of the system as having originally been estimated at \$3,749,000, and said the actual cost would be \$149,000 within the estimate.

President Evans, in thanking Mr. McNaught for his address, referred to Winnipeg's municipal power development, which is now under way, and said that he felt confident that Winnipeg, as well as the Hydro-Electric Power Commission, would keep well within its estimate.

Town and City Planning.

The responsibility of the municipality in regard to civic improvement and beautification was dealt with in an able manner by Mr. Henry Vivian, M.P. for Birkenhead, Eng., who showed the folly of allowing cities and towns to expand without regulation or intelligent planning. Mr. Vivian was a member of the special committee appointed in 1906 by the British House of Commons to investigate the housing problem in the old country.

It is interesting to note that Mr. Vivian will return to Toronto in October and assist the council to frame its application to the legislature for authority to raise money for the improvement and beautification of the city.

At the evening session the papers by Controller Spence on "Boards of Control," and by A. Buschart, City Commissioner, Edmonton, Alta., on "Municipal Government by Commission," led to a most interesting discussion, participated in by most of the representatives present. Controller Spence presented the Board of Control as a "civic cabinet," responsible to the

people, while Mr. Buschart presented his case on the side of business efficiency.

The sessions were brought to a close on Friday, Sept. 2nd, when the following officers were elected: President, Mayor Chisholm, Halifax, N.S.; 1st vice-president, Mayor Geary, Toronto, Ont.; 2nd vice-president, Mayor Bleau, St. Boniface, Man.; 3rd vice-president, Mayor Milne, Medicine Hat, Alta.; honorary secretary-treasurer, Mr. W. D. Lighthall, K.C., Montreal, Que. (re-elected). Mr. Charles Hopewell, Mayor of Ottawa, was elected an honorary past president of the Union.

Important Resolutions.

A number of resolutions were put through at this session, among which were the following:

"That the water powers of the country are a national asset which should be preserved for the benefit of Canada by building up Canadian municipalities; that no perpetual or long-term rights of exporting power from such sources should be granted, and that where temporary rights of export are allowed there should be clear advantage to the public interest or the public revenue.

"In view of the rapid development throughout the Dominion and consequent greater danger to the travelling public at level railway crossings, that the Union memorialize the Board of Railway Commissioners for Canada regarding the necessity of requiring the railway companies to at once proceed with the construction of effective works and appliances, at their own cost, for the convenience and safety of the travelling public.

"That the Executive of the Union of Canadian Municipalities be authorized to appoint a special committee to investigate and study the question of city and town planning, and the housing of the people, and that such committee report fully to the Union at the next convention; also, that the committee in the meantime take steps to promote and forward, so far as circumstances will permit, the recommendations made in the address delivered before this convention by Mr. Henry Vivian, M.P."

"That it was desirable a uniform system of accounting should be adopted by all municipalities throughout the Dominion; also, that each province should adopt uniform methods in recording statistics."

Master Plumbers' Convention

At the 15th annual convention of the Master Plumbers' Association, held last week at Toronto, the following officers were elected for the ensuing year: President, G. H. Cooper, Toronto; vice-president, J. E. Walsh, Montreal; secretary, L. Legrow, Toronto; treasurer, E. D. Higginbotham, Fort William. Provincial vice-presidents—Nova Scotia, F. Dexter, Truro; New Brunswick, G. E. Blake, St. John; Quebec, H. W. Munday, Montreal; Ontario, R. J. Shannon, Toronto; Manitoba, R. Thompson, Winnipeg; Saskatchewan, W. C. Heinricks, Moose Jaw; Alberta, E. J. Young, Calgary; British Columbia, R. C. Hodgson, Vancouver. Chairmen of committees—Legislative, H. A. Knox, Ottawa; Sanitary, Geo. Ross, Brockville.

The next meeting will be held at Port Arthur, Ont., in June, 1911.

The largest single piece of fabricated steel ever made in Winnipeg has just been delivered by the Manitoba Bridge & Iron Works to the new Orpheum Theatre. This steel is in the form of a plate girder, 90 feet long and 5 feet deep, weighing 17 tons. This girder, which will extend across the full width of the theatre to carry the balcony so that no columns will be necessary in the space below. The girder, when completed, will weigh 38 tons and will safely carry as many people as can possibly be crowded into the gallery. All of the steel to be used in this building is being fabricated in Winnipeg at the shops of the Manitoba Bridge & Iron Works.

Johnson & Carey are now working over 600 men in their contract for filling in the railway bridge over Racing lake, near Fort Frances, Ont.

For Improved Specifications

As the result of a number of conferences between committees appointed by the Master Builders' Exchange of Philadelphia and the Philadelphia Chapter of the American Institute of Architects, a list of recommendations have been agreed upon for improving conditions in the building business of that city. These recommendations were the outgrowth of questions put to the architects by the builders and a general exchange of views between those engaged in both branches of the industry. Among the recommendations were the following:

Plans to be drawn to scale of not less than one-eighth inch to one foot.

Where party walls are used, a clause be inserted in specifications that the party wall or walls, including cost of measurer's services, etc., are to be paid for by owner.

Wells or cisterns, if accessible to contractor at time of estimate, the cost of cleaning, filling, etc., be included in contract price, provided such wells and the kind of filling required are noted on plans or distinctly called for in specifications. Wells not in evidence be considered as an extra and paid for at price mutually agreed upon.

Information relating to proposals be supplied to sub-contractor by general contractor, and all inquiries in relation to plans, etc., be sent to architects by letter from general contractor.

Depth of all foundation walls be distinctly marked on plans, and any greater depth of excavation and foundation walls to be paid for at price agreed upon before work is begun. If evident that foundation be on rock, or that blasting be required, the fact be noted in specifications. The same recommendation applies to plumbing where in excess of ordinary, such as surface water.

All plans to be finally completed before being placed in hands of contractors, and that ample time be given to make up estimates.

In case of an apparent disagreement between plans and specifications, the attention of the architects should be called to the discrepancies in order that the contractors may be notified of the explanation.

Where walls are to be furred, the same be mentioned in specifications and noted on plans.

All partitions be plainly marked as to thickness and material indicated.

Where partitions on one floor are the same as those on another floor and it is not considered necessary to draw in these partitions, the plans should be clearly and conspicuously lettered, "partitions same as ——— floor."

The detail construction of corridor partitions in office buildings, etc., be either shown on scale drawings or fully specified to convey proper information to contractor.

The questions of the freezing of walls on delayed work and the necessity of repointing, which often entails a heavy expense on the contractor, were not favorably considered by the Chapter Committee, the answer being that the contractor for brickwork or masonry, and all other mechanics should be responsible for their work and leave it in proper condition. Should an exception be taken in the case of pointing, the plasterer and paving contractor would be entitled to the same consideration, as their work also is liable to be damaged by frost.

Many Noteworthy Exhibits at Toronto

Things Worth Seeing by Constructional Men at the 32nd Annual Canadian National Exhibition—Brief Mention of Most Interesting Features

Evidence of gratifying improvement in the majority of lines pertaining to construction is to be found at the 32nd annual Canadian National Exhibition now in progress at Toronto. The exhibits generally represent the best productions in their respective fields. In most cases they are displayed to good advantage and furnish an excellent tribute to the excellence and progressiveness of Canadian manufacture.

The Exhibition Board is deserving of much credit for the enterprising arrangements made with a view to assisting exhibitors in the transportation and arrangement of their material, and few complaints are to be heard on this score. In one particular, however, there is certainly room for a little forethought next year, and that is in the provision of adequate protection for firms who have been allotted outside space for the demonstration of contractors' machinery. If it is not considered advisable to have these machines operated in the buildings, some sort of temporary shelter should be provided against the elements. A visit to the grounds one morning last week, after a heavy rain had fallen during the night, was very convincing on this point. One Western Ontario concern had an exhibit of several thousand dollars' worth of machinery, which, covered with rust and surrounded by mud, was anything but improved by these adverse conditions.

Every effort is made to develop the Canadian National Exhibition on bigger and broader lines each year. If this is to be done effectually such details as the one cited above must not be overlooked.

Brief comment is made herewith on some of the most interesting exhibits pertaining to the field covered by the "Contract Record." Pressure of space prevents a more extended reference in this issue. Possibly a few of our readers and advertisers will remind us of things we have forgotten to mention in time for the publication of such in our next issue.

Standard Glass Co., Ltd., Toronto, Ont.—An attractive line of their various products, including leaded stained glass, electric fixtures, electric and gas domes, etc.

Pilkington Bros., Ltd. (Works, St. Helens, Eng.)—Samples of polished plate and window glass. This firm manufacture sand-cut glass, bevelled plate glass, bent glass, etc.; also cast or hammered plate and other lines.

Brantford Roofing Co., Brantford, Ont.—"Brantford" asphalt, "Brantford" rubber, and "Brantford" crystal roofing. This firm supplied two-thirds of the G.T.R.'s requirements last year. A recent contract for roofing is that of the Standard Bank, at the corner of King and Jordan Sts., Toronto.

Hoidge Marble Co., Ltd., Toronto, Ont., representing Ontario Marble Quarries Co., Ltd.—The marble used in the temporary office of the Bureau of Mines in the Agricultural Building was from the Ontario Marble Quarries, and bore testimony to the beautiful effect produced with the finished material.

Dominion Sewer Pipe Co., Ltd., Toronto, Ont.—A large and interesting exhibit of salt-glazed and vitrified sewer pipe, culvert pipe, inverts, flue linings, etc. Dominion sewer pipe are impervious to water, and are manufactured in all sizes from 4 to 24 inches.

H. M. Robinson & Co., Toronto, representing the well-known English firm of Wooliscroft & Son, Ltd.—Interesting exhibit of tasteful designs in wall and floor tile.

Chamberlain Metal Weather Strip Co., Ltd., Toronto, Ont.—Demonstrating the special advantages of their product, which appears to be particularly serviceable.

Ontario Wind Engine & Pump Co., Ltd., Toronto, Ont.—Samples of their latest improved gas and gasoline engines, etc. This firm manufacture steel sub-structures of all kinds, also steel and wood tanks, hydraulic rams, etc.

Standard Sanitary Manufacturing Co., Ltd., Toronto, Ont.—A large and effective display of their well-known plumbing fixtures. The reasonable prices at which "Standard" sanitary products may be obtained make it possible to fit up quite an elaborate bathroom at a comparatively low cost. Considerable interest is taken in this exhibit, especially in the model bathroom.

Batts, Ltd., West Toronto, Ont.—A well-arranged and comprehensive display of some of their many products, which include staved columns, veneered doors, newel posts, pine doors and frames, sash, trim turned newels and balusters. The best of a number of excellent exhibits made by this firm in recent years.

Standard Ideal Co., Ltd., Port Hope, Ont.—Exhibiting high-grade enamelled baths, lavatory fittings, etc., for which plenty of inquiries are forthcoming. This firm manufacture an impermeable pipe which is well worth investigation by architects and sanitary engineers.

Ideal Concrete Machinery Co., Ltd., London, Ont.—An excellent display of concrete mixers, brick and block machines, etc. "Ideal" automatic tamper, with scraper and finisher in operation. Makes blocks automatically of all sizes. This exhibit is in charge of Mr. C. F. Pulfer, the company's energetic manager, who reports as many enquiries as he can handle.

Goldie & McCulloch Co., Ltd., Galt, Ont.—A convincing line of fireproof safes, vaults and vault doors. Interesting booklet containing photos and testimonials obtainable on application.

Royal Doulton Potteries, England. Agents: Chillias-Black, Ltd., Toronto, Ont.—Architectural terra cotta and "Carrara." Claimed that the terra cotta combines the massive appearance of stone with the fireproof qualities of brickwork, and that the appearance of the "Carrara" is not affected by smoke or dirt.

Jno. T. Hepburn, Toronto, Ont.—Showing the Hepburn Scotch Derrick, used by leading contractors in all parts of the Dominion, made in standard sizes from $\frac{3}{4}$ of a ton upwards, operated by hand or power. Also the "New State" concrete mixer, claimed to be the most practical machine on the market for mixing sand, gravel, crushed stone, cement, etc.

American Road Machine Company, of Canada, Ltd., Goderich, Ont.—Crushing and road building machinery. Exhibiting "Champion" dump wagon. An excellent line manufactured by this firm is one of the best propositions of its kind on the market.

Asbestos Manufacturing Co., Ltd., Montreal, Que.—Asbestos building lumber, corrugated sheathing, asbestos cement shingles. Products of this firm are claimed to be water and fire proof, and very durable. Asbestos lumber claimed to be indestructible by exposure to elements.

Archer Light, Heat & Power Co., Ltd., Toronto, Ont.—Hot water furnaces, bath tank heaters, etc.

Bournival & Co., Toronto, Ont.—"Field" gas and gasoline engines; also the "Champion" combination woodworker, an economical and labor saving machine for the contractor.

Smart-Turner Machine Co., Ltd., Hamilton, Ont.—Leading lines of manufacture: power and steam pumps, condensers, travelling cranes, etc. An interesting exhibit.

Johns-Manville Co., Ltd., Toronto, Ont.—Fireproofing of all kinds, asbestos roofing, etc.

Canadian Producer & Gas Engine Co., Ltd., Toronto, Ont.—Producer gas power plants, claimed to represent the "acme of power economy."

H. W. Petrie, Ltd., Toronto, Ont.—Comprehensive line of machine supplies and transmission. Much interest is being taken in the Keighley gas engine in operation.

N. J. Holden Co., Ltd., Montreal.—A comprehensive and interesting exhibit of railway and contractors' supplies. The various tools and appliances shown by this firm are well known and receive a great deal of attention at the hands of the contracting interests. The Maxwell Deformed Bar, for concrete reinforcement, placed on the market by this company last Fall, is earning an excellent reputation.

London Concrete Machinery Co., Ltd., London, Ont.—One of the best displays of concrete machinery at the Show, and probably the largest exhibit of the kind ever made by one firm at a Canadian exhibition. The company are showing most of their leading lines, including the London automatic batch concrete mixer and the London automatic cement drain tile machine. (We learn with interest that this company will commence shortly the erection of a new plant ten times the capacity of their present factory.)

Amherst Foundry Co., Ltd., Amherst, N.S. (represented by Ontario agents: Monarch Brass Manufacturing Co., Ltd., Toronto.)—A comprehensive line of Beaver Brand porcelain enamelled sanitary ware. The attention paid to this exhibit is sufficient evidence of the increasing popularity of the Amherst Company's products. The plumbers' supplies shown by the Monarch Company are also of much interest, representing a considerable number of new designs in valves, etc.

Standard Paint Company of Canada, Ltd., Montreal, Que.—Devote most of their time at the Show to explaining the merits of Ruberoid Roofing. Ruberoid contains no rubber, tar or asbestos. It is claimed to represent the last word in permanent, fire-resisting roofing material.

Berg Machine Manufacturing Co., Ltd., Toronto, Ont.—Demonstrating the latest improvements made in the realm of the brick manufacturer. The products of this firm are of neat design and well calculated to meet every requirement affecting durability and cost. The "Style A" pressed brick machine, with a capacity of 35,000 to 50,000 brick per day, is one of the firm's best lines.

Merillat Culvert Core Co., Winfield, Iowa.—Demonstrating an adjustable culvert core for sizes between 20 and 48 inches. This machine is expansible, collapsible and portable. It is extremely simple in operation, and has done well on the Canadian market since its introduction at the Cement Show at London in the spring. Mr. Merillat informs us that a Canadian company is now being organized.

Corrugated Pipe Co., Ltd., Stratford, Ont.—Showing their product in a number of different sizes. Special merits claimed to be strength, durability and economy. The company guarantee their culverts, which are made exclusively under the Moore & Hall patents, for 20 years if placed properly.

Waterous Engine Works, Ltd., Brantford, Ont.—Featuring the Seagrave fire apparatus. The steam road rollers manufactured by this company have many claims to superiority. Each

roller manufactured at the Waterous Works is subjected to a vigorous test before shipment, with the result that the machines are absolutely reliable as regards operation and durability.

F. W. Bird & Son, Hamilton, Ont.—Samples of "Neponset" products. "Neponset paroid" roofing is easy to apply and guaranteed to stand the tests of time and wear. It is made from high-grade material, and treated with a preparation that renders it strictly waterproof.

Berry Bros., Ltd., Detroit, Mich.—Specimens of work finished with the varnishes manufactured by this firm, claimed to give the best results in staining, shellacking and finishing.

Down Draft Furnace Co., Ltd., Galt, Ont.—Demonstrating among other things the ready adaptability and other merits of their coal and wood chutes.

Imperial Plaster Co., Ltd., Toronto, Ont.—"Wood Fibre Plaster" and the advantages that commend it to architects and builders are the centre of interest at this booth.

Factory Products, Ltd., Toronto, Ont.—Noteworthy exhibit demonstrating principally the excellent lighting capacities of "Osram" lamps. This company is the Canadian agent of Stothert & Pitt, Bath, Eng., manufacturers of travelling cranes and hoisting machinery, Mr. H. G. Nicholls being the general manager.

Cement Tile Machinery Co., Chatham, Ont.—The Schenk machine manufactured by this concern is the first of its kind manufactured in the United States or Canada. It is sold on a guarantee and is claimed to be very speedy and profitable in operation.

F. Sturgeon, Toronto, Canadian agent for Major & Co., Ltd., Hull, Eng.—Demonstrating the appliance and advantages of Solignum, a wood preservative and stain that is claimed to be an absolute preventive against decay.

Richards Bros., Toronto, Ont.—Kelsey warm air generator, an excellent system of heating and ventilating for churches, schools and residences. 37,000 Kelseys in use.

Wettlaufer Bros., Toronto, Ont.—An interesting line of mixers and other machinery for cement users.

Pease Foundry Co., Ltd., Toronto, Ont.—"Economic" boilers and furnaces, also the new "Economic" blower for ventilating and heating public buildings.

Northern Electric & Manufacturing Co., Ltd., Toronto, Ont.—Demonstrating the operation of their fire alarm equipment as adopted by the city of Toronto. Also the advantages and low cost of operation of their inter-phones, well worth investigating by business concerns.

North Lanark Marble & Granite Quarries, St. Catharines, Ont.—Beautiful samples of verde antique marble.

Milton Pressed Brick Co., Ltd., Milton, Ont.—Various samples of dark red and buff pressed brick and other products well known to the trade.

Gurney-Tilden, Ltd., Hamilton, Ont.—The builders' hardware shown by this firm is worthy of special inspection by architects and builders. In excellence of manufacture it compares favorably with any of the U. S. products. Also "New Idea" furnaces, boilers and radiators.

Canada Cement Co., Ltd., Montreal, Que.—Materials used in the manufacture of high-grade Portland cement.

W. D. Beath & Son, Toronto, Ont.—Adjustable parlor and barn door rollers. The triangle mesh concrete reinforcement manufactured by this firm is being used to a greatly increasing extent, and their business is growing very rapidly.

Jas. Morrison Brass Mfg. Co., Ltd., Toronto, Ont.—Electric fixtures and brass goods of all kinds.

Positive Clutch & Pulley Works, Ltd., Toronto.—Demonstrating the combined jaw and friction clutch, the first com-

bination of the kind to be placed on the market. The materials entering into the manufacture of this clutch have been carefully selected, and the parts being interchangeable it should have strong claims for inspection.

Dominion Roofing & Supply Co., Toronto, Ont.—Roofing materials. Feature: sample of Malthite asphalt roofing. Malthite roofing material is saturated and coated with natural asphalt and is said to be especially durable.

George B. Meadows Wire, Iron & Brass Works Co., Ltd., Toronto, Ont.—Comprehensive line of their various products. Builders' iron work, ornamental iron fences and metal lockers, of special interest. One of the most artistic displays at the Exhibition.

Canadian Steam Boiler Equipment Co., Ltd., Toronto, Ont.—Economic vacuum steam heating specialties.

Among other interesting exhibits may be mentioned those of the Butterworth Foundry Co., Ottawa; Jas. Stewart Manufacturing Co., Ltd., Woodstock; Norsworthy Co., Ltd., St. Thomas; Wizard Furnace Co., Ltd., Toronto; Peerless Furnace Co., Toronto; McClary's, London, represented by David Millar, Toronto; Hall Zryd Foundry Co., Ltd., Grimsby; A. Welch & Son, Toronto.

Royal Architectural Institute

Concluding Details of 3rd Annual Meeting at Winnipeg—Proposed Federation of Provincial Associations

A preliminary report of the 3rd annual assembly of the Royal Architectural Institute of Canada, at Winnipeg, which was held during the last week of August, appeared in our last issue, together with a list of the new officers. Since going to press, we have received further details which may be of interest.

In addition to the names published in our previous issue, the following gentlemen were elected to the council of the Institute: W. H. Archer, Vancouver, A.I.A.; C. B. Chappell, Prince Edward Island; A. F. Dunlop, Montreal, R.C.A., P.Q.A.A.; D. Ewart, Ottawa, I.S.O., O.A.A.; C. E. Fairweather, St. John; H. E. Gates, Halifax; H. B. Gordon, Toronto, O.A.A.; E. L. Horwood, Ottawa, O.A.A.; J. P. Hynes, Toronto, T.S.A.; R. P. Lemay, P.Q.A.A., Quebec; C. P. Meredith, Ottawa; G. A. Monette, Montreal, P.Q.A.A.; James A. Wise, A.A.A., Edmonton, and Sam Hooper, Winnipeg, M.A.A.

The federation of the various provincial associations of Canada under the Royal Institute was brought up at the closing business session. It was announced by the president to be the most important business which had been brought before the assembly. "It means," he said, "that instead of continuing as an absolutely independent organization, as at present, the Association will become the parent body of the various associations of the Dominion. The motion to change the charter to permit of the change is being made at the request contained in a joint resolution of the four established provincial associations. The matter has been very thoroughly considered by this council, and if the motion carries, the council will be given full power to deal with the matter and apply for the powers necessary to effect confederation. If the proposal fails, then the Institute will continue as at present. As I have said, the motion is the result of the application of the provincial bodies. We are certain of their co-operation in the matter, and it simply remains for the details to be decided upon."

Upon the platform with the President during the hearing of this problem were: Mr. Edmund Burke, representing the Ontario Association; Mr. Joseph Gardiner, for Quebec, and Mr. J. H. G. Russell, for Manitoba. While the importance of the matter was generally recognized, the preliminary canvass

had completely covered all details, and in the main discussion there was little dissention.

Federation and Protection

A motion, which read as follows, was introduced by Mr. Edmund Burke, of Toronto, seconded by Mr. E. L. Horwood, of Ottawa, and carried unanimously: "The council be hereby empowered to obtain amendments to the charter of the Royal Architectural Institute of Canada, and to take the other steps necessary to alter the constitution of the Royal Architectural Institute of Canada, to comply with the request in the joint resolution of all the official provincial associations throughout Canada to form the R.A.I.C., into a federation of official provincial architectural bodies, with the approval of such official bodies."

Among the important papers of the convention were those of Mr. Isaac Campbell, K.C., on "Architectural Jurisprudence" (extract published in this issue), and Prof. P. E. Nobbs, of McGill, on "Canadian Architecture." Mr. Joseph Greenfield, past president of the Manitoba Association, was scheduled to present a paper on the architecture of the west, but, owing to serious illness, he was unable to attend the convention, and Mr. S. F. Peters, of Winnipeg, undertook to fill the vacancy. Mr. Peter's paper will appear in our next issue.

When the matter of providing better protection for Canadian architects was brought before the assembly, Mr. S. Frank Peters, of Winnipeg, made a motion, which read: "That the Canadian Government be asked to increase the duties on the service of foreign architects." In the discussion which ensued, a general rate of 2½ per cent. on all services was suggested, but the convention finally adopted a blanket resolution which paves the way for an increase without stipulating the amount.

Outside the business sessions of the assembly, the time of the delegates was occupied in a continual round of entertainments and luncheons. Trips were made to the Garson Quarries, at Tyndall, and to the St. Andrew's Locks.

The paper on Canadian Architecture, prepared for the convention by Professor Percy E. Nobbs of McGill University, Montreal, was read in his absence by Mr. H. E. Matthews.

It was decided to hold the next annual convention at Montreal.

Representative Attendance at Banquet

The annual banquet of the Institute was held at the Royal Alexandra Hotel on Friday, August 26th, and proved a most enjoyable function. The attendance numbered about fifty. Mr. F. S. Baker occupied the chair. Those present included: H. B. Gordon and Edmund Burke, Toronto; Alcide Chausse, J. Rawson Gardiner, Montreal; T. Chapman Clemesha, Regina; David Webster, Saskatoon; Chas. F. Burden, Massey, Ont.; E. L. Horwood and J. H. Watt, Ottawa, and from Winnipeg: W. H. Carter, president Builders' Exchange; T. W. Drewry, president Board of Trade, and E. H. Rodgers, J. Prendergast, J. Woodman, Wm. Fingland, F. S. Murdock, W. A. Elliott, Fred G. Pusey, J. D. Matheson, Sam Hooper, J. H. G. Russell, S. Frank Peters, D. A. Ross, Herb B. Rugh, W. Percy Over, H. E. Matthews, L. P. Kenwick, W. B. Lait, A. J. Rowley, Geo. H. Measham, Harold Edwards, Hector L. Chalmers, Hart Leech, G. Chignell, Lawrence Hooper, John Hooper, Geo. W. Goodall, William T. Davis, R. O. McGougan, R. B. Pratt and D. W. F. Nichols.

The toast of the King was proposed by Mr. H. B. Gordon of Toronto, and duly honored. Mr. Gordon spoke of the wonderful progress that had been made in the western city during recent years.

"Sister Societies" was proposed by Mr. E. L. Horwood of Ottawa and responded to by representatives from four provincial organizations, Messrs. Russell, Burke, Chausse, Gardiner and Clemesha.

Settlement of Winnipeg Strike

Interesting Statement by Mr. Peter Lyall, Sr.—
Items of Interest from Architects and Contractors

Winnipeg, Sept. 3rd, 1910.

Good progress is being made on civic contract work. At the McPhillips Street subway Jno. Gunn & Sons are making rapid strides. The preliminary construction for the overhead bridge on Arlington Street, formerly Brown and Brant Streets, is being pushed ahead by Contractor Newman. Thos. Kelley & Sons are making good progress with the Pembina Street subway.

Provincial Architects' Association and Competitive Plans.

A protest has been made in writing, for the Architects' Association of the province, against the changing of the draft advertisement for competitive plans for a tubercular hospital by the city. The co-operation of the president of the Association was asked by the city and given, but his suggestions were afterwards altered and the Association objects. Two clauses caused the friction. One provided that a member of the Architects' Association be one of the judges of the plans submitted. The other restricted drawings to resident architects. In the first case the city struck out the clause pertaining to the judging. It was intended to secure professional opinion on the plans, but by letting the clause go providing for a member of the Association as judge the board felt that it was recognizing the organization, and as there were a number of architects of the city not connected with it, this was deemed unfair. The other clause, if inserted, would bar the plans of Dr. Sharpe, which were considered meritorious and eligible for the competition.

The Association now bases its chief protest on the striking from the draft the condition of judging, asserting that after the architects spent so much labor on the plans it would be unjust to them not to have professional judges technically qualified to select the most advantageous drawings. The letter has been sent to the Board of Control, but has not yet been dealt with.

Peter Lyall on the Labor Situation.

Upon his arrival in the city from Montreal last week Mr. Peter Lyall, Sr., discussed the present labor troubles of his own firm, Peter Lyall & Sons, of Montreal, and the firm of Lyall-Mitchell, of which his son, Peter Lyall, Jr., is managing director, reaffirming the statement made by his son that the two firms are distinctly separate. Mr. Lyall, Sr., states that he has an interest, less than one-third, in the Winnipeg firm, but that he takes absolutely no hand in its management in any way. Also he states that Peter Lyall, Jr., has not, and never had, any direct connection with the Montreal firm and has no pecuniary interest whatever in it.

About two years ago, Mr. Lyall explained, his firm declared for the open shop at Montreal, simply because the union there had become affiliated with the international union, and he found that his men were being dictated to by alien agitators. He simply refused to recognize the union. Some little time ago the international union demanded that his foreman at Montreal become a member of the union, and Mr. Lyall refused to sanction this arbitrary demand, although he believes that some of his men were and had been members of the union. This precipitated the strike at Montreal, which was followed by a walk-out of the masons and bricklayers at Regina, where the contract for the new parliament buildings and the hospital is held by the Montreal firm.

As to the situation in Winnipeg, Mr. Lyall, Sr., had nothing to say, as he had never had anything to do with the active management of the local firm. He offered the opinion, however, that the men had acted unfairly, and in direct violation of a signed agreement and the finding of an arbitration board provided for in the agreement.

Reverting to conditions at Montreal, Mr. Lyall stated that

work on the several big contracts his firm has there was not interfered with to any extent by the strike, as the strikers had been readily replaced. At one time he had made arrangements to import a number of Scottish masons and bricklayers, but the order was countermanded when it was found that enough men could be obtained in Canada. He thought the men ill-advised in their action in the present state of the labor market in the Old Country and the freedom of the contractors to bring into Canada workmen who are British subjects. If forced to import men by the action of the international union, he would not hesitate to do so, but at present he has all the men required on the contracts under way.

Concerning Professional Labor Leaders.

"I am in deep sympathy with the men, and a firm believer in unions," he added, "but Canadians should belong to Canadian unions, and not have their bread and butter dependent on the manipulations of foreign professional labor leaders. I believe thoroughly in a Canadian federation of labor unions, and think it could be made successful. I pay the highest union wages, and do not interfere with any man in his union connections. I simply refuse to recognize an international union which takes the money of Canadian workmen and puts over them professional leaders, whose very jobs depend on fermenting labor trouble. I was a workman and a union man myself for many a year, but I did not belong to an American union."

Strike Settled by Arbitration

A board of arbitration, the appointment of which was brought about by Mayor Evans, vindicated the action of the Builders' Exchange in forcing a lockout and ordered the striking bricklayers and masons back to work on the Lyall-Mitchell contracts. The action of the international union in ordering out the workers on the Lyall-Mitchell contracts was heavily censured.

The effect of the lockout and strike upon the building situation has not been very serious. Owners of buildings under construction were beginning to grow anxious, when the Mayor intervened and brought about what proved the settlement. It is stated that these owners approached the contractors and informed them that it was desirable to call off the trouble and get down to work, thereby insuring the completion of works. The arbitration movement was partly a result of this.

The proceedings before the arbitration board were devoid of features. Mr. Lyall simply submitted evidence as to the ownership of his firm and proved conclusively that there was no connection with his father's business in Montreal. Goeves, representing the union, deplored the fact that this information had not been given the men earlier, so as to prevent the strike, but this was ridiculous in view of the fact that identically the same evidence had been presented before the strike commenced.

The members of the Builders' Exchange are now endeavoring to find some method by which a repetition of the trouble can be guarded against. Clauses 5 and 6 of the present working agreement between the union and the contractors stipulates that the men shall not walk out without first calling an arbitration board, but in this instance the clauses were ignored.

One undoubted effect of the strike and lockout in Winnipeg was to hush up all information concerning projected work. A round of the architects' offices this week, in search of information of new work, was met everywhere with evasive replies which boded well for the future, but left the present in doubt. The object of this move was evidently to abstain from giving the men the impression that business was so heavy that they could afford to hold off.

Mr. Alcide Chausse, building inspector of Montreal, has been asked to attend the Town Planning Conference, which is to be held in London early in October, under the auspices of the Royal Institute of British Architects.

Shortage of Cement at the Coast

Building operations at Victoria, B.C., are reported to be seriously hampered by a shortage of cement. For the past month the situation has been almost acute. Cement has been brought into the city from Seattle and other points, but so great is the demand that supplies are inadequate. Last week a supply arrived from the Old Country on the Blue Funnel boat, some 1,000 barrels, but this will only meet immediate demand and make no provision for the future. The same trouble is being experienced at Vancouver. This cement shortage is seriously affecting civic sidewalk work, and in combination with a shortage of gravel, is holding up progress on several of the street works.

Building Operations at Fort William

Fort William, Ont., has been a scene of remarkable building activity this season. The progress made is particularly noticeable. Real estate men state, however, that there is a shortage of houses for renting purposes. One of the most interesting works is that being done by the Canadian Stewart Company in the additions to the Consolidated elevator. The walls have all been constructed and the machinery is being installed in the workhouse, which will be in operation September 15. The storage house will be completed by November 30. With the completion of the annex the capacity of the Consolidated elevator will be doubled. The storage capacity will be increased from 850,000 bushels to 1,700,000.

Contractors Seaman and Penniman have a large force of men working on the construction of the main building at the West Algoma Agricultural Fair Ground. The structure will be 80 by 120 feet. The total height of the building will be 45 feet, with a gallery around the entire centre portion, which will be supported by five large trusses.

The contractor for the alteration to one of Winnipeg's city churches is a Toronto man, named Van der Feen. This gentleman is a recent arrival from Amsterdam, where he is considered something of an expert on church decoration.

Vancouver Builders' Exchange Working for Industrial Peace

The work of the National Industrial Peace Association, which has for its object the establishing and maintaining of more harmonious relations between employee and employer, received the endorsement of the Vancouver Builders' Exchange recently in the adoption of the following resolution after an address delivered by Mr. P. H. Scullin of San Francisco, a representative of the society:

"Resolved, that we, the members of the Vancouver, B.C., Builders' Exchange, in special meeting assembled for the purpose of investigating the educational work, plans and purposes of the association, do most heartily endorse the same, and call upon our fair-minded citizens, in every walk of life, to give their earnest support to this humane and patriotic effort for our city's and country's good."

Port Mann, B. C. the C. N. R. Terminal

There are fresh evidences of the intention of the C. N. R. to make Port Mann, opposite New Westminster, their main terminal on the Pacific coast. It is stated on the authority of the head office of the company that the plans for the railway yards along the waterfront have been greatly extended.

Under the revised scheme the business and residential section of Port Mann will be shifted back to the sloping hillside, extending southward in a series of terraces. Along the two-mile waterfront sites will be reserved for wharves, grain elevators, freight sheds and factories. Surveyors are still at work

locating the boundaries of the townsite as a preliminary to undertaking the subdivision of the big area into lots.

The work of laying out the yards has been entrusted to Mr. W. G. Swan, division engineer, who will act under the direction of Mr. T. H. White, chief engineer. Mr. Swan's staff has nearly completed the taking of soundings for the initial wharf to be located about a mile and a half above the railway bridge. The wharf will be 1,000 feet long.

Grading and clearing of right-of-way between Port Mann and Chilliwack, a distance of sixty-six miles, is now in progress. A return received by the chief engineer shows that 880 men are employed by the various sub-contractors in the eight construction camps established along the route through Fraser River Valley.

Brandon Wants Labor Badly

The scarcity of labor at Brandon, Man., is acute. Contractors in that city are offering higher wages than ever before, but the supply is not one-half equal to the demand.

On one piece of construction, that of the excavation being carried out for the public heating system mains, the work is being held back on account of the inability to secure laborers. At the present time Contractor Bullock, who has the work in hand, is advertising for seventy-five more men to go to work at \$2.50 a day.

On the large business block being constructed for the McKenzie Co. on Ninth Street the need of more help is also badly felt. This block, which will practically contain more floor space than any other structure in the city owned by one business concern, is being constructed of reinforced concrete, and must, therefore, be completed before the cold weather sets in.

These two cases are cited as an indication of existing affairs in the city. The problem is a serious one for the Brandon contractors, as at this period of the year time is the essence of the whole business.

Personal and General Notes

Contractor Cream, of Edmonton, Alta., sustained severe injuries last week in falling from the city power house to the concrete floor of the building.

Controller Ward, of Winnipeg, returned home last week from St. Paul, Minn., where he attended the convention of the League of American Municipalities.

The sheet metal workers' union of Edmonton declared a strike last week for the recognition of the union and the fixing of a minimum rate of 50 cents per hour for an eight-hour day.

As the result of the combined calls of railway contractors and Western farmers, the labor market has suffered, and at Fort William it is difficult to procure ordinary laborers for \$2.50 per day. It is estimated that Fort William and Port Arthur employment agents have sent out less than 4,000 hands during the summer to Manitoba, Saskatchewan and British Columbia construction camps.

The death occurred last week at Boscombe, Eng., of Mr. J. M. Gander, a well-known Toronto contractor, and for almost thirty years a resident of the Queen City. The late Mr. Gander came to Toronto from England in 1871. He was a former president of the Toronto Builders' Exchange and was at one time chairman of the Technical School Board. He returned to England a year ago owing to failing health.

The Montreal Board of Control is on the war-path hunting for paving contractors who are not giving first-class construction to the city. Last week a flaw was discovered in a cement

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Antigonish, N.S.

On September 17th tenders will be received for \$25,000 30-year waterworks debentures. D. C. Chisholm, treasurer.

Chippewa, Ont.

On October 25th a bylaw will be voted on to issue \$30,000, 30-year, $4\frac{1}{2}$ per cent. waterworks debentures. Chas. Weinbrenner, clerk.

Chilliwack, B.C.

Tenders addressed to J. H. Ashwell, city clerk, will be received until October 1st for the purchase of the following 20-year debentures: Road machinery, \$10,000; drainage, \$10,000; interest at 5 per cent.

Halifax, N.S.

The Government of Nova Scotia invites tenders until September 15th for the construction of a public highway, leading around Big Pond, near the town of Sydney Mines. C. P. Chisholm, commissioner public works.

Hamilton, Ont.

Tenders will shortly be called for the construction of sewers on Main street between Garth and Locke streets. Estimated outlay, \$5,000.

Humberstone Tp., Ont.

On September 28th the ratepayers will vote on a by-law to raise \$2,500 to construct a road.

London, Ont.

Tenders addressed to J. A. Tancock, chairman No. 2 Committee, will be received until September 15th for tile sewers on Redan and Marmora streets. Plans, etc., in City Engineer's office. G. W. Wright, deputy city engineer.

Montreal, Que.

Tenders addressed to Board of Commissioners will be received until September 23 for designing, building and erecting at the Papineau avenue pumping station, one electrically driven, 6,000,000 imperial gallon turbine, or improved centrifugal pump, with direct connected motor complete. Specifications, etc., obtained from Superintendent, Waterworks, City Hall. L. N. Senecal, secretary.

Moose Jaw, Sask.

To build a dam on the Moose Jaw river which would raise the water 65 feet above its present level is projected. Three years would be spent on the undertaking, and when the construction work was finished the town would have a water supply which would be sufficient for a population of 100,000. Estimated cost, about \$1,500,000.

Penticton, B.C.

Municipal Engineer Latimer has been asked to prepare a preliminary report upon the cost of installing water, light and power, on the completion of which by-laws will be prepared. An estimate of the resources of the three great reservoirs, now the pro-

perty of the municipality in this connection, has just been made. It is stated that at Ellis creek reservoir, 240 horse power is available, sufficient to feed 1,200 sixteen candle power lights, while it will be possible to generate at least 300 horse power. Noted in issue of August 31st.

Regina, Sask.

Money by-laws, authorizing the issue of debentures totalling \$196,000, to be distributed as follows, were carried: Pavements, \$132,000; fire protection, \$16,000; sewer, and waterworks extension, \$20,000; sidewalks, \$59,000. Total, \$196,000.

Red Deer, Alta.

Tenders will be received until October 1 for \$9,000, 30-year, 5 per cent. park; \$5,500 30-year, 5 per cent. cement sidewalks; \$4,000, 20-year, 5 per cent. purchase of pump; \$500, 10-year, 5 per cent. new call; \$2,500, plank walk, 5-year, 5 per cent. purchase of hose debentures. A. T. Stephenson, secretary-treasurer.

St. John, N.B.

Time for receiving tenders for sewer and water main construction on Douglas avenue has been extended to September 20th.

St. Lambert, Que.

The construction of macadam roads and cement sidewalks throughout the town will be undertaken shortly.

Swift Current, Sask.

Tenders are being called by G. W. Bilbrough, secretary-treasurer, until September 27th for contracts C, power house; contract D, settling tank and in-take; contract E, pumping machinery (compressed air system); contract F, electrical machinery; contract G, producer gas plant. J. Darling-ton Whitmore, engineer, Regina.

St. Andrews, N.B.

The C. P. R. has decided to spend about \$100,000 in bringing water from Chamcook lake to St. Andrews. The water is intended, primarily, for the use of the Algonquin hotel, the artesian well system having proved a failure, but it is understood that the company hopes to make an arrangement with the town corporation to supply the town with water. The work is to be pushed forward with the quickest possible despatch, so that it may be ready for use next year. Engineer Lumsden is looking after it.

Tp. of McKillop, Ont.

Tenders for construction of Johnson drain will be received until September 20. M. Murdie, township clerk, Winthrop P.O.

Toronto, Ont.

The directors of the Toronto Industrial Exhibition have decided to pave all the main thoroughfares in the grounds before next year's show. Dr. Orr, manager.

An overflow sewer from Broadview avenue to the Don river to relieve the Langley avenue sewer, at a cost of \$1,500, and a special sewer to relieve the Starr avenue sewer, at a cost of \$500, were decided upon by the Board of Control as works that should be pushed forward at once.

Victoria, B.C.

See "Public Buildings."

Vancouver, B.C.

The city engineer presented a recommendation, based on the local improvement principle, covering the granitoid paving of Broadway, from Granville street to Bridge street. The estimated cost was \$167,999, of which the city was to pay \$87,296. In connection with the Broadway paving the city engineer said that a trunk sewer should be laid on the street before the pavement was laid, the cost being \$42,000. Referred back to city engineer. The report of the city engineer on the tenders for sewer pipe recently submitted was presented. This stated that the aggregate of the tenders was as follows: Evans, Coleman & Evans, \$19,315; Dominion Glazed Cement Pipe Company, \$24,500; G. Gardiner Johnson & Company, \$26,265.

Winnipeg, Man.

Tenders are called by Board of Control until September 15th for construction of granolithic walks, asphalt pavements, water mains. M. Peterson, secretary.

AWARDED.

Fernie, B.C.

The contract for extending the sanitary sewer system was awarded to J. J. Wood, \$12,560.

London, Ont.

Contracts to the amount of \$16,943 have been let by the Water Commissioners for electrical equipment at Springbank pumping plant to the Canadian Westinghouse, Allis Chalmers-Bullock, Seamans Brothers and John McDougall & Company.

Ottawa, Ont.

The Board of Control considered the following tenders for paving: Wellington street, Irving to Pinhey street (Hintonburg), Union Construction Company, \$16,226; City Engineer, \$15,947; Barber Asphalt Company, \$15,660; Ottawa Construction Company, \$15,586 (accepted). Mel-gund avenue — Union Construction Company, \$4,618; Barber Company, \$4,543; City Engineer, \$4,526; Ottawa Construction Company, \$4,895 (accepted). Little Ann street — Union Construction Company, \$2,000; City Engineer, \$1,963; Ottawa Construction Company, \$1,926; Barber Company, \$1,900 (accepted). Flora street — City Engineer, \$21,500; Union Construction Company, \$21,000; Barber Company, \$20,670; Ottawa Construction Company, \$20,560 (accepted).

Peterboro, Ont.

The Ontario Sewer Pipe Company will supply the vitrified pipe for the new sewerage system; Taylor & Hall, the reinforced concrete pipe. Contract awarded to E. Conroy for sewers, storm drains and pumping station.

Quebec, Que.

The following tenders for supply of about 3,000 feet of curb stone, cement or asphalt sidewalks for this municipality were received: Blais & Frigon, Quebec, 75 cents a foot for cement work—and the fol-

lowing for stone work: Canadian Hassam Paving Company, Montreal, 98 cents; Mr. Glode, Quebec, \$1.00 (accepted); Reid Craig & Company, Quebec, \$1.05 (accepted). For cement sidewalks, Mr. Glode, \$3.70; Hassam Company, \$2.33; Reid & Company, \$2.39. For asphalt sidewalk, Glode, \$4.00; Hassam Company, \$2.85 and \$3.26. Only one tender, that of the Sicily Asphaltum Company for the paving of Caron street, opposite Jacques Cartier Church, in asphalt, was received, the price being \$3.54 per square yard, and on motion of Ald. Guillot, that firm was awarded the contract.

Rainy River, Ont.

The contract for installing sewer system and disposal plant has been awarded to the National Paving & Contracting Company, Limited, of Winnipeg, at \$18,239. J. H. Wilson, city clerk.

St. John, N.B.

The tender of the Caritte-Patterson Manufacturing Company for the Germain street paving was accepted at \$12,545. City engineer, Murdoch.

Swift Current, Sask.

Tenders for laying sewers and water mains were received as follows: M. A. Pigott, & Son, Kenora, Ont., \$49,739; S. E. McManus & Son, North Battleford, Sask., \$87,457.50; Broley & Martin, Fernie, B.C., \$71,535.13; H. G. McVean, Moose Jaw, Sask., \$62,673; W. I. Gray & Company, Winnipeg, \$59,000; Laidlaw & MacDonald, Fort William, \$39,179.85 (accepted). Tenders for constructing sewage disposal works as follows: M. A. Pigott & Son, \$11,801; Broley & Martin, \$11,137.95; Laidlaw and MacDonald, \$8,299 (accepted). G. Marriott, engineer of construction. Two contracts yet to be awarded. J. Darlington Whitmore, Regina, consulting engineer.

Vancouver, B.C.

The contract for paving Second avenue was awarded to Hassam Paving Company. Other tenders awarded were to the Warren Bitulithic Company for paving Tenth avenue from Granville to Laurel, and Palmer Bros. & Henning for block-paving on Fourth avenue, from Maple to Cedar. The tender of M. P. Cotton for laying cement walks at 15 cents per square foot was rejected. The council awarded the contract for the First avenue paving to the Independent Company and instructed the solicitor to move promptly in connection with the Hastings street repairs.

Railroads, Bridges and Wharves

Calgary, Alta.

See "Power Plants."

Edmonton, Alta.

Premier Sifton has signed the plans for the first 100 miles of the line to cross the whole province from the international boundary to Peace river, distance of over 700 miles. The company will be known as the Pincher Creek, Cardston & Montana Railway. Connections will be made with the C. P. R. at Pincher Creek and with the Hill lines in Montana. Application will be made next session for an extension of the charter.

Goderich, Ont.

Tenders are being called by Department of Public Works until October 4th for reconstruction of breakwater here. Plans, etc., at office of J. G. Sing, district engineer, Toronto; J. L. Michaud, district engineer, Montreal, and on application to local postmaster.

Hamilton, Ont.

The tenders for the building of the re-ventment wall at Burlington Beach were much higher than anticipated, the tender of Joseph Battle, Thorold, being the lowest. His figure was \$22,412, and the beach commissioner's estimate of the cost of the work was \$17,000 or \$18,000. The building of the wall may be delayed temporarily, owing to the high cost, but it will eventually be built.

Lakeport, Ont.

Tenders are being called by Department of Public Works until October 4th for reconstruction of wharf here. Plans, etc., at office of J. G. Sing, distributing engineer, Toronto, and on application to the local postmaster. R. C. Desrochers, secretary.

London, Ont.

See "Business Buildings." Tenders are called for diverting waters of Medway river and erecting concrete breakwater at the Hugabone bridge. Plans and specifications at the county engineer's office. S. F. Glass, Reeve.

Levis, Que.

Plans for the dry dock here are ready to submit to the government. The following firms are comprised in the Dominion Drydock Company, the Canadian Pacific Line, the White Star Line, the Allan Steamship Company, Harland & Wolff, of Belfast, and Davie Bros., of Quebec, under the bonus system provided in the subsidy act of last May. Sir R. Perks, representative.

New Mills, N.B.

Tenders are being called by the Public Works Department until October 3rd for the construction of wharf here. Plans, etc., with district engineers at St. John, Chatham, and on application to local postmaster.

North Vancouver, B.C.

It is stated that tenders will shortly be invited from several bridge firms in America, England, France and Canada for the bridge over Second Narrows. Reeve McNaught is interested. Noted previously.

Orillia, Ont.

The Township of Orillia reeve and Councillor Joyce have been appointed as committee to call for tenders for Marchmont steel bridge; cement work to be done by day labor. C. E. Rose, township clerk.

Quebec, Que.

Mr. D'Abbadie, chief engineer, for M. P. and J. T. Davis, contractors, is the authority for the statement that the construction of the bridge here will not be seriously delayed by the accident to the caisson.

Saskatoon, Sask.

The route by which connection will be made between the G. T. P. and the Hudson Bay Railway has been decided upon. A G. T. P. branch line will be run from here through Melfort, and connect with the Hudson Bay Railway at Pas Mission.

Tofield, Alta.

See "Business Buildings."

Township of Elgin, Ont.

On November 15 a by-law will be taken into consideration by the county council to issue \$10,000 bridge debentures. K. W. McKay.

Vancouver, B.C.

The G. T. P. Railway has abandoned the idea of calling for tenders this fall for the building of the 500-mile section, representing that portion of the road between Aldermere in the Bulkley Valley and Tete Juane Cache, not under contract. Scarcity

of labor is given as the cause for this decision. Unless conditions radically improve there is no possibility of the company carrying out the terms of its statutory agreement with the Dominion Government requiring the completion of the line by 1911.

AWARDED.

Aylmer, Que.

Mr. A. Laflamme, of Montreal, has obtained the contract for the building of the new government wharf here. It will cost in the neighborhood of \$12,000.

Belleville, Ont.

The section of the C. N. R. from Trenton to Belleville has been sub-let as follows: J. Stewart, two miles; Murray & McDonald, five miles; McGinnes, three miles.

Guelph, Ont.

H. E. Croft was awarded the contract for the concrete bridge over Presant's Mill raceway.

Public Buildings, Churches, Schools, etc.

Belleville, Ont.

The Board of Education decided to appropriate the Lingham property which is required for the school site and to consult with Messrs. Ellis & Connery, architects, Toronto, as to plans.

Tenders will be received at the Y. M. C. A. until September 17th for the excavating by the yard of Y. M. C. A. building site, Campbell street; also the excavating and laying of a sewer from above site to main street. Specifications may be seen at the Y. M. C. A. rooms.

Crossfield, Alta.

Tenders were called until September 15th for erection of stone and brick school for district No. 752. Plans, etc., with G. H. Murrin, architect, this place.

Chippewa, Ont.

A petition is in circulation asking the government to aid in the establishment of a lighthouse on Hog Island, at the mouth of the Welland river (Chippewa creek), in the Niagara river.

Calgary, Alta.

A by-law authorizing a grant of \$150,000 from the city toward a university, is being prepared.

Chilliwack, B.C.

Tenders addressed to J. H. Ashwell, city clerk, will be received until October 1st for \$15,000 municipal hall debentures.

The plans submitted by Mr. Thos. Hooper, architect, Vancouver, for the new city hall have been approved.

Tenders addressed to J. A. Ashwell, city clerk, will be received until September 24 for erection of city hall building. Plans, etc., at office of the above; at office of city clerk, New Westminster, and at office of the architect, Thos. Hooper, 526 Winch Building, Vancouver.

Gilbert Plains, Man.

On September 20th the ratepayers will vote on a by-law to issue \$10,000 6 per cent., 20-year school debentures. J. C. Turner, secretary-treasurer.

Halifax, N.S.

Tenders were called until September 14 for erection of brick building to be used as power house for Victoria General Hospital.

Howe Sound, B.C.

Tenders are being called until September 26th by Public Works Department,

Victoria, for erection of 2-room school here. Plans, etc., at above Department; at office of Jas. Fletcher, Gibson's Landing; the provincial timber inspector, Vancouver.

Hamilton, Ont.

A special committee was appointed by city council to confer as to site for Children's Shelter.

Koksilah, B.C.

Tenders are being called by Public Works Department until September 20th for erection of a one-room school.

London, Ont.

Plans prepared by City Architect Nutter for new school to replace Colborne Street school have been accepted and tenders will be called shortly.

Levis, Que.

The eastern wing of the Hospice de St. Joseph de la Deliverance was damaged by fire to the extent of about \$20,000 on the 1st inst.

Montreal, Que.

Mr. Alphonse Contant, architect, 17 Place d'Armes Hill, has prepared plans and specifications for the erection of St. Philomene School in Rosemount for the Catholic School Commissioners.

Megantic, Que.

Tenders are being called until September 27th by Public Works Department for construction of public building here. Plans, etc., at office of H. N. Lymourner, Superintendent of Dominion Buildings, Post Office, Montreal; at local post office and at the above Department. R. C. Desrochers, secretary.

North Toronto, Ont.

The Eglinton Young Men's Own Club have completed final arrangements for their proposed gymnasium and reading room here.

New Westminster, B.C.

Tenders have been called until September 12th for erection of church on Sixth Avenue. Plans, etc., at office of Thomas Hooper, architect, Winch Block. J. W. Macdonald, secretary.

Tenders addressed to the Minister of Public Works will be received until September 26th for the erection of additions to Court House. Plans, etc., at offices of the Government Agent, this city; Provincial Timber Inspector, Vancouver; and at the Department of Public Works, Victoria. F. C. Gamble, public works engineer.

Ottawa, Ont.

Building Superintendent Garvoek, of the public schools, announced that the new school at Ottawa South will be ready for opening on January 1st.

It is reported that the Public Works Department will call for tenders at the end of the year for erection of new departmental block. Plans are being revised.

Pembroke, Ont.

Notice was given by Mr. Bromley of his intention to introduce a by-law to borrow \$2,500 for library site.

Rock Bay, B.C.

Queen's Hospital of the Columbus Coast Mission here was totally destroyed by fire on the 3rd inst. Estimated loss, \$10,000. The hospital was the property of the Hastings Mill.

St. Catharines, Ont.

The Public School Board have decided to call for competitive plans for a new school

on the ground recently purchased on Niagara street.

Summerside, P.E.I.

Tenders are being called by Public Works Department, Ottawa, for construction of armory here. Plans, etc., on application to Mr. A. McSween, Post Office Building, this place, and at office of J. H. Hegan, resident engineer, Charlottetown, and at above Department. R. C. Desrochers, secretary.

South Vancouver, B.C.

Tenders were called until September 8th for the following: Erection of brick and stone building at Ontario street; erection of wood frame school at Wilson and Victoria; erection of brick and stone school at Wilson and Victoria roads. W. Ferris, secretary; J. H. Bowman, architect, 112 Crown Building, Pender street, Vancouver.

Strathcona, Alta.

Tenders addressed to John Stocks, Deputy Minister of Public Works, Edmonton, will be received until September 20th for plumbing, steaming, electric wiring for the Dormitory Building; also interior hardware for certain public buildings. Plans, etc., on application at engineer's office, Department of Public Works, or at Branch Department, Calgary.

St. John, N.B.

Hon. Wm. Pugsley is authority for the statement that specifications for the drill hall were being drawn up and that tenders would be called for within a few weeks. The site has been chosen.

Toronto, Ont.

Permit was granted to Board of Education for a 2-storey school on Ashdale avenue, \$36,590.

Tenders addressed to the Chairman of Building Committee, will be received until September 17th for the various trades required in the erection of buildings for the Medical Wing and Administration Building in connection with General Hospital. Darling & Pearson, architects. See advertisement in this issue.

It is understood that an offer will be made shortly to the governors of University of Toronto by the Department of Militia and Defence for the purchase of a piece of the University College grounds for an armory site. Sir Frederick Borden, Minister of Militia and Defence.

Tenders for the work on the new school building to be erected on Manning avenue were recommended to the Board for acceptance as follows: Mason work, Chalkley & Sons, \$22,397; carpentering, Frank Armstrong, \$4,770; roofing, Regan and Spence, \$745; plastering, T. Blackburn & Son, \$2,500; painting, J. Phinnemore, \$95; plumbing, Fred Armstrong Company, \$575; structural steel, W. H. Saker, \$2,800; heating, J. R. Seager, \$5,450; heat regulating, Johnston Temperature Regulating Company, \$825; electric wiring, Fred Armstrong, \$60; total, \$40,217. The contract for the planking at the Parkdale School was recommended to be given to Frank Armstrong at \$2,431.

Victoria, B.C.

It has been decided by the provincial government to raise the status of the Queen Charlotte school district, and a new school will be built as soon as the local board provides the site.

The following by-laws were carried:-- Spring Ridge high school site; school loan by-law, \$50,000; Dallas road foreshore protection by-law \$75,000; Isolation hospital, \$25,000; public convenience by-law, \$20,

000; sewer loan by-law, \$50,000. That for the placing of telephone wires underground was defeated. Total amount, \$275,000.

Preliminary plans for the new theatre, proposed by the Northwest Theatrical Association of which Mr. Cort, Seattle, Wash., is general manager, have been prepared by the association's architect, Mr. E. W. Houghton. Messrs. Simon Leiser, R. Hall and C. W. Rhodes are named as provisional trustees. Estimated outlay on building and equipment, about \$80,000.

Vancouver, B.C.

At a recent meeting of the Women's Auxiliary of Westminster Hall, the proposal was made to erect a thoroughly modern young ladies' college. The project has been referred for consideration to the different Presbyterian congregations of this city, represented by the auxiliary, and it is fully established that they will announce in favor of building such an institution.

Welland, Ont.

The estimated cost of the proposed rink, mentioned in last week's issue, is \$6,000. As yet the proposition is not far enough advanced to give news for publication. For further particulars apply to Mr. H. E. Cooke, Welland. F. S. Port, architect.

Warren, Man.

Tenders addressed to M. S. Peacock, secretary-treasurer School Board, Hanlan, will be received until September 23rd for erection of school here.

Winnipeg, Man.

Tenders closed recently for the North Winnipeg building for the Y. M. C. A. The architect, J. H. G. Russell, states that half a dozen tenders for the work were opened. The contract will be awarded within a few days.

The city will shortly call for tenders for the construction of a public bath. The rough plans are now being drafted. The bath is not to cost more than \$50,000.

P. C. Samwell has completed plans for a sanatorium to be built in Elmwood at a cost of about \$40,000. It is to be three storeys in height and will have accommodation for about thirty patients. Dr. A. D. Carscallen is identified intimately with the project, which is the first of its kind to be noted in Winnipeg.

AWARDED.

Cornwall, Ont.

The members of the Cornwall Club have decided to erect a building for their own use on their property west of the Public Library on Second street. It is to be a substantial two-storey brick building with all the modern appointments for a club house. Atchison & Company have the contract. Work was commenced on the foundation last week.

Hatzic, B.C.

The contract for the erection of a new public school was awarded to Thos. Turnbull, Victoria.

Meaford, Ont.

The contract for improvements to school building were awarded as follows: Cleveland Bros., heating and ventilating; D. B. Brown, plumbing; James Sparling, excavating, masonry and carpenter work; Probable expenditure, \$4,200.

Montreal, Que.

Ward & Radlock, 2608 Waverly street, have the general contract for the 2-storey dwelling on Canning street for the Protestant School Commissioners. Architect, A. F. Dunlop, Lindsay Building.

The contract for the steel work in the Central Y. M. C. A. building has been

awarded to the Structural Steel Company; that for brickwork and masonry, to John Stewart & Company. Foundations having already been prepared, work will start at once. It is expected that contracts for the building at Westmount will be awarded shortly.

North Vancouver, B.C.

The contract for the erection of the new North Star school at North Vancouver has been awarded to Mr. F. P. Rogers, Victoria.

Toronto, Ont.

The Finance Committee of the Board of Education has withdrawn the contract for heating, ventilating and plumbing which had been awarded to J. R. Seager for \$5,450, and has given the heating to Keith & Fitzsimons for \$5,495, and that for the plumbing to Fred Armstrong Company for \$575.

Winnipeg, Man.

The contracts for plumbing, heating and ventilation of the two new technical high schools were awarded as follows: St. John's school, Standard Plumbing & Heating Company, at \$35,650; South End school, Cotter Bros., \$35,497.

Duncan & Macdonald, 562 Balmoral street, this city, were awarded the contract for erection of Olivet Baptist Church. Architect, Geo. G. Teeter, 604 Builders' Exchange.

Residences

Edmonton, Alta.

Buildings, for which permits have just been issued include one for a dwelling for Dr. G. H. Malcolmson, east side of Seventh street, \$6,400, McSporran, contractor; three dwellings on the west side of Tenth street for Armstrong Bros., by Dewar & Conover; dwelling on east side of Syndicate for C. Querengesser, \$2,100.

Fort William, Ont.

Tenders will be received until September 16th for erection of a residence. Plans with Hood & Scott, architects.

London, Ont.

W. H. Hayman, this city, is the architect for the 4-storey apartment house, corner of Queen's avenue and Wellington, of which the owner is John Hayman & Sons. Materials, red pressed brick and cut stone; estimated cost, \$35,000.

Ottawa, Ont.

Among the building permits taken out recently were: Omer C. Lyon, dwelling, Lisgar street, \$4,500; A. E. Shaver, dwelling, Powell avenue, \$6,000; David Cuthbertson, Turner street, dwelling, \$3,800; D. L. Campbell, apartments, Preston street, \$4,000.

South Vancouver, B.C.

Broadhurst & Wtaker, real estate firm, will have constructed on the Angus road at Mills street an apartment house, 116 x 132, three storeys in height. A. J. Bird, architect.

Toronto, Ont.

Permit was granted to A. G. Saunders for 1 pair semi-detached, 2-storey brick dwellings, near Ossington, on Manchester, \$16,000.

Vancouver, B.C.

Permits were issued to Dr. D. H. Wilson for a dwelling to cost \$31,000; another to W. J. Harrington for a \$13,000 home on Alder street, Fairview.

Mr. Ward, of the Prudential Builders' Limited, has informed Building Inspector

Jarrett that his concern expected entering upon an extensive building programme in West Fairview. The tract purchased by them from the C. P. R. contains 105 lots and they intend to erect seventy-five residences on the property, each to cost from \$3,500 to \$5,000. The concern will have fifty buildings erected by next spring.

AWARDED.

Ottawa, Ont.

P. W. G. Adamson has been awarded the carpentering contract for Admiral Kingsmill's residence at Rockcliffe. Jas. Mather is architect. H. Robilliard will furnish the limestone, on which this dwelling will be constructed.

Strathcona, Alta.

D. Grant & Company, Edmonton, are the contractors for the residence being erected for Mr. J. W. Tipton on First avenue south. Cost, \$4,500. Architects, Wilson & Herald.

Business Buildings and Industrial Plants

Burnaby, B.C.

Mr. O. S. Wakeling has charge of the construction of the new plant being established by the Sumner Iron Works of Everett, Wash. The site for buildings will occupy about 10 acres. The foundry, boiler shop and three erecting shops will be built in the order named.

Beauport, Que.

The town council has voted a loan of \$20,000 to the promoters of the Canadian Silk & Cotton Company, who are to erect a factory to employ 250 hands.

Brantford, Ont.

Tenders will be received by Taylor & Taylor, architects, Brantford, Ont., up to September 20th for the various trades required in the erection of a bank and office building for the Imperial Bank of Canada. See advertisement in "Tenders and For Sale Department" of this issue.

Calgary, Alta.

Permit was issued to A. A. Dick for hotel, Ninth avenue, \$140,000.

Comber, Ont.

The lumber and stave mills of J. S. Ainslie & Bros. was destroyed by fire on the 11th inst. Estimated loss, over \$6,000.

Compton, Que.

The Oriental Hotel, owned by E. S. Squire, with three other buildings, were destroyed by fire on the 9th inst. Estimated total loss, \$60,000.

Eastview, Ont.

R. W. R. Cummings is erecting an elevator and feed mill in Eastview. It will be entirely of reinforced concrete and the elevator will have a capacity of 15,000 bushels. It will cost about \$12,000. Fred Kuntz, of A. E. Baxter Company, Buffalo, will superintend the work.

Fredericton, N.B.

The John Palmer Manufacturing Company is to be reorganized and capital increased. In return for civic privileges, the company will build a new modern factory. R. W. McLean, solicitor.

Hamilton, Ont.

The Oliver Chilled Plough Works have taken out another permit for a factory building. The building will be of brick, steel and concrete and will cost \$45,000.

Kingston, Ont.

It is stated that the Hawthorne Silver &

Iron Mines has acquired about 20,000 acres in this vicinity. This will, in all probability necessitate the erection of large plants for the manufacture of pig iron later.

Kenora, Ont.

Murphy's hotel and the residences of M. Nelson and Dr. Beatty were destroyed by fire on the 6th inst. Total estimated loss, \$6,000.

Leduc, Alta.

The sheds and machinery rooms of the Telford Lumber Mills here were gutted by fire on the 8th inst; loss, \$3,000. J. M. Telford, M.P., is the owner.

London, Ont.

The plans for the C. P. R. improvements in this city show that the company will build a larger new station at Quebec street, a new roundhouse, capable of accommodating 26 of the largest-sized engines, machine shops, and office buildings, and very extensive improvements to the yard. It is not unlikely that the work will be rushed through this fall.

Moncton, N.B.

The Massey-Harris Company will erect a new warehouse to replace the one torn down.

Maisonnette, Que.

The Bell Telephone Company will erect a branch exchange building here. Plans, specifications and all information to be obtained from the architect, Mr. J. W. Carmichael, Bell Telephone Building, Montreal.

Milestone, Sask.

A temperance hotel is to be started here. A joint stock company has been formed and arrangements are being made for immediate construction.

Midland, Ont.

The east-house of the Midland Engine Works Company was damaged by fire to the extent of \$12,000 on the 8th inst.

Mission City, B.C.

The Fraser Valley Sugar Works, Limited, New Westminster, incorporated at \$300,000, will, it is stated, construct an extensive plant here.

Montreal, Que.

It is reported that a new building of 10 storeys will be erected, possibly not before the spring, on the site occupied by the Oak Hall restaurant, corner Notre Dame and St. Peter street. The property belonged to the Carsley Company.

North Vancouver, B.C.

The Bank of Hamilton has completed plans for its new building on Lonsdale and First street. The structure will be massive and ornate and will consist of three storeys. It is expected that work will be proceeded with very soon.

New Westminster, B.C.

The decision of the city council to tear down all the old rookeries in the heart of the city has had a good effect and already many large buildings are talked of. It has been tentatively announced that the Kelly-Douglas Company, of Vancouver, is to erect a large wholesale house in the city for the supplying of the Fraser Valley trade.

Penticton, Sask.

An important industry will be established here this fall if a site on the waterfront can be secured from the council. A syndicate of local men and outside capitalists

proposes to secure 250 feet of waterfrontage on the Esplanade and to construct a brick kiln with extensive yards, as the cliffs in the immediate vicinity are said to afford ideal clay for brick manufacture.

Prince Rupert, B.C.

Sir Wilfrid Laurier is quoted as saying that the government will build a grain elevator here.

Perth, Ont.

Winn Bros., shoe manufacturers, will locate their factory here, in which local capital is invested. The site has not yet been secured. Estimated total outlay, \$60,000. Mayor Hall, Col. Balderson and Mr. J. H. Mendels, provisional directors.

Port Arthur, Ont.

The ratepayers ratified an agreement with Robert Greig, of Toronto, whereby he will establish here a branch of a New York enamel works, to employ not less than 200 men. By-laws for building car barns, building swimming pools were carried also.

Princeton, Ont.

The Bank of Hamilton, owned by Mr. Thos. Starr, was destroyed by fire on the 8th inst. Estimated loss, \$2,500.

Regina, Sask.

Tenders are being called for erection of brick warehouse here, two storeys and basement, with sufficiently strong walls to carry two other storeys. Reily, Dawson & Reily, architects.

St. Boniface, Man.

It is reported here that the C. N. R. (T. Turnbull, assistant chief engineer, Winnipeg, Man.), will erect a warehouse and freight sheds, storehouses and round house. It is proposed to share the Union Depot with the G. T. P. Railway there, and build a new bridge across the Red river. The total improvements will cost over \$1,000,000.

Sydney, N.S.

A new company capitalized at \$100,000 and known as the Nova Scotia Hotel Company, have acquired the Alfonso Hotel and the adjoining Hillis block.

Tofield, Alta.

Tenders are being called for the construction of the G. T. P. station here. The station designed is in the class E. The system for grading in sizes is from A to F.

Toronto, Ont.

Wm. Davies Company has obtained a permit for the erection of a two-storey stores and office building at the corner of Bloor and Yonge streets, \$20,000. The Mendelssohn Piano Company has been given a permit to erect a four-storey and basement brick factory building at rear of 110 Adelaide street west, \$20,000.

Consolidated Optical Company will erect a 4-storey brick building 88 x 138 feet on Richmond street west, just east of Spadina avenue. Machinery to be operated electrically. Denison & Stephenson, architects, King street.

A large retail store, it is stated, may be opened in Toronto, in which Harrods, of London, England, is stated to be interested. The managing director of Harrods was recently appointed to the directorate of the Hudson Bay Company, which also comprises Mr. Wm. Mackenzie, of the C.N.R.

Victoria, B.C.

Mr. Hayter Reed, superintendent of C. P. R. hotels, it is stated, will recommend

that the 70-room addition to the Empress hotel be undertaken immediately.

The option taken by the G. T. P. Railway Company on the site for its big new hotel, to be built on Government street, opposite the parliament buildings, has been taken up, and one more block, added, in order to round out the site. It is understood that the hotel will be built next spring.

Vancouver, B.C.

Among the building permits granted was one to Mr. W. T. Whiteway covering a large six-storey warehouse at 130 Water street; cost, \$45,000.

Tenders addressed to W. Marbury Somervell, architect, 43 Exchange Building, will be received until September 17th for supply of materials and construction of 8-storey and basement office and bank building for the Bank of Ottawa.

Woodstock, Ont.

By-laws to grant certain privileges to the Canadian Linerman Company and the Fibre Board Folding Package Company, Limited, in return for which factories will be erected, will be submitted to the ratepayers on September 19th.

Winnipeg, Man.

Tenders were called until September 10 for erection of brick warehouse for the W. J. Guest Fish Company, Alexander street. Jas. Chisholm & Son, architects.

There will be a meeting of the C. P. R. directors shortly, at which plans for alterations to Royal Alexandria hotel will be discussed. Mr. Hayter Reed, superintendent of C. P. R. hotels.

Tenders were called until September 10 for the proposed St. John's Telephone Exchange Building. Plans, etc., on application to provincial architect.

It is stated on good authority that the Hudson Bay Stores will be extended to cover the whole block bounded by Main, Fort, York and Broadway streets. Commissioner Chipman is in charge.

Plans have been completed by John D. Atchison, for a structure to enclose the first engine to cross the Red river, which is to be set up in Whyte park. The Board of Control is calling for tenders now for the construction of the building.

Tenders are called until September 14th for the erection of factory for Speirs-Parnell Baking Company. Matthews & Le Maitre, architects, Bank of Nova Scotia Building.

AWARDED.

Hamilton, Ont.

The contract for erection of storage warehouse for the Armstrong Cartage & Warehouse Company has been given to Contractor Cooper, \$25,000. Architects, Staunton, O'Heir & Morison.

David Dick & Sons, Welland, have been awarded the contract for the erection of additional buildings for the Oliver Plow Works Company at \$45,000.

Morden, Man.

M. McKinnon has the contract for the erection of warehouse for the Imperial Oil Company, of Winnipeg.

Orillia, Ont.

The contract for the office and main building of the Canada Smelting & Refining Company's plant has been awarded to Mr. E. Webb.

Saskatoon, Sask.

Shannon Bros & Cassidy are reported to have secured the contract to erect for the Cockshutt Plow Company, a warehouse to cost about \$60,000. F. Peter, architect, Winnipeg, Man.

Woodstock, Ont.

The Industrial Committee awarded the contract for the erection of the buildings for the Woodstock Textile Company to Messrs. T. D. Broom & Son, at \$10,800. The contract calls for the completion of the building by December 1st, 1910. Mr. B. McNichol, architect.

Winnipeg, Man.

The contract has been awarded to W. Beverley Robinson, Montreal, for supplying "Carrara" (white semi-glazed terra cotta) manufactured by the Royal Doulton Potteries, London, Eng., for the exterior of the new premises to be erected for the Trust & Loan Company of Canada.

Power Plants, Electricity and Telephones

Brandon, Man.

Prof. Herdt, of McGill University, Montreal, is making an investigation of the various power propositions near this city, at the request of the city council.

Burnaby, B.C.

The site is being cleared for the \$80,000 power sub-station to be erected on the G. N. B. line.

Calgary, Alta.

On September 15 the ratepayers will decide whether the following will be issued: \$484,000 4½ per cent. 30-year debentures for a municipal street railway; \$100,000 4½ per cent. 30-year debentures for parks and cemeteries; \$40,000 4½ per cent. 30-year debentures for a subway under C.P.R. W. D. Spence, city clerk.

Guelph, Ont.

On September 26th a by-law will be voted on to issue \$85,000 4½ per cent. 30-year street railway debentures. T. J. Moore, city clerk.

Maisonneuve, Que.

See "Business Buildings."

Montreal, Que.

See "Waterworks."

Five companies tendered for street lighting, etc., but three only desired to light parts of the city. The Montreal Light, Heat & Power Company, who have the job of street lighting at present, tendered as follows: For 1,650 lamps or more, \$72.70 per annum; for 1,000 lamps, \$80, and so on down to 500 lamps at \$90.55. At present they are charging \$90 per lamp. The Provincial Light & Power Company, a new concern, offered to light the streets for \$54.80 per lamp, and enclosed a certified cheque for \$25,000 to show their good faith. They propose getting their power from Cedar Rapids. The awarding of the contract was held over until further investigation could be made.

Ottawa, Ont.

Tenders are being called by Board of Control until September 15th for electric light fittings for city registry office. Specifications at office of Architect Ewart, 193 Sparks street. John Henderson, city clerk.

Port Arthur, Ont.

The by-laws to build car barns and to buy land for power plant were carried.

Prince Rupert, B.C.

The question of the city lighting problem has come up again before the city council. The engineer's report showing the cost in detail of establishing the plant required for the temporary scheme at the sash and door factory was presented. The

(Continued on page 28)

Tenders and For Sale Department

Tenders Wanted

Bulk and separate tenders for all or any of the different branches of work and material required in the erection and completion of a

Bank and Office Building

to be erected in Brantford for the Imperial Bank of Canada, will be received up to 12 o'clock noon, **TUESDAY, SEPTEMBER 20TH, 1910.** Plans and specifications may be seen at the office of

TAYLOR & TAYLOR, Architects,
Hope Chambers, Brantford, Ont.

Lowest or any tender not necessarily accepted. 38

City of Moose Jaw, Saskatchewan

Tenders

Tenders will be received by the undersigned up to 8.30 p.m. on **MONDAY, OCTOBER 10TH,** for supplying (for the use of the City Fire Department), one standard combination chemical and hose wagon with capacity 50 gallons chemical tank and 800 feet of 2½-inch fire hose, or 40 gallons chemical tank and 1,000 feet of 2½-inch fire hose. Wagon to be fitted to carry one 20-foot extension ladder on top.

Tenderers are asked to quote prices for either 2½-inch steel or 2½-inch rubber tired Archibald wheels; also for one extra set of Archibald wheels, 1½-inch axle, 2½-inch steel or rubber tires.

Tenderers are asked to furnish detailed specifications and cut of wagon and equipment, and give price f.o.b. Moose Jaw.

The lowest or any tender not necessarily accepted.

W. F. HEAL,
City Clerk.

Moose Jaw, September 10th, 1910. 39

Tenders Wanted

Sealed tenders, addressed to John I. McLaren, Chairman, Board of Control, and endorsed "Tender for Sewers," will be received by the undersigned up to 11 o'clock a.m. of **WEDNESDAY, SEPTEMBER 21ST INST.,** for constructing the following sewers:

Main Street, from Locke Street to West End Main Sewer.

Greig Street, from Little Greig Street to Barton Street.

Sherman Avenue, from Brant Street to G. T. R. tracks.

Ravenscliffe Avenue, both branches.
Aberdeen Avenue, Hyde Park Avenue to Chedoke Ravine.

MacDonald Avenue, from Aberdeen Avenue to Stanley Avenue, and on Stanley Avenue, from MacDonald Avenue to Garth Street.

Chedoke Avenue, Aberdeen to Hillcrest Avenue.
Flatt Avenue, Aberdeen Avenue to Hillcrest Avenue.

Hyde Park Avenue, Aberdeen Avenue to Hillcrest Avenue.

Aberdeen Avenue, Garth Street to Hyde Park Avenue.

Glenside Avenue, Garth Street to Chedoke Avenue.

Hillcrest Avenue, Garth Street to Chedoke Avenue.

Plans and specifications and other information can be obtained at the office of the City Engineer.

The lowest or any tender not necessarily accepted.

S. H. KENT,
City Clerk.

Hamilton, September 12th, 1910. 37

To Contractors

Tenders will be received at the office of the Registrar, Queen's University, Kingston, up to 6 p.m. of **TUESDAY, SEPTEMBER 20TH,** for the several trades works required in the erection and completion of the Nicol Building for the Governors of the School of Mining and Agriculture.

Plans and specifications may be seen at the University and at the office of the undersigned.

The lowest or any tender not necessarily accepted.

POWER & SON, Architects,
Merchants' Bank Chambers.

Kingston, Ont. 87

TENDERS

Toronto General Hospital College Street

Tenders addressed to the Chairman of the Building Committee will be received by the undersigned up to noon **TUESDAY, SEPTEMBER 27TH, 1910,** for all the various trades required in the erection and completion of buildings for the medical wing and administration building in connection with the General Hospital.

Plans and specifications and all other information can be obtained at the office of the architects.

The lowest or any other tender not necessarily accepted.

DARLING & PEARSON,
2 Leader Lane, Toronto.

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Power Plants, Electricity and Telephones

(Continued from page 27)

total cost was figured out at \$11,363, being an increase of \$2,400 over the estimate made in the report of August 13th for a 60 kilowatt plant. The operating cost was put at \$28,230. Street lamps consumption 87,600 kilowatt hours winter, and 43,700 summer, or 131,400 per year. Consumers consumption was estimated at 114,975 kilowatt hours winter, and 49,275 summer, or a total of 164,250 kilowatt hours per annum, and the city engineer estimated the probable revenue to amount to \$29,656 at 10 cents per kilowatt hour.

Strathcona, Alta.

See "Public Buildings."

Sherbrooke, B.C.

The Sherbrooke Railway & Power Company will require new cars of the latest type.

Swift Current, Sask.

Tenders addressed to G. W. Bilgrough, secretary-treasurer, will be received until September 27th for contracts C, power house; contract D, settling tank and intake; contract E, pumping machinery (compressed air system); contract F, electrical machinery; contract G, producer gas plant. J. Darlington Whitmore, engineer, 104 Willoughby and Duncan Block, Regina.

Vancouver, B.C.

In order that the B. C. E. R. may extend the system in all parts of the city and dis-

tract it has been decided to postpone the erection of a new terminal depot and offices until next year. Mr. J. Buntzen, managing director.

The part which pumping machinery plays in the equipment of a modern pulp mill and paper mill is shown by an order for 11 Worthington centrifugal pumps, recently received by the John McDougall Caledonian Iron Works Company, Limited. These 11 pumps, which will be built in their shops in Montreal, are for the new mill of the Powell River Paper Company, Limited, near Vancouver, B.C. They will have an aggregate capacity of over 37,000,000 gallons in 24 hours, which is about equal to the pumping capacity of the city of Montreal water works. Two of these pumps, having each a capacity of 4,200 gallons a minute against 40 foot head, will be used in the grinder room for carrying ground wood pulp stock to the screens. Two others, of a capacity of 4,000 gallons a minute against 100 foot head, will be stationed in the screen room for carrying ground wood stock to deckers. Others again will be used for carrying stock to beaters and digestors and for boiler feed purposes. Six of these pumps will be direct connected to motors, two of them will be direct connected to a water wheel, and the balance will be belted to motors.

Winnipeg, Man.

See "Business Buildings."

Yorkton, Sask.

W. E. Skinner, of Winnipeg, is consulting engineer to supervise the installation of its thirty-five thousand dollar electric light system. Tenders will be called for immediately for steam, oil and gas producer plants and work on the pole line will commence as soon as possible. It is hoped to have the plant in operation by February 1st.

AWARDED.

Fort Saskatchewan, Alta.

The contract has been let by this municipality to the Evans Construction Company, Edmonton, for the construction of a dam on Sturgeon river at a cost of \$20,000. Lighting and power for other purposes will be supplied.

Port Credit, Ont.

The Hydro-Electric Commission awarded the contract for the erection of a distributing station and the necessary electrical apparatus at Port Credit at a total cost of about \$90,000.

Winnipeg, Man.

The tender recommended for acceptance of cables for power transmission was that of the Canadian Insulated Cable Company of Montreal. The contract involves, \$51,520, being for the supply and installation of 46,000 feet of 13,000-volt three-core cable for distribution of the city's power between stations Nos. 1 and 2. Wm. Kennedy, Jr., consulting engineer.

Miscellaneous

Hamilton, Ont.

Recent building permits include: W. A. Pettit, seventeen brick dwellings, corner Fullerton avenue and Princess street, \$17,000; Wray & Nichols, ten brick dwellings, Cedar avenue, between Cumberland and

Central avenue, for A. Ward, \$16,500; W. H. Yates, jr., brick factory building, Hughson street, between Rebecca and Gore streets, for the F. F. Dalley Company, Limited, to cost \$20,000.

London, Ont.

This city may purchase a motor fire engine of 300 gallons capacity, or a steam engine of 1,000 gallons capacity. Alderman Ashplant is interested. Tenders will be called shortly.

Montreal, Que.

Recent building permits include: F. Pagueau, 1103 Huntley street, house containing two dwellings, on Boyer street, \$2,000; H. L. Deslauriers, 1427 Papineau avenue, house containing five dwellings on Papineau avenue, \$5,000; D'Ambroise & Frere, 2828 St. Lawrence Boulevard, four houses containing eight dwellings on Alexandra street, \$8,000; A. Arcand, 1216a St. Denis street, two houses containing four dwellings and two stores, 1272 St. Denis street, \$8,000; D. Cusson, 171 Parc Cartier street, two houses containing six dwellings on Parc Cartier, \$6,008; E. St. Pierre, 159 Parc Cartier, two houses containing nine dwellings, St. Antoine and Lenoir streets, \$7,000; Dubuc & Chartrand, 610 St. Hubert street, four houses containing eight dwellings on Mariana street, \$7,000; A. Pepin, 75 Buller street, house containing two dwellings on Buller street, \$92,000; J. Dugas, 2752 St. Lawrence Boulevard, house containing two dwellings and two stores, \$2,300; Mitchell & Deguise, 432 St. Germain street, four houses containing twelve dwellings on St. Germain street, \$10,000; Jules Labelle, 13 Guy avenue, house containing two dwellings on Alma street, \$2,500; Protestant School Commissioners, a two-storey dwelling on Canning street, \$4,000; D. Raymond, 244 Clark street, three houses containing eight dwellings on Laurier avenue, \$12,000.

Toronto, Ont.

Recent building permits include: N. C. McEachren, pair semi-detached 2-sty. brick dwellings, Strathecona, \$4,000; R. Paterson, 2-sty. and attic brick dwelling, on Evelyn avenue, \$4,000; N. D. Pratt, 2-sty. and attic brick dwelling, on Edna, \$4,000; M. Healy, 2½-sty. brick dwelling, 65 Rowanwood avenue, \$6,000; Wm. Brown, 2 pair semi-detached 2-sty. brick dwelling, corner Shaw and Garnet, \$7,000; G. M. Bryan, 3-sty. brick addition, to pair dwellings, on Yorkville, \$8,000; Walker & Palmer, pair semi-detached 2-sty. brick dwelling, near Dufferin, on Millicent, \$4,000; D. E. Moore, pair semi-detached 2-sty. brick dwellings, 1105-07 Gerrard street, \$4,000; Mills and Holmes, pair semi-detached 2-sty. brick dwellings, near Willoughby, on Central, \$4,400; R. C. Bustard, 4 pair semi-detached 2½-sty. brick dwellings, near Harbord, on Crawford, \$18,000; A. O. Scott, 2 pair semi-detached 2-sty. brick dwellings, near Emerson, on Royce avenue, \$8,000; Jas. McDonald, 2 pair semi-detached 2-sty. brick dwellings, near Emerson, on Millicent, \$8,000; Rolph, Clark, Limited, 4-sty. brick and steel factory, rear Simcoe and Pearl, \$10,000; Robt. Stubbs, pair semi-detached 2½-sty. brick dwelling, on 680 Manning avenue, \$5,000; Dundas Building Company, pair semi-detached 2½-sty. brick dwellings, near Caer Howell, on Murray, \$6,000; J. Bine, 2 pair semi-detached 2-sty. brick dwellings, near Wallace, on Campbell, \$8,000; B. J. Case, 2½-sty. brick dwelling, on Westminster, \$4,000; News Publishing Co., 2-sty. brick mechanical building, rear 107 Bay street, \$8,000; City of Toronto, 1-sty. brick lavatory, near Roncesvalles, Queen, \$5,000; H. E. Mitchell, 2-sty. and attic

brick dwelling near Highland, Binscarth, \$7,000; Waters & Porter, 4 pair semi-detached 2-sty. brick dwellings, near Ossington, on Manchester, \$16,000; A. G. Saunders, pair semi-detached 2-sty. brick dwellings and stores, near Wallace, on Lansdowne, \$5,000; Colman & Pearson, pair semi-detached 2-sty. brick dwellings, near Garden, on Sunnyside, \$4,000; F. G. I. Whellers, 2-sty. brick dwelling, 16 Laws street, \$4,000; J. H. Maguire, 2 detached 2½-sty. brick dwellings, on Medland, \$5,000; W. J. Cole, pair semi-detached 2-sty. brick dwelling, on Margueretta, \$4,000; P. B. Kaiser, pair semi-detached 2-sty. brick dwellings, on Dovecourt road, \$4,000; C. McCracken, 2½-sty. brick dwelling, on 267 Havelock street, \$4,000; J. J. McLaughlin Company, 3-sty. brick addition to warehouse and shows rooms, 155 Sherbourne, \$26,000.

Victoria, B.C.

After nearly two months' delay the tenders for garbage tins, 1,000 of which will be ordered at once, but 8,000 of which will ultimately be purchased, was awarded by the city council recently. The tenders received for garbage tins were as follows: J. A. Johnston, \$2.85 per tin; C. M. Cookeon, \$3.39; Clarke & Pearson, \$4.00; Andrew Blythe, \$2.80; Joseph Market, \$2.70; S. Little, \$3; A. Warren, \$2.88; H. Pooley, \$3.48. Joseph Market's tender was accepted. 1,000 will be required at once and 8,000 ultimately.

Recent building permits include: Mount Edwards apartment house, corner of Vancouver and Coutts streets, \$65,000; warehouse for R. P. Rithet & Company, Dallas road, \$13,598; Moore & Whittington, dwelling, Fisguard and Richardson streets, \$2,500; John Vaio, dwelling, corner of Government and Bay streets, \$8,350; Trustees of the Baptist Church, temporary church, corner of Yates and Quadra streets, \$2,000.

Vancouver, B.C.

Recent building permits include: Additional storey to the Granville Loan & Investment Company, Granville street, \$15,500; R. A. Ogilvie, warehouse, three storey brick, corner Hamilton and Helmcken, \$36,000; W. W. Ross, dwelling 1649 Third avenue east, \$3,500; Tomlinson & Cook, one storey brick building for stores, Water street, \$4,000; J. Skeffington, 1761 Third avenue west, \$2,650; J. Lumsden, 115 Tenth avenue west, \$3,000; McDermid & McIntosh, 1879 Third avenue east, \$2,700; C. Ehler, 522 Salisbury drive, \$4,000; H. G. Winters, 1350 Thirteenth avenue east, \$2,000; Black & McDonnell, 634 Semlin drive, \$4,000.

Winnipeg, Man.

Recent building permits include: All Saints' Church, school, north side of Broadway, opposite Osborne street, \$9,500; Salvation Army, detention home, west side of Home street, between Portage and Buell avenues, 3-storey building, \$6,500; G. Jones, two dwellings, west side of Horne street, between Wolsley and Ida avenues, \$7,000; W. Gray, two dwellings, west side of Ruby street, between Buell and Portage avenues, \$9,500; W. J. Hood, two houses, south side of Jessie, between Hugo and Helen, \$6,000; Angus Galbraith, two houses, west side of Stiles, between Portage and Wolsley, \$3,600; A. J. Carson, house, east side of Home, between Ellice and Sargent, \$2,800; L. H. Shepley, church for Rosedale Methodist congregation, northeast corner Beresford and Nassau, \$2,500; E. W. Andrews, house, west side Chestnut, between Buell and Wolsley, \$4,500.

New Companies

The Andrews Wire Works of Canada, Limited, Watford, Ont., capital \$49,000, incorporated to manufacture and sell articles of wood or metal. Incorporators, Alfred W. Andrews and Frank C. Andrews, Rockford, Ill.

The Robertsonville Foundry Company, Robertsonville, Que., capital \$20,000. Incorporators, J. Edouard Morency, merchant, and Geo. Rosseau, manufacturer, both of Robertsonville.

Conduit and Cable Company, Limited, of Toronto, Ont., capital \$20,000. Incorporators, John F. MacGregor, accountant, and Francis Walkingshaw, solicitor's clerk, both of Toronto.

The T. Sidney Kirby Company, Limited, Ottawa, Ont., capital \$100,000, incorporated to carry on business as builders and general contractors for buildings of all kinds. Incorporators, Thos. S. Kirby, Geo. H. Bowie and John C. Roger, contractors, Ottawa, Ont.

British Columbia Portland Cement Company, Limited, Princeton, B.C., capital \$500,000. Incorporators, Robt. P. McLennan, merchant, and Jas. A. Harvey, barrister-at-law, Vancouver, B.C.

The Leslie Contracting Company, Limited, Kingston, Ont., capital \$10,000. Incorporators, Henry E. Richardson, banker, Jas. F. Leslie and Ernest V. Leslie, accountants, all of Kingston.

Dominion Wireless Telegraph-Telephone Company, Limited, Windsor, Ont., capital \$40,000. Incorporators, Leroy F. Bloomer, Cleveland, Ohio, capitalist, and Thos. E. Clark, Detroit, Mich., electrical engineer.

The Linden Baptist church in Camden, N.J., presents several mechanical features which are of peculiar interest to contractors and builders, not the least interesting being the dome of concrete slabs with which the building is crowned. The dome has a radius of 36 feet 2½ inches and a rise of 27 feet, the cement roofing slabs being carried on 16 wooden rafters built up of yellow pine boards. Fifteen courses of slabs were used on the dome, the ends being covered with tiles, these being interlocking.

The following is Dr. M. F. Bonzano's recipe for preparing caustic potash lye for removing old paint from iron: Dissolve 2 pounds of potash in a bucket of water, add about 1½ pounds of slaked lime and stir it well. With a mop apply this mixture to the paint, and after a few minutes it may be easily removed by scraping. As rapidly as the old paint is scraped off rinse the iron with fresh water and dry it. This will leave the iron clean and bright.

The B. C. Gazette gives notice of the incorporation of the following companies:—Canadian Holding Company, Limited, capital \$1,250,000, incorporated to carry on the business of loggers, contractors, dealers in bricks, cement, lumber, etc.; the Vancouver Sewer Pipe and Refractories Company, Limited, capital \$250,000; the Bridges Lumber Company, Limited, capital \$125,000; Electric Railways Construction Company, Limited, capital \$600,000; Notch Hill Builders' Supply Company, Limited, capital \$75,000; Shurly Dietrich Company, Limited, capital \$350,000, incorporated to manufacture, sell and deal in saws, machineries, tools, etc.; the Dominion Radiator Company, Limited, capital \$600,000, incorporated to manufacture radiators, steam generators, plumbers' supplies, etc.; The Swanson Bay Forests, Wood Pulp and Lumber Mills, Limited, capital, \$1,500,000.

The Field of the Constructing Engineers

An Increasing Scope for Technically Trained Men with Initiative and Insight into Practical Work—Desiderata for the Position

The constructing engineer is rapidly winning a professional standing decidedly novel in some of the latest developments. Until quite recently it has been customary for the plans for civil engineering works to be developed in minute detail at the headquarters' designing office, and the field work of the resident engineers was little more than inspecting and clerical. This system is giving way under some conditions to one in which the field staff has far greater responsibilities. The general designs prepared in the main office go to the field for criticism and suggestion regarding details, and the latter are not developed until after the field staff has made a thorough study of the best methods of fitting the general projects to the local conditions. In some cases the final plans for the details are made in the office of the constructing engineer, in order that his more accurate knowledge of the problems that will arise during the execution of the work may be utilized to the fullest extent. In this way, the old time resident engineer, who was little more than an inspector, is being superseded by a man with sufficient knowledge, responsibility and executive ability to co-operate fully with contractors endeavoring to carry out the work properly and to interpose a firm and successful resistance to any attempts to scamp the work.

As a result of these changed conditions, a demand has arisen for field engineers possessing certain characteristics which were described forcefully by Mr. John A. Bensei at a recent dinner given to the Board of Water Supply of the city of New York. The development of engineering, in his opinion, has reached a state when it is necessary for us, while acknowledging that we can be licked and killed, to prove that we cannot be scared because things not covered by precedents are presented to us. Mr. Bensei said: "No engineer is worthy of being entrusted with responsible charge of work who is afraid of the risk involved in such responsibility, and yet, as a matter of fact, one too often finds a fear for the personal result of a line of action to be the governing motive in arriving at a decision." Just how far this criticism is accurate is left to the reader; it is made by one of the leading engineers of the country, of wide experience, particularly in works undertaken by public authorities. Another statement that he made was: "One too often finds men afraid to risk anything by a separation from the protecting arms of precedents, thereby becoming as useful along the lines of professional activity as a well-wrapped Egyptian mummy in the affairs of living men." This certainly is pretty strong, and when printed in cold type it has a harshness which was softened, when it was spoken, by the speaker's smile. Inferentially it explains, however, the reason why the constructing engineer is rapidly having more and more responsibility put upon him, while that of the designing engineer is diminishing. The constructing engineer is faced to face frequently with conditions whose solution must be made without regard for precedents. A knowledge of engineering principles and of various methods of construction is as necessary as an acquaintance with previous practice, and unusual resourcefulness has consequently become the primary requisite in such a position.

The delegation of large authority to the field staff and its association with the designing office during the pre-

paration of plans and specifications may result, however, in a condition productive of legal complications. It is in this respect that the new type of engineering organization is most open to criticism. When plans and specifications are made part of a contract, any subsequent change in them is likely to open the way for claims for extras. It is the easiest thing in the world for a contractor, bent on securing such extras, to obtain from a resident engineer in the presence of witnesses a verbal consent to accept something which differs from just what has been specified. It is evident, moreover, that where the resident engineer has taken part in the preparation of plans and specifications and knows thoroughly the intention of them, down to the most minute detail, his inclination is to accept something not called for in place of something that is, provided the substitute will serve the purpose equally well and will materially help along the progress of the work.

On large undertakings or those where difficulties will certainly arise which cannot be exactly foreseen, considerable latitude must necessarily be left to the field force. Provision should be made for this, however, in the contract, and also in the instructions governing the constructing engineer. Probably every field engineer of much experience has been in charge of work where foundation difficulties have been developed, where piling became necessary in places and footings had to be spread owing to unforeseen defects in the soil. Where the work is being conducted far from headquarters with which communication is slow and tedious, while the early completion of the undertaking is urgent, it is a mistake not to give the man in responsible charge on the ground authority to meet the conditions that arise.

If a competent man is on the work as constructing engineer, he should be provided with the necessary authority to use his knowledge and experience for the advantage of the work. Otherwise the expense of keeping him there is wasted. The only reason why this responsibility is not given to him more often is through a lack of satisfactory means for doing so in a legal way, and the sooner this point is settled, the better it will be for economical field construction. As Mr. Bensei well said, more real engineering progress is evidenced to-day in the methods of construction than in the design of the works themselves. The constructing engineer has necessarily become an important factor in any large undertaking, and it is time that his duties and responsibilities received more thoughtful attention.—Engineering Record.

According to a recent dispatch from Winnipeg, the Builders' Exchange of that city have decided to declare a lockout unless the striking bricklayers resume work immediately on the Lyall-Mitchell Company's construction. In Winnipeg building circles it is considered that the joint arbitration board was a thoroughly represented body; its finding had been mutually agreed upon and the action of the union in setting aside the decision is considered most unreasonable.

Mr. A. H. Van Cleave, of Niagara Falls, N.Y., has been appointed city engineer of London, Ont., vice A. O. Graydon, resigned. The position is worth \$4,000 per annum.

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No. 37

The City Engineer as a Contractor

When is a city engineer not a city engineer? We venture to think that the writer of a letter published in this issue would have little difficulty in offering an approximate solution.

The city engineer's "estimate" in many cases provides a reasonable objection on the part of contractors. It cannot be denied that there is a certain unfairness in contractors having to compete with the engineer when the latter is bidding under entirely different conditions. The engineer's estimate seems to be made on the "heads I win, tails you lose" basis. It is not required to come within a certain figure, no deposit cheque is required, neither is a bond of any kind necessary. The case cited in the letter to which we refer provides a good example of the unfairness of the thing. A 10 per cent. retainer for three years has to be figured on by the contractor and the loss of interest has to be included in the expenses of the work.

It is against the etiquette of the architectural profession to engage in building and surely it is opposed to all the principles of common sense and economy for an engineer to contract for his own work. It is sometimes adduced in favor of the city engineer in the capacity of a contractor that it facilitates the modification and changing of plans after the commencement of work, but surely such an argument reflects upon the capability of the engineer, whose first essential is that he be qualified to devise contractors' requirements for varying conditions. Changes in the plan are more often the result of an incomplete grasp of the problem, and even if there be a possible increase in the cost of construction resulting from modifications after the award of contracts it is more than likely to result in an ultimate saving in cost and increased efficiency.

Every man to his own particular calling. The con-

tractor has the practical experience and the first hand knowledge of construction that the engineer does not possess, and it is economically absurd to try and pit day labor against the contract system. Apart from these considerations there are several other interesting points contained in the article published on page 36 of this issue.

Changes in Plans and Specifications

An engineers' accountability to a client is generally of a peculiar character, except when he is engaged on a salary basis, because few engineers make any definite contracts respecting their own services. Architects are much better off in this respect, because the form of contract for architectural services of the American Institute of Architects is practically universally employed in this country, and a similar form, which has been interpreted and tested by numerous judicial decisions, is employed in Great Britain. Even among architects, however, great caution must be exercised in their dealings with clients, as Mr. H. A. Hudson pointed out in an address before the Royal Institute of British Architects. In his legal connection with members of the profession, he had observed a tendency among them to believe they could work their own sweet will in every thing, though this is far from the facts. They get into trouble because they fail to keep their clients regularly and promptly informed of the variations from plans and specifications necessary in a building while it is in course of erection. Mr. Hudson counseled them to bear in mind that there is grave question regarding the scope of any variation which may be safely ordered without the client's knowledge, unless the architect is willing to assume responsibility for the changes. Such advice is still more applicable in the case of an engineer serving a client without any written contract. Under such circumstances it is always desirable to submit immediately to the client for his approval copies of all orders making any needed modification of requirements which have been previously adopted, with a full written explanation of the reasons for the change and a request for an approval of it. It is only in this way that the engineer can prove in court the limitations of his responsibility for changes in plans and specifications. He should never forget that he is the interpreter and not the maker of the contract between the client and the contractor, and whenever his interpretations approach the field of orders for changes he must exercise great caution.

A feature of interest in the settlement of the bricklayers' strike at Montreal is the provision that no members of the union "shall be allowed to work for any person, firm or corporation not a bona fide builder or contractor for less than 10 cents more per hour than the current rate of wages." The city is alarmed at what savors of a combination in restraint of trade. The question is whether a protective clause of this nature is a restraint. Should not the regular contractor have a little advantage over the casual employer who steps into another man's business for fear that a working profit should be made out of him? Doubtless the clause will be the cause of a little anxiety to the advocates of the day labor system, for it would be hard to prove that the city is a bona fide builder or contractor.

The article on the Detroit river tunnel construction, published in this issue, will doubtless be of interest. Final touches have been put to the work and two large electric locomotives are at Windsor, Ont., awaiting operation.

An Arbitrary Compensation Act

The New York State Legislature has the distinction, if such it be, of having passed one of the most arbitrary labor acts on record. Under the provisions of the enactment a workman is entitled to compensation for injury even though the accident be brought about by negligence or carelessness on his own part. The Act is stated to have been passed by the legislature in compliance with the recommendations of the Wainwright Commission, which spent several months investigating cases of refusal by employers to grant financial relief. Heretofore a workman disabled by accident could get no damages until he had shown that the injury was due to the negligence of his employer, but this formality is now dispensed with. Canadian contractors will doubtless be interested in developments. Doubtless we shall see a material increase in the number of building accidents reported and contemplated over the border.

The City Engineer's Estimate

Winnipeg, Sept. 7, 1910.

Editor, "Contract Record":—

In a recent issue of your journal I noticed an editorial reference to the matter of city engineers bidding on municipal work.

Certainly there could be no objection to having the city engineer submit an estimate if, as you suggest, he were to bid under the same restrictions that are laid upon contractors.

Recently I was requested to bid in a certain city in Saskatchewan, and after making three trips to secure the necessary information and to put in my tender at a cost of at least \$200 (partly due to the delay in securing plans and specifications), I was within a fraction of a cent a square foot of the "estimate" of the city engineer. Although I pointed out to the council the absurdity of awarding the work to the engineer, who lacked contracting experience, who did not have to put up bonds or even to guarantee his work, who did not even put up a deposit cheque, who did not have to pay for water, or for insurance on labor or the public in case of accident, etc., they decided to let him do the work and run chances.

Apart from these considerations, the specifications called for the purchase of cement from the city at a profit of about 20 cents per barrel, and also for a retainer of ten per cent. of the contract moneys for three years without interest. The use of the money alone was sufficient to make more than the difference in the prices quoted. I refuse to say "tenders" because the city engineer's was only an estimate.

Unfortunately for the poor ratepayer, the work, I am told upon good authority, is proving very unsatisfactory, and has been delayed much longer than if done by contract. The worst feature of this particular case is that there is a prospect of there being little competition next time, as contractors do not care to waste time and money on such cases.

It is too bad that councillors cannot see these things in their proper light, as it stands to reason that an engineer, even though the best in his profession, cannot do the work as well as a contractor who has spent years in perfecting an organization, choosing his experts in different branches of the work and using his experience in securing the best results.

In the particular instance to which I refer, the cement was being supplied to the city by an alderman (under the guise of an incorporated company). It looked

to me like a case of "a bird in the hand is worth two in the bush."

The writer does not feel in the least displeased at losing this particular contract, but he does feel very sorry for the poor ratepayer who has to take what he gets in the shape of poorer results at possibly a greater cost than if the contractor were paid a price slightly in advance of the "engineer's estimate."

City engineers have admitted to me that they would rather see work left undone than have it carried out by day labor. These men see that the work is properly done when let by contract and the ratepayer secures value for every cent expended.

Yours very truly,

WESTERN PAVERS, LIMITED,
Charles Curtis, Manager.

Rules for Measuring Concrete and Excavation

A joint committee, consisting of architects, engineers and contractors of the city of Chicago, has recently adopted rules for measurement of excavation and concrete work. The formulated rules cover all the details for this kind of work on building construction, defining specifically how certain classes of work shall be paid for. The adoption of this set of rules, according to our contemporary, the "Contractor," of Chicago, is the outgrowth of difficulties in coming to an agreement for compensation, entailing not only disputes and bad feeling between the parties, but litigation as well. It is only natural that a contractor will make claims for extra compensation when his margin of profit is dwindling because he was obliged to go to additional expense in erecting forms for concrete, or sheeting in for excavation, which could not be foreseen when he made his estimate. Under the rules drawn up, provision is made for these contingencies, and extra compensation is allowed where excavation becomes difficult, or where forms for concrete are complex, so that they require not only more time, but additional outlay for material.

There can be no doubt that the step taken by this committee is in the right direction, and that much resultant good will be the outcome. More than this, it is worthy of imitation and an extension with modifications to suit, into the general contractors' field. Here it would undoubtedly prove quite a factor in solving some of the problems which arise in reference to proper compensation. Most contractors would not require deep research in the repertory of their work to adduce instances of this kind, where, for instance, the encountering of a certain kind of material made the execution of the work a dead loss at agreed prices, which would not have been accepted had the circumstances been foreseen. It is a fact well known to contractors that in many of these cases the solution has to be sought in the arbitrary decision of the engineer, who would or would not allow additional compensation, according to his interpretation of the contract or specifications. In almost every contract instances of this nature arise, and it would seem that a logical solution would be the establishment of standards to cover these contingencies.

As a step towards standardization alone, this Chicago body has marked an advance. A little study of organization proves that the establishment of standards has been the keynote of success for all enterprises, which would apply in this case. It would furthermore promote good feeling between all parties concerned, which in turn would result in better work. Another benefit which would result from this is that the establishment of such rules of measurement in the general contracting field would make a better basis for estimates.



Alliance Manufacturing Building, Montreal—Elevation to Clark St.

Turner "Mushroom" System at Montreal

First Application in the Eastern Metropolis—Its Several Advantages as Illustrated by the Alliance Manufacturing Building

An interesting reinforced concrete building is now being erected in Montreal and we have pleasure in illustrating a form of construction known as the "mushroom system," which, although used quite extensively in the west of Canada and all over the United States, is its first application in Montreal.

The Turner "mushroom" system, as described in a pamphlet issued by the patentees, is so called from the peculiar formation of the rods and the concrete around the column head and for the remarkable rapidity with which it may be erected.

The idea of this system is:

(1)—To build the floor slabs so as to transport the load directly to the columns without the use of beams and girders and take full advantage of the extraordinary strength developed by slabs reinforced in several directions.

(2)—To simplify the centering and thus to reduce the cost of the temporary parts of the construction.

(3)—To eliminate the beams and ribs which interfere with light, catch dust, cost money to plaster and finish, and reduce the clear storey height. The arrange-

ment of the reinforcement is designed with a view to secure the maximum efficiency of the material and place the maximum amount of steel around and over the top of columns where shear and the negative moments are the greatest.

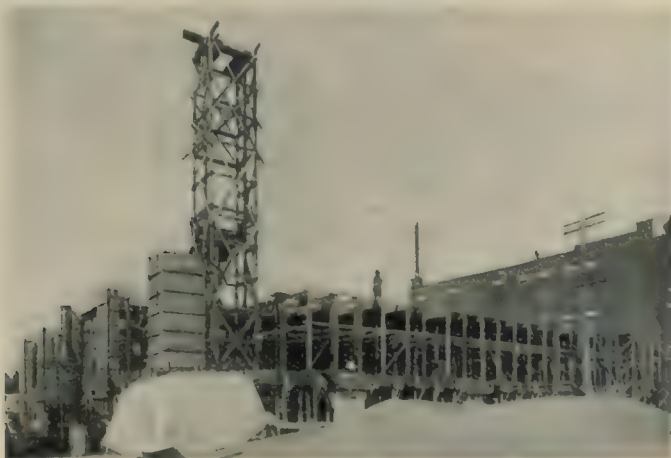
The flat ceiling so obtained gives free and unobstructed illumination from the windows and permits one to place partitions anywhere without regard to the floor, giving unusual stiffness and solidity due to the fact that a part of the material which in the beam type is placed in the rib, is consolidated in the slab, making the slab of unusual thickness with an actual decrease in the total amount of material where the loads are at all heavy.

In a factory building, such as is illustrated, the "mushroom" system possesses the following important advantages:

(1)—The better distribution of light.

(2)—The flat ceiling enables more convenient places for shafting than where ribs are used.

(3)—Freedom from vibration—owing to the fact that any concentrated load brings into action the reinforce-



Centering in Place for First Floor



Constructional View from Clark St., Aug. 18th, 1910



Alliance Mfg. Building—June 16, 1910. Steel Bars in position for concrete of first floor



Alliance Mfg. Building—Basement floor. Note absence of all beams and ribs



Alliance Mfg. Building—Showing reinforcing bars on top floor

and for the high quality of their work. Building operations were commenced at the end of April. After the excavations were finished, the building progressed at the rate of one floor in ten to twelve days. It will be finished two months or six weeks ahead of time.

The foundation footings and columns are designed for two additional floors which may be built at a later date. The floors are designed for a live load of 150 lbs. to a square foot. These are reinforced with plain round bars and all columns are of the Considere hooped type.

The subcontractors for the plumbing were Messrs. Selkirk Bros. The Philip Carey Company undertook the roofing. The elevator was supplied by the Otis-Fensom Elevator Company. The electric wiring, which is concealed in tubes embedded in the body of the concrete, was installed by M. Rubenstein. Mr. C. G. Craib was superintendent of the work for the Atlas Construction Company, whose president, Mr. M. Morssen, C.E., acted as consulting engineer. Mr. Philip J. Turner, F.R.I.B.A., Board of Trade Building, is the supervising architect.

Modern Building in Old Quebec

The new building now being erected at Quebec by the Quebec Railway, Light, Heat & Power Company is



Quebec Light, Heat and Power Company's Proposed New Building at Quebec.

situated at the corner of Crown and St. Joseph streets, two of the old capital's busiest thoroughfares. The building is of steel skeleton construction, fireproofed with concrete and terra cotta. The first two storeys of the structure are to be of granite and the remainder of the building either of limestone or marble. As will be seen from the illustration, a feature is the main entrance, with cornice of architectural terra cotta. Freight and passenger elevators will be installed. The plumbing equipment will be on the most sanitary and improved lines.

The ground and first floors, with the exception of a portion of the ground floor, which will be devoted to banking purposes, are to be occupied by the offices of the company. The upper floors are laid out in offices for rental purposes. These will be replete with every modern improvement, particularly in regard to light and ventilation. The building is well located, facing on four streets. Mr. R. P. LeMay, of Quebec, is the architect.

Concrete Mixer Plant for Roadbed Repairs

The concrete mixing plant used in connection with the roadbed work of the Detroit United Railway is so arranged that there is no manual labor at any stage in its operation except in emptying cement bags and trimming, following the deposit of the material by the mixer. Owing to the character of the soil it becomes necessary on the main thoroughfares to reinforce the regular foundation with a broad concrete mat to withstand the hammering of the heavy city cars and suburban coaches which run over the lines. Dump cars, loaded with gravel by a locomotive crane at a dock in the suburbs of Detroit, are drawn to place by an electric motor car and their contents dumped between the rails of the track under construction. A car loaded with cement in bags is then run over the gravel pile and the cement deposited. A concrete mixer plant, mounted on wheels and provided with a scooping device, is run forward and a shovelful of the cement and gravel mixture scooped up, raised, and discharged into a 5-cubic yard hopper above the mixer, from which a charge of 2 cubic yards is delivered to the mixing drum. While the material is being mixed the machine is run back to the point of delivery and a batch of concrete is dropped between the rails and levelled off to the correct height by lowering a levelling board at the rear of the machine and running forward slowly. Trimming and final levelling is done by a crew of three or four men who follow behind the mixer.

The concrete mixer consists of a rigid platform of steel I-beams covered with a floor of $\frac{3}{8}$ -inch steel plate and resting upon two Peckham trucks, which are equipped with four 30 h.p. motors. The mixing drum, of the hollow rotating type, is mounted on rollers on this platform and is rotated by a motor geared to it and resting on the same platform. The shovel for raising the aggregate to place in the hopper is raised and lowered by another motor geared to a windlass drum, both resting on the same platform. The hopper is suspended on a steel frame over the mixing drum and delivers the aggregate to this drum in batches of 2 yards as desired, and can fill the drum from either side of the bin. The mixing drum is similar to those used in Smith mixers. A tank holding water enough for six batches is carried in the rear of the control platform. The shovel for loading the hopper is carried by two long channel bar arms on either side of the machine, one end of each bar being attached to the shovel and the other end being pivoted to a cast iron arm suspended from the side of the platform. The whole is low enough to get a good push into the gravel pile and the arms are long enough to swing the shovel clear of everything and to bring it to a vertical position over the bin, where its bottom is tripped and the contents dropped into the hopper. In working it is customary to load the drum with a batch of 2 yards first, then close the slides in the bottom of the hopper and load it to its capacity.

The mixer is handled by two men, who stand on a platform high in the rear of the machine, where all the apparatus is located for the control of the drum and shovel and the progress back and forth of the car. Six other men handle all material from the car and finish levelling on the track. The capacity of the mixer is about 180 cubic yards in 10 hours, or counting in the time of transfer from line to line, repairs, etc., about 300 cubic yards in 24 hours. The entire cost of the plant for concreting, including the mixer, crane, 27 dump cars, 2 motor cars, gravel dock and miscellaneous tools, is approximately \$57,000. The saving per yard on the lowest price that the company is paying a contractor for laying concrete is \$1.25.

The Detroit River Tunnel Construction

Description of the Novel Engineering Features of the Work — Sinking Tubes and Embedding in Concrete—Resourceful and Successful Scheme

When it was first suggested to construct the Michigan Central Railroad's tunnel under the Detroit river between Windsor, Ont., and Detroit, Mich., by the methods described in the following columns, not a few engineering experts expressed their doubts as to the practicability of the scheme. The completed work, however, vindicates the judgment of the engineers behind the enterprise and is a standing tribute to their resourcefulness.

The method pursued in the construction is the novel one of constructing tubes in the form of steel shells; sinking them into a trench dug in the bottom of the river; uniting them end to end; embedding them in a concrete casing and finally giving them a concrete lining. No compressed air was used in the subaqueous portion of the work except for the divers by whom the bolts, fastening the ends of the tube sections together, were placed.

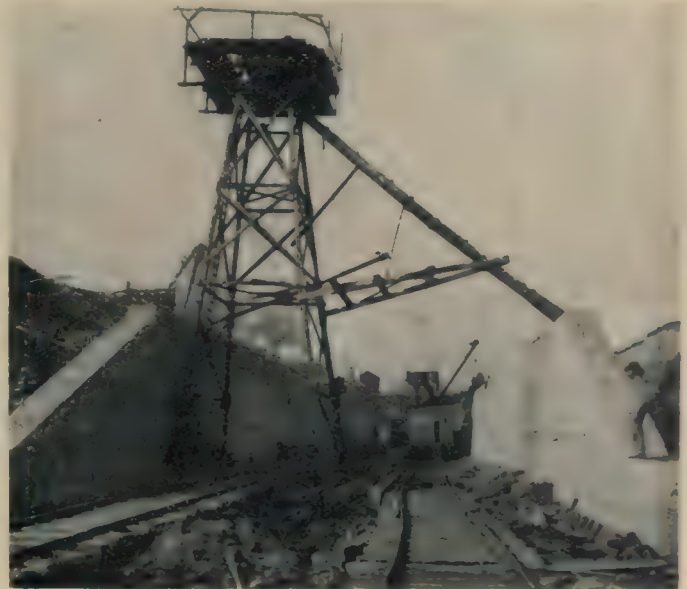
In considering this plan it must not be confused with that of sinking independent caissons that were joined end to end, as in the case of the Metropolitan Railway under the Seine at Paris. There the regular caisson method of sinking was followed, using compressed air in the usual manner. The caissons were independent sections, to be sure, and were afterwards joined together to form the tunnel. The Detroit tunnel, on the other hand, was formed by excavating a ditch across the bed of the river, setting a core in it and filling around with concrete, no caisson work being done at all.

The evolution of the idea is interesting and direct. The water in the river is 50 feet deep in places, and it was the natural desire of the engineers to keep as high as possible so as to avoid long or heavy approach grades; and so, when studying the situation, regrets were expressed that the bottom was not of rock so that the minimum of cover could be used. This suggested the excavation of a trench and filling it with an artificial rock (concrete) and then tunneling through that. But why tunnel? Why not sink a core and form the concrete around it? That was the birth of the idea and the completed tunnel is the result.

The scheme, simple as it appears in outline, was novel and daring in the magnitude of the undertaking and the depths of water to be encountered, but the results have fully justified it, for the completed work is dry and considered by its engineers to be one of the strongest subaqueous tunnels in existence. While the general scheme was one of simplicity itself, it is evident to anyone versed in such matters that in its execution for the first time, problems of novel character would be constantly arising, the solution of which would tax the resourcefulness of the engineers to the utmost in order to reach a successful consumation. These problems cropped up from the very start. They began by presenting unexpected difficulties in the excavation of the trench in the bottom of the river in which the tubes were to be laid. The greatest depth of water at the point of crossing is about 50 feet and the excavation was carried some 22 or 23 feet below this, or 74 feet from the surface. A bucket dredge was equipped to work to 40 feet, and did excellent work, taking out 1,500 cubic yards per day. It was the intention to let this dredge lead and follow with a clamshell for the balance, but

when the latter was set to work it was found to be unsuited to the task and that, at the rate which it could dig, the time required would be so long as to place it outside the pale of consideration. The first step, then, was to reconstruct the bucket dredge and adapt it for working to depths of 60 feet. But, although braces and strengthenings were added, breakages occurred to such an extent that the idea had to be abandoned. This was especially caused by the breakage of the spuds and the great expense attending the same. The solution was found in the designing of a special clamshell capable of removing 700 cubic yards per day of 12 hours on an average with a maximum output of 1,200 cubic yards.

The material to be removed from the river bed and



An early stage in the construction of the Detroit River Tunnel.—Easterly open cut, Windsor, Ont.

from the approach tunnels was a stiff blue clay, and the total net quantity was about 700,000 cubic yards. The methods of removal were dredging from the river bottom and tunneling, both with and without a shield, in the approaches. It was thought at first that the drifts could be driven without using compressed air and some of the work was done in that manner for the centre wall. A drift was first carried forward for one of the lower quarters and that section of wall built, then the next lower quarter was removed, after which the two upper quarters in succession. A part of this, as already stated, could be done without air, but for much of the work air under pressure of from 10 to 20 pounds, or even more, was required.

Before starting to sink the tubes grillages were sunk into the trench, and spaced so as to form a bearing and support for the adjacent ends of the tubes. These grillages were formed of 12-inch beams, and were carried on spuds or spurs that were driven into the bottom. They were lowered into place and then tapped with a pile driver until they were slightly below the level that the bottom of the tubes was to occupy.

For floating the different sections of tubing down

served as the outer forms and the steel tubes as the core. One chute came down just inside the sheathing and one between the tubes, or at the points B, C and D. The concrete was sent down very wet so that it would flow and find its own level, and the chutes were raised as the space filled up. This formed a block of concrete of practically rectangular section with the two tubes running through it. The space between the sheathing and the slope of the banks was then refilled with clay, so that the tunnel stands embedded in the bottom.

With the concrete laid there was thus a column of concrete laid out into the river, abutting against the approach walls and capable of withstanding any end thrust to which it might be subjected. It was lined by the steel tubes and cut up into compartments by the diaphragms in the latter. Then, as the work advanced, a section of the tubing would be freed from water, the temporary bulkheads cut away and the workmen would advance into it and put up the inner lining, or tunnel proper, working in the usual manner with wooden forms and without using any compressed air. When the internal lining was placed a concrete mixing plant was erected on the shore at the head of the shaft, and the concrete sent down through a chute to cars on a temporary track in the tunnel. These cars were then hauled out to the point where the work was in progress. The mixture used was 1-2-4 and was formed of Portland cement with sand and fine gravel. The levelling of the tunnel was true, while the alignment was out but a fraction of an inch. The last tube dropped into place with exactly the calculated clearance between its end and the Windsor approach walls, which was about 18 inches.

As it stands, the tunnel is very dry. The steel tubes have served as a waterproofing and are tight. In the approach tunnels the minor leakages are drying of themselves, and in but one or two places will any attention be needed from the contractors. The novel method is, therefore, a success, and a similar plan is being used for one of the tunnels under the Chicago river, where a single section will be sunk. Its success, too, is not limited to its engineering features, but touches the financial side of the question, for not only has the cost been more than \$2,000,000 less to the railway company than any other type of construction would have been, but it has been a profitable undertaking to the contractors. In finish the section is one of the largest, if not the largest, subaqueous tunnels in existence. The conduit bench is large, roomy and with ample headroom. There is one upon each side and access is obtained by ladders set upon staggering at 50-foot intervals, so that the trackmen have an opportunity to seek refuge every 25 feet.

The track construction is permanent and has been tested in service and under observation for more than two years in the open and has been found to be satisfactory in every particular. It is formed by embedding short wooden ties measuring 36 by 11 by 8 inches in the concrete flooring and spiking the rails to them with the intervention of tie plates. The rail used will be 100-pound section.

Outside on the Detroit approach the value of the ground is such that the natural slope could not be used, so that vertical concrete retaining walls are resorted to. But in Windsor the work in the approach cut resembles more the finished product of an old and prosperous road that what we are accustomed to associate with a newly constructed line. The tendency of the clay to flow and the probability of trouble with a natural bank led to a complete drainage of the slopes. Drains are carried up at right angles to

the track, and the whole slope has been sodded; then, at the bottom, there are the tile drains to carry off the water so that no trouble is anticipated, and when the tunnel is opened to the public it will present the finished appearance, in whole and in detail, of an old and well-established line.

Concrete Piers Constructed on Shore and Floated to Place

Two reinforced concrete piers were recently built in the harbor of Genoa, Italy, in order to carry a light steel bridge of a grain unloading plant. Each reinforced pier, according to "Engineering," London, is 35 feet high and carries a masonry pier 19 feet high above water level. The piers are 13 feet 11 inches by 17 feet 3 inches in plan, and have a working chamber at the bottom, 5 feet 11 inches high, so that they could be sunk by pneumatic process. The walls vary in thickness with the depth, the maximum being 7 inches. They transfer the pressure on them to vertical beams, which in turn are stayed by the horizontal reinforced concrete struts running to the beams in the opposite wall. Beam and strut sizes are also reduced with the diminishing water pressure. The walls of the working chamber are of solid concrete, reinforced in both faces, 23.6 inches thick at the top and 7 inches at the bottom, where they are shod with a cutting edge of channels and angles. This cutting edge is secured to the concrete by straps placed at intervals, looped over the reinforcing bars in the concrete and riveted to the upturned legs of the channel. The piers were built on shore, floated to place and then sunk.

A solid granite spillway dam, 19 feet high and 215 feet long, across the Chicopee river at Three Rivers, Mass., was blown out last winter in order to remove interference with a new hydro-electric plant above it. There were 169 drill holes, 16 feet deep, $8\frac{1}{2}$ inches in diameter at the top, $1\frac{1}{2}$ -inch in diameter at the bottom, spaced 4 to 5 feet apart. About 11 pounds of Dupont 60 per cent. dynamite were used in each hole. Fourteen to sixteen holes were loaded and exploded simultaneously. A foreman, engineer, driller and helper did the work.

Vancouver building returns for eight months of the current year are \$8,259,045, compared with \$4,883,312 for the same period of 1909. The permits issued last month represented a value of \$733,635, against \$842,020 for August, 1909. The last figures show a small decrease for August, 1910, but conditions generally are excellent and building operations are keeping well up to the mark.

The building record for the current year at London, Ont., is slightly lower than that of 1909. Last month 81 permits were issued, representing a value of \$40,705. In August, 1909, 59 permits were issued for buildings estimated to cost \$64,137. For the eight months of 1909 and 1910 the figures were \$695,734 and \$530,871 respectively.

At Prince Albert, Sask., the building permits last month represented a total value of \$212,720, as compared with \$32,000 for August, 1909. Trade conditions are reported to be exceptionally good and quite a building boom is anticipated for next season.

Trade News from Winnipeg

Building Still Active—Current Prices of Principal Materials—Interesting Comparison with Vancouver Rates

Winnipeg, Sept. 11, 1910.

August, accounted a slow month in building circles as far as new business is concerned, kept pace with the previous months of the year in this city. When the month's records were totalled, new buildings showed an aggregate cost of \$1,449,100, or a total value for the first eight months of the year of \$12,829,400. The volume of plans for new structures seem inexhaustible. The expectation is now expressed that the fifteen million dollar mark will be exceeded before the close of the year.

Coincident with the immense activity of this year it is remarkable to note that prices of material have experienced but a very slight increase. When compared with the figures obtaining in other western centres, they appear very reasonable. Winnipeg dealers who read in a recent issue of the "Contract Record" a list of the Vancouver rates, have asked your correspondent here to prepare a comparative table of the chief requirements of the supply trade. In almost everything the prairie capital undersells by a substantial margin the houses of the west coast.

The following table, which is not perhaps complete in detail, is fair evidence of the discrepancies:

	Winnipeg.	Vancouver.
Building paper, tarred, per roll .	\$0.70	\$0.90
Building paper, plain, per roll . . .	.60	.70
Bricks, common, per M.	11.00	13.00
Bricks, pressed, per M.	\$23 to 50.00	\$40 to 62.00
Cement, per barrel	2.40	3.10
Lime, per barrel	1.60	1.35
Sewer pipe, 4-inch, per foot	.10½	.18
Sewer pipe, 6-inch, per foot	.16½	.33
Plaster of paris, per ton	13.00	18.50
Putty, per pound	.03	.05
Tar, per barrel	5.00	8.50
Hard wall plaster, per ton	12.50	17.50
Nails, base	3.10	3.25
Hair fibre, per ton	13.00	18.00
Fire clay, per ton	20.00	20.00
Expanded metal lath, per sq. yd. . .	.16	.27
Hexagon floor tiling, per sq. ft. . .	.50	.55
Wall tiling, per square yard. . . .	.50	.60

This list of prices the supply men show to prove that there has been no attempt to take advantage of the demands by raising prices. The stocks carried have been heavy in every line. Even during the most pressing period there was nothing which might be called a shortage.

In view of the fact that this year's operations are almost twice as large as last, the foresight of the supply men in providing against a shortage or famine is commendable. The whole market was anticipated and now without any dead stock on their hands, the supply houses are placing orders for material to be used in winter building. If the season turns out as well as last year, when we had such a mild winter, it is intended to do a great deal of house building. This will be an innovation in Winnipeg, as last year was the first time such work was attempted, and then it was only on a very small number of blocks which were behind contract time. This winter it is anticipated work on frame structures will be carried right through, giving an early impetus to the regular season, which opens in March.

A measure that will have the effect of producing

more high class fireproof buildings is the extension of the first fire limits which will take place with the installation of the additional high pressure fire mains.

The weight of the dry matter in a cubic foot of wet mud of the density to be expected at the bottom of a reservoir was determined by the engineers of the Tallahatchie Drainage District, Mass.; in connection with their investigations of the probable sedimentation in the reservoirs that may be constructed in the district. Two sections, 8 inches long, of 3½-inch wrought iron pipe, were turned on a lathe to a cylinder bore inside, were milled at the ends, bevelled outside at one end, and carefully measured with calipers and scale. Each tube was pushed down into typical submerged mud, struck at the ends and the contents then washed out into an iron vessel, which had been first heated to drive off moisture, and then weighed. The vessel was then heated until all moisture had been driven off, and again weighed. By several such determinations it was ascertained that 1 cubic foot of wet mud such as was tested contains 60 pounds of dry matter, and "parts by weight", of sediment can be readily reduced to cubic yards of wet mud which would deposit in a reservoir, provided the column of water passing be known.

Advantages of Reinforced Concrete Chimneys

At a recent meeting of the Concrete Institute, of London, Eng., a paper on "Reinforced Concrete Chimney Construction" was read by Mr. Ernest R. Matthews, borough engineer of Bridlington. He commenced by remarking that during the past seven years one firm alone—the Weber Company, of Chicago—had erected nearly a thousands such chimneys in America, under the direction of some of the most able engineers and architects in that continent. The advantages of using reinforced concrete in chimney construction were stated to be: (a) Economy in cost.—It had been found in America that reinforced concrete chimneys could be built by a well-organized firm at less than one-half the cost of a brick shaft. (b) Saving of space.—In a shaft 300 feet in height, for example, the brickwork at the base, according to the building regulations of the English cities and boroughs, would be about 4 feet 10 inches, whereas the thickness of the walls at the base of a reinforced concrete chimney would probably be as follows: outer wall, 9 inches; inner walls, 5 inches; with a space of 4 inches between the two walls. (c) Less weight than brick shaft.—A matter of the greatest importance where a treacherous soil had to be built upon. (d) Stability.—Reinforced concrete chimneys had been erected in the United States for some years past, and the author knew of only one failure. (e) Freedom from repairs.—Once erected, reinforced concrete chimney shafts required practically no repairs. (f) Rapidity of execution of work.—This was well known; a reinforced concrete chimney could be erected in half the time that it took to build a brick shaft. Particulars were then given as to typical examples of reinforced concrete chimneys in Great Britain and in America.

According to reports received by the C. P. R., the western wheat crop will be a great deal better than has been anticipated. Late estimates indicate that the wheat crop will amount to between 90,000,000 and 100,000,000 bushels. This is a very fair return, and should help to insure satisfactory business conditions for another year.

Architectural Possibilities of the West

Rapid Development of Winnipeg and Other Western Cities a Stimulus to Professional Ambition—The Question of Materials and Labor*

By S. FRANK PETERS, Winnipeg.

It seems to me that the first point to be observed in connection with the architecture of the West is the vastness of its extent as well as the varied character accompanying it.

Doubtless many present have come west of the Great Lakes for the first time, and they are just commencing to see for themselves the glorious vista spread out before them, and realize more fully than is possible from the study of either pen, pencil or brush sketches, the grand opportunities of the architect in the preparation of suitable designs of all classes of buildings for the many millions of inhabitants who will yet dwell in the land.

To those of you who might possibly take a run further west or north on the occasion of this visit, the numerous villages and towns of but yesterday's growth will seem truly marvellous. With the continued growth of population this building up of such centres in the different sections must continue. In addition to the vast extent of the growth, it must be borne in mind that the class of settlers is very superior to that usually found in the settlement of new countries. This will materially affect the development of architecture in the West, and at the very commencement the class of buildings will be much better than would have been possible under less favorable conditions.

As we are all aware from trade and municipal returns, many of our western cities are establishing record growths. Commencing with Winnipeg, the "Gateway of the West," statistics have already shown a more rapid growth than even Chicago, the great internal metropolis of the United States, could ever claim. And it looks very much as though Vancouver on the coast is going to establish a similar record, to say nothing of the enormous development and possibilities of Port Arthur and Fort William at the head of the lakes.

It is unnecessary, I think, to describe the class of habitations of early days—the Indian teepees, the mud huts and log houses of the early settlers, the shacks of the railroad contractors and prospectors, and gradually trace them in their different stages, excepting that a reference to the old Hudson's Bay posts are always interesting. One known as Fort Garry, which used to stand where our main street now runs, near the junction of the Assiniboine and Red rivers, was a most interesting piece of good old masonry, built by clever Scotchmen who knew more of good masonry than all the labor unions put together. The post known as Lower Fort Garry, about 27 miles down the river, still remains, and it is to be hoped that it will be preserved.

Next to the vast extent of our field for labor in connection with the architecture of the West, is the necessity of looking out for suitable materials with which to erect and furnish our structures. At present even material of ordinary use in vast sections of our country in the West is being imported from foreign countries, or at least freighted enormous distances. That this condition of affairs will continue is impossible, as it is not consistent with the spirit of the West. Investigation from day to day proves that western Canada will be able to supply material of all kinds that may be necessary for the construction of the largest and most costly buildings. Following the development of material will come the permanent residence of many new and well quali-

fied mechanics and artisans, who are already arriving in large numbers.

It might not be out of place here to refer to the importance in western building work of care in our foundations. In many localities the sub-soils are deceptive. In addition to the usual enquiries, most thorough tests should always be made, particularly for the larger buildings, so as to avoid the unsatisfactory distinction of having "leaning towers of Pisa" as a result. Wind pressure is also a most important factor to consider, as with the wide sweep of prairie comes also the strong and steady wind pressure against which due provision must always be made.

As regards the style of architecture of the West, it must, of course, be based on classic and ecclesiastical lines, the foundation of all good work in our public structures, as well as in our domestic architecture. This will undoubtedly be secured as the result of the efforts that are now being made to provide suitable education and opportunities for the student, both by the Governments and by the architectural associations.

Importance of Town Planning

Another point to which I would like to refer, as it is most intimately connected with architectural designing, is the importance of town planning, the laying out of parks and other great centres of attraction. There is no doubt that it is most important for every municipality to set to work at the start to establish definite lines on which to build, by engaging experts in that line of work, after careful consideration by the best business men of the community. What is a magnificent pile of buildings without suitable and well laid out grounds and approaches, so that the impressions of the mass itself may be adequately improved by the surroundings, and so that the surrounding areas may be properly appreciated from the site itself.

I cannot help expressing my regret that there is such a tendency amongst the business men of our communities to copy the sky-scraper kind of building for office purposes, a type which is so often of such unsightly shape and proportions. No doubt such buildings may prove financially successful to the unfortunate owner who is allowed to erect them, but I believe the beauty of our city would be greatly enhanced if a reasonable limit were placed upon the height of these structures. In the most beautiful capitals of Europe the sky-scraper is practically unknown. And who will think of comparing the sky-line of New York, for instance, with many of the beautiful cities of the Continent? New York has a style of its own and it may be that the sky-scraper is a necessity in that city, but I believe there are a great many wise men living in New York who hold the opposite opinion. Be this as it may, surely such a style is totally unnecessary in Winnipeg and other western cities, surrounded as they are by boundless prairie where there can be no necessity for cooping up a mass of hard workers within such a restricted area.

A most important point in connection with our subject is the training of the rising generation on artistic lines in conjunction with regular practical work.

"Sky-Scraper" Architecture Not the Best for Canada

It is also to be hoped that in the erection of the many large and important buildings that will be required in the

* Extract of paper read at 3rd Annual Convention Royal Architectural Institute of Canada, Winnipeg, Aug. 25-27, 1910.

development of the West, proper efforts will be made to secure suitable designs by fair and honorable competition. Our public men should realize that meritorious designs for all large public buildings—no matter to which class they belong can only be secured by engaging the best talent in the land. Where such is not secured directly, a competition should be held so as to afford an opportunity to our best architects. This would result in the advancement of architecture not only in the west, but throughout the entire country, and it would mean the ultimate erection of public buildings which will be a credit to the designer and a standing monument to the wisdom of the citizens.

Federal buildings in the different provinces, as well as Provincial structures, should be carried out on these lines, in conjunction with the department, whose chief architect should be called in as consulting or even supervising architect also.

To sum up, it seems to me that it would be much preferable for us to take our ideas from the world at large, and not adopt too hastily the style set by our neighbors to the south, much as there is to admire in their work. Let us assist in establishing a Canadian architecture which shall be in close sympathy with that of the mother land, and so help to perpetuate an architecture that shall be known throughout the world as British, holding the same relative position in future generations to that of Rome and Greece in the olden days.

Building Operations Booming in Sidney, N.S.

Sydney, N.S., is at present enjoying quite a boom in the building trades. Last year was marked by the greatest activity in this line since 1903. In 1909 there was an advance in the amount of money expended in building operations of \$95,000 over that of 1908. This record has been completely eclipsed in 1910.

With only eight months of the present year passed, the people of Sydney have already taken out permits for building, valued at \$272,071, an amount \$12,000 greater than the entire amount expended during 1909 and more than two and one-half times larger than that for 1908.

How much the record will be better before the close of the present year cannot, of course, be closely estimated, but it is to be judged that the betterment will be extensive from the fact that during the last four months of 1909 more than one-third of the entire year's work was done. A statistical comparison of the total for the past six years will express the situation in very striking style:

1904	\$127,595	1907	\$ 87,175
1905	118,800	1908	65,615
1906	118,425	1909	160,470
1910, eight months	\$272,071		

The trouble between the Winnipeg Builders' Exchange and the International Union of Bricklayers and Masons has broken out again. It appears that Geeves, the union representative who signed the agreement, afterwards received a telegram from headquarters at Indianapolis refusing to sanction his entering into any agreement with the Exchange. Consequently orders were issued by Geeves for the twelve men working on the Lyall-Mitchell contracts at Winnipeg to cease work. At this writing a general lock-out has not been enforced by the contractors.

The Silliker Car Company, Limited, of Halifax, N.S., have just issued a splendidly illustrated catalogue, termed "Catalogue No. 8," showing the many lines turned out in their woodworking department. High grade doors, sashes, mouldings and building materials of all kinds are fully illustrated, and give a contractor full information on all the lines handled in that department.

Personal News and Notes

Mr. G. R. Harper, architect, of Toronto, died suddenly last week at the age of 67 years.

Mr. Jas. Shillinglaw, for many years one of Brandon's leading contractors, and the father of W. H. Shillinglaw, formerly city engineer of Brandon, died last week in his 78th year.

Mr. W. H. Lackie, district superintendent for the Barber Asphalt Company, Buffalo, died last week in Buffalo. The late Mr. Lackie was well known in municipal contracting circles. He was 37 years of age and a native of Toronto.

Building permits issued at Toronto from January 1 to August 31, 1910, are valued at \$13,486,973. The total for the corresponding period of 1909 was \$12,018,812. The respective totals for August, 1909, and August, 1910, are \$1,335,332 and \$1,713,040.

A dispute over ten or twelve items in an account rendered by Mr. Patrick McGovern, the Boston contractor, to the city of Montreal, has led to his taking an action for \$12,326. He was engaged to construct a conduit for the city this year, and the city disputed several items in his account when it was furnished.

Mr. C. A. D'Abbedie, chief engineer for Messrs. M. P. & J. T. Davis, contractors for the substructure of the Quebec bridge, does not anticipate any delay by reason of the removal of the caisson. He states that the caisson is as good to-day as when it was launched and that the work will be pushed ahead as usual next spring.

It is stated that owing largely to the scarcity of labor and the deadlock that has arisen between the G.T.P. and the B. C. Government upon the question of Oriental labor, the completion of the extensive Mountain section of the system may be delayed a couple of years. It is almost a foregone conclusion that when the contract for the work is awarded it will go to Foley, Welsh & Stewart, who are building all the other portions of the line from Edmonton to the coast.

Seven firms are understood to be tendering for the superstructure of the Quebec bridge, bids for which will be received up to October 1st. The Canadian concerns are the Dominion Bridge Company, Montreal, and the Canadian Bridge Company, Walkerville. Tenders are also expected from the McClintock-Marshall Company, of Pittsburg; the Phoenix Bridge Company, of Philadelphia; the American Bridge Company, of Ambridge, Pa.; the Cleveland Bridge Company, of Darlington, England, and a German company.

The death occurred last week at Victoria, B.C., of Mr. Jas. Rebbeck, who had been residing at the coast for nearly 20 years. The late Mr. Rebbeck was a native of England and was a consulting engineer of wide experience, having seen service in many parts of the world before coming to this country. For some years he was assistant manager for the B. C. Iron Works, Vancouver. Later he accepted a similar position with the Albion Iron Works, Victoria, B.C. Six years ago he established himself at Victoria as a consulting engineer.

1909 was a prosperous year for the plaster business in Hants County, N.S., which is the centre of big operations along this line. About 250,000 tons is the estimated amount shipped from Windsor, valued at \$265,000. Of that amount 150,000 tons were handled by the Wentworth Gypsum Company. The Newport Mixing & Manufacturing Company, Windsor, which opened up extensive quarries at Avondale, shipped 24,000 tons. From other points in Hants County a quantity of crude gypsum has also been shipped to the American market. Those handling shipments were: T. A. Mosher, Windsor, quarries at Newport; M. Parsons, quarries at Mapleton; A. Parsons, Walton, and O'Brien Bros., Noel, N.S.

Railroad Construction and Current Topics

Norwegian Consul's Serious Allegation Concerning Treatment of Laborers—Extensive Development Work in Sight—Seven Thousand Miles in Next Five Years

Railway contractors in this country will be well advised to look into the action of Mr. Arvid Jacobson, the Norwegian consul in Montreal, in warning his countrymen against coming to Canada to engage in railroad construction. Certainly the statements made by Mr. Jacobson, who claims that Canadian railway contractors are both inhuman and unfair to their men, will not tend to improve the already unsatisfactory condition of the labor market.

Mr. Jacobson stated that the number of men employed in Canadian railway construction, according to official statistics, averages 35,000. About 150 of these are killed by dynamite explosions or other accident, while probably a greater number died in the hospitals as a result of injuries received by exposure or otherwise. Among the men on the road there were probably between two and three thousand Norwegians, and a similar number of Swedes and other Scandinavians. Most of the men from Scandinavian countries were employed in dangerous work—the handling of dynamite and mining of rocks.

Regarding deaths and accidents in the course of construction work in Canada, he says that experience shows it is practically impossible to obtain information of deaths occurring on construction work, caused by accidents or otherwise, and that it is also practically impossible to get any exact and reliable information of the name, nationality and home of the victims. The property left by men who are killed on such work or who die in the hospitals often disappears, and it is impossible for the relatives to take action and claim damages, which they most certainly should be entitled to in special cases, according to the various provincial laws regarding compensation to the relatives of laborers killed or injured.

Wages due the deceased often remain on the books, and deposits made in the banks remain as unclaimed. The article further states that the matter has been brought by the Consul-General in Montreal before the Canadian authorities, who have paid little or no attention to it.

Canada's Great Railway Development

Contracts let and engagements entered into with the Dominion and Provincial Governments by the various Canadian railway companies, indicate that at least 7,000 miles of new railroads will be built during the next five years.

The construction for the present year is 1,500 miles, about the same as last year. The largest increase in mileage will be in British Columbia. The construction of the National Transcontinental—better known as the Grand Trunk Pacific—from Moncton on the Atlantic to Prince Rupert on the Pacific, 3,550 miles, is more than half completed. On the eastern part of this line from Moncton to Winnipeg, being built by the Dominion Government, out of the 1,804 miles, 742 miles are graded. The Quebec bridge, now being reconstructed over the St. Lawrence, is part of this system. Of the 1,746 miles from Winnipeg to Prince Rupert, 915 miles are completed, and trains are being operated between Winnipeg and Edmonton. From Prince Rupert the contract for 200 miles east has been let, and the track is being laid on the first 100 miles. The remaining 500 miles to Edmonton will be under construction this year.

The subsidiary Grand Trunk Pacific Lines Company has just placed on the British market an issue of \$6,000,000 4 per cent. bonds, guaranteed by the province, for the construction of branch lines in Saskatchewan as follows: Regina

to international boundary line near Portal, 155 miles; Regina to Moose Jaw, 110 miles; from Biggar southwesterly, 50 miles; Prince Albert branch, 110 miles; and Cut Knife branch, 50 miles.

Under an agreement with the Alberta Government, a company has undertaken to build 600 miles of line in that province, and has started the construction from Tofield to Calgary. In the eastern provinces, the Canadian Northern Ontario has under construction 100 miles from Toronto to Trenton, as the first section of its line to Ottawa. It is expected that contracts will be placed during the year for the balance of the line, and also for the grading of the line from Toronto to Buffalo, along the Toronto-Niagara Power Company's right of way.

The construction under way by the Canadian Pacific during the current year includes a second track between Winnipeg and Portage La Prairie, and 459 miles on six different branch lines in Manitoba, Saskatchewan, Alberta and British Columbia. The Dominion Government has provided funds for making a start on the 600-mile line from Pas Mission to Hudson Bay, from Prince Albert to Fort Churchill. Another line known as the Hudson Bay & Pacific Railway is contemplated in the near future. The Great Northern of Canada has a large mileage surveyed for construction, but the only point now where active work is being done is between Abbotsford and Hope, in British Columbia. In Newfoundland the Reid Newfoundland has agreed with the Government to construct 280 miles of branch lines at the rate of 50 miles a year.

For the purpose of construction, rails and fastenings are to be admitted duty free, also the material for the construction of rolling stock. The immense amount of railway construction which is being done in Canada, in proportion to its population, will be more fully realized in the fact that during the year 1909, according to the official returns of the various railway companies, Canada constructed 1,582 miles in new lines of railroads.

According to reports from Cochrane, Ont., Foley, Welsh & Stewart, contractors for the National Transcontinental Railway, have been meeting with considerable difficulty in crossing a muskeg near Low Bush river, 30 miles east of Cochrane. One of their locomotives was overturned and partly submerged in the soft earth. They have ceased laying rails in the effort to fill the morass. Fauquier Brothers, however, are laying about a mile of track a day west of Cochrane and considerable activity is being shown in the erection of bridges along the line in that vicinity.

The Department of Railways is having a survey made to determine the cost of enlarging the Welland Canal, and it is expected that before Parliament meets the work will be completed. A rough estimate fixed the cost of making a 21-foot passage at \$50,000,000, which is about half what the Georgian Bay Canal is estimated to cost. However, it is pointed out that as the enlargement of the Welland Canal would have to be followed by the enlargement of the whole system of St. Lawrence canals, the cost of improving the Welland route might be greater than the Georgian Bay Canal.

Messrs. Gould & Champney, architects, of Seattle, have opened a branch office at Vancouver in charge of Mr. Albert Wood.

The Second International Road Congress

Interesting Conclusions Reached Last Month at Brussels—Pertaining to the More Important Phases of Road Construction and Maintenance

One of the most important features of the Second International Road Congress at Brussels was the conclusions reached by the various sections regarding phases of road construction and maintenance. These sections considered the following subjects: (1) metalled and paved roads; (2) foundation and drainage of road; (3) light railways and tramways; (4) cleaning and watering; (5) choice of surfacing; (6) distribution systems under roads; (7) influence of weight and speed of vehicles on bridges; (8) design of road vehicles. While the conclusions do not bring out much that is new, yet they express in concrete form ideas which formerly in many cases have been held but vaguely

Metalled and Paved Roads

Use of Binding Materials in the Construction of Metalled Roads—The Congress believes that it is desirable to pursue and develop the applications of the use of binding materials in the construction of metalled roadways, special attention being given:

- (1) To determine in each case the character of the binder best suited to local conditions.
- (2) To determine as exactly as possible the physical and chemical characteristics to be specified for tar, bituminous, asphaltic or other binders as best suited.
- (3) To compare the different results obtained in various methods of construction.
- (4) To investigate the influence that storing of tarred metal during a more or less extended period, before being used, may have upon the perfection of the work.
- (5) To make a study of the deteriorations that the materials are subjected to during use.
- (6) To specify the system to be advised where ordinary metalling has proved deficient and stone paving cannot for some reason be applied.
- (7) To establish for each district, according to local conditions and in each case the relation between cost and the result obtained.

Use of Trackways in Paved Roads—(a) Apart from exceptional cases depending upon local conditions, the construction of trackways in paved roadways can be considered but an expedient.

Progress made in Combating Wear and Dust—Confirming the resolutions passed at the Paris Congress in 1908, the Congress believes:

- (1) That superficial tarring may be considered as definitely accepted in practice, and that the advantage to be derived from spreading fine sand or suitable stony material after tarring and rolling the same is not at present proved, and should form the object of comparative tests.
- (2) That in the future application of these methods the attention of road builders could be drawn with benefit to the comparison of results obtained by the laying of tar, bituminous or asphaltic substances—hot or cold—by machine or by hand, both from the point of view of cost and from the point of view of the efficiency of the operation.
- (3) That it is desirable, in comparing results, to take into account the quantity of the materials composing the metalling, the intensity of traffic and tonnage, as well as the climate.
- (4) That with due regard to the resources of each region in tar, bituminous or asphaltic substances, it is important to specify in contracts the conditions that are to be fulfilled,

especially as regards the preservation of "life"; that is to say, the property of preserving the binding power.

(5) That it would be desirable that a comparison be established between the advantages of tarring—this word being taken in its broadest sense—in different cases; whether the operations are to be frequently repeated, small doses being applied each time, or whether larger quantities are to be applied at greater intervals. Furthermore, whether, in the metalling itself, a tar, bituminous or asphaltic binding material has already been incorporated or not.

(6) That the conclusion adopted by the first Congress is to be maintained in toto, running as follows: emulsions of tar or of oil, hygroscopic salts, etc., have a real but not a lasting efficiency. Therefore their use should be limited to special circumstances, such as on race-courses, and in connection with festivals, processions, etc.

Foundation and Drainage of Roads

Foundation—(1) The formation and construction of foundations of roadways should be made the stronger in proportion to the lesser compactness of the ground. The foundation should have more body and resistance the more it is exposed to internal deterioration and external wear.

(2) In the choice of the system of foundation for roadway, both stone sett and metalled, stress should be principally laid on the degree of dryness and dampness of the subsoil, while having regard to the possibility of their drainage and to their geological nature and to the nature of the materials of the locality.

Drainage—(3) In soils where preliminary drainage is required before construction the general methods of drainage should be applied to the whole or to a part of the road body and to the bed of the metal if necessary.

(4) The cross and longitudinal sections of roads and those of side gutters should be established so as to facilitate the flow of the trickling water and to prevent infiltration of water into road surfaces, which should be made as impermeable as possible.

The evaporation of superficial dampness should be encouraged by every means.

(5) The works for the foundation and for drainage should be carried out simply and economically, and by using the materials of the country so far as possible.

Light Railways and Tramways.

(1) In the study of the new roads to be constructed both in the neighborhood of large towns as well as in the open country it may be useful to try to provide a sufficient road width for the construction of a light railway outside the roadway.

The designs should be of such a kind as to provide for every kind of traffic.

It is desirable that the supplementary costs should be defrayed by the owners of the light railway as far as the part of the road reserved for the rail track is concerned.

(2) The construction of sunken rails in the metalled roadways is always harmful to the viability of roads, and there results a marked increase in cost of the maintenance. It is desirable that this method should be avoided as much as possible.

The presence of tramway rails in paved roads makes the repair of the paving very difficult where the latter abuts

against the rails. It is necessary to diminish that nuisance as far as possible by appropriate methods.

(3) Where the railway is placed by the side of the road it is preferable, where the width of the road permits, to construct it on a special track, inaccessible to wheeled traffic and super-elevated in order to allow greater safety.

It is necessary in all cases to provide proper drainage.

In the case of metalled roadways, the owners of the railway should be obliged to construct on the outside border of the roadside a depot for materials for the repair of the road; the same obligation should be in some cases extended to paved roads.

(4) The removal of trees along roadsides should not be tolerated unless in special cases.

If the width between the tree rows is insufficient for the rail track to give the necessary width for ordinary wheel traffic the track should be laid on the outside of the trees.

(5) It is desirable that the owners of light railways should assist the work of maintaining the area of the road or roadway occupied by the rails or contiguous to same or pay the costs of this maintenance.

Cleaning and Watering

Throwing refuse upon the public roads should be carefully avoided. Such refuse should be removed by the municipality and not by the owners of adjoining property provided the cost of this work is recovered from the latter.

In large towns it is necessary to give special care to cleaning and watering.

Cleaning should be done as rapidly as possible.

Watering must be frequent and limited in amount according to local conditions.

Washing and sweeping should be done as early as possible. Mechanical processes are particularly recommended.

Improvement in the implements should be sought for with a view of ensuring the most complete cleaning with the least inconvenience to the public.

Motor machines can be advantageously used for cleaning and road watering in large towns.

Choice of Surfacing Materials

(1) Macadam causes dust and mud, is expensive to maintain, and is suitable in large cities only for streets where the traffic is not very great or heavy.

(2) The experimental work carried out in recent years with macadam improved by using a bituminous or tarry coating or binder must be continued in order to determine the best methods of utilizing this kind of construction under varying conditions, so that this question may be submitted again at the next conference.

(3) Stone pavement has great qualities of resistance and durability. Its maintenance is easy and economical; it produces hardly any dust, and is suitable where there are tramway tracks.

(4) It should be adopted in thoroughfares whenever noise is of little consequence or when wood or asphalt surfaces are not suitable. It should consist of setts regular in shape, durable, but not slippery, wearing evenly, and laid upon a foundation and with close joints.

(5) The Congress desires to see the trials of small sett pavements continued wherever local circumstances and traffic conditions permit.

(6) Wood paving is noiseless; not slippery if kept clean; it stands very heavy traffic. The use of it should be extended even to thoroughfares through which run tramway lines.

(7) The respective advantages of soft and hard wood blocks must be a subject of discussion at a forthcoming Congress.

(8) Asphalt pavements should be recommended owing to their good qualities from the hygienic point of view and

their ease of cleaning and of repair. This surfacing is almost noiseless and produces but little dust, but is unsatisfactory adjacent to tramway rails.

(9) There is opportunity for its use in fashionable thoroughfares where the traffic is not severe, where there are no tramways, and where the grades are very moderate.

(10) Finally, the trials of asphalt flag and block pavements should be continued.

Distribution Systems Under Roads

(1) It is desirable to free as far as possible the carriageways from the minor distribution systems of pipes which now encumber them and to leave in them only the large sewers and mains which require little attention.

(2) As far as possible the minor distribution pipes which are connected to the adjoining houses should be doubled and placed on both sides of the streets. This doubling is especially recommended for streets with heavy traffic and also for those where the surface rests on a solid foundation.

(3) It is advisable to consider the advantages of placing all distribution systems except gas in subways of suitable dimensions under the footways. In this case great care must be taken to prevent flooding caused by breakage of water pipes.

(4) When the distribution works have been actually placed under the carriageway, the Congress advises that the system of doubling should be applied prudently by taking advantage of the opportunity given by considerable repairs or alterations.

(5) Complete agreement is necessary between all authorities interested in the streets in order to conduct their operations so as to interfere as little as possible with the traffic. It is most desirable that all street works should be under the general direction of those responsible for maintaining the surface. The work must be carried out as rapidly as possible, and so as to reduce the space occupied on the public highway and the obstruction to traffic.

(6) Trees planted in the footways in urban districts should be chosen so as not to inconvenience the frontagers by their leaves nor to interfere by their roots with the distribution systems.

Influence of Weight and Speed of Vehicles on Bridges, etc.

(1) The development of mechanical traffic has not had up to the present the effect of increasing the weight of vehicles generally beyond the limits recognised by regulations and custom in connection with constructional calculations. In any case it is desirable that when existing regulations are revised steps should be taken to test bridges by placing upon them the heaviest probable loads under the most unfavorable conditions and exclusively composed of mechanical vehicles.

(2) Under the present conditions of constructing motor vehicles and building public roads it does not seem possible that the speed of vehicles could have any effects on modern and well built bridges which have not already been duly taken into account in the usually adopted methods of calculations of strength. It may be advisable, however, when testing new bridges or re-testing bridges to make use of the heaviest motor-driven vehicles permitted to run, and running them at high speed.

(3) The consolidation (solidarization) of the different parts of which bridges are composed aids their capacity to withstand the effects of vehicular traffic.

Design of Road Vehicles

Animal-drawn Vehicles—(1) Heavily loaded vehicles with narrow tires may cause exceptional damage to roads laid down for general traffic.

(2) It is desirable that trials should be taken in hand for the purpose of determining the relation which should exist between the load, the diameter of wheel, and the width of tread, so as to avoid abnormal damage.

Mechanically-drawn Vehicles—(1) Such automobiles as fall

under the head of "touring cars" cannot cause abnormal damage to the roads so long as their speed is kept within limits.

(2) Public service automobiles cannot cause appreciable damage to the road provided that the maximum speed does not exceed 25 kilometres per hour; that the maximum axle-load does not reach four tons on the heaviest loaded axle.

(3) Commercial motors need not cause exceptional damage to a well constructed road provided that the following limits are adhered to: First type—vehicles in which the axle-load is less than $4\frac{1}{2}$ tons; maximum speed, 16 kilometres per hour.

In the narrow streets in towns and large cities, when vibrations of the ground are to be feared, it is possible to minimize the inconvenience by reducing the speed in a suitable degree.

Second type—vehicles in which the maximum axle loads are between $4\frac{1}{2}$ and 7 tons, and the maximum speed 12 kilometres per hour.

It is desirable that experiments should be taken in hand in order to determine the maximum width of the tires of all automobiles while still insuring that under normal conditions the distribution of the load on the ground should take place over the whole supporting area.

(4) Ribbed or grooved iron tires cause abnormal damage to the road no matter what their width or what load they support.

(5) Vehicles propelled by mechanical power cannot cause extraordinary damage to the curved portions of roads provided that at these points a sufficient super-elevation is given, and that the curved portion is not approached or traversed at an unreasonable speed.

(6) With a view to saving the roads it is desirable that car builders should go carefully into the question of clutches and brakes, so that the skidding of the wheels may be avoided, balance the motors as perfectly as possible, and allow a reasonable raising of the centre of gravity.

Road Construction in Ontario

The annual report issued by Mr. W. A. McLean, Provincial Engineer of Highways for Ontario, contains many items of interest.

Township expenditure in the twenty years, 1889-1908, has amounted to \$19,015,343, and statute labor in 1908 was 1,141,976 days. Estimating statute labor at one dollar a day, this would be equal to a total outlay in twenty years on township roads alone of \$30,435,103. The cash expenditure of townships has more than doubled since 1889, in which year it was \$677,564; while in the year 1908 it amounted to \$1,403,211. With statute labor at one dollar a day, the total township expenditure in 1908 had a value of \$2,545,187.

Seventeen counties have taken advantage of the opportunities for road improvement given by the Act of 1901, which provides Government assistance to municipalities making improvements. Expenditure under the Act since 1902 has been \$2,128,122.93.

Of this amount the counties have spent \$1,418,748.63. The provincial expenditure, extending over eight years, has been \$709,374.30, the province contributing one-third of the total, or one dollar to each two dollars raised by the counties. Combining the items of road construction and supervision (the latter about \$75,000), the total cost of road construction is \$1,404,497.88. With 1,125 miles of road built, the average cost per mile has been approximately \$1,250. This, as previously stated, neglects a large amount of incomplete and scattered work, so that the average cost per mile would be less.

The fifth annual convention of the Union of Saskatchewan Municipalities will be held in Saskatoon Sept. 21st and 22nd. Particulars may be obtained of the secretary, Mr. J. Kelso Hunter, Regina.

Montreal Strike Settled

The bricklayers' and masons' strike at Montreal, which lasted more than two months, was settled last week. The agreement made by the Builders' Exchange and the International Union will remain in force until June, 30th, 1912. An arbitration committee consisting of two representatives from each side will be appointed for the term of the agreement. Nine hours will constitute a day's work, and the rate of wages will be 50 cents an hour for bricklayers (sewer and conduit work 60 cents), and 45 cents an hour for stonemasons. Work on holidays will receive double pay, and overtime pay for work after five o'clock will be at the rate of time and a half. The agreement was signed by Messrs. E. G. Cape, of Byers & Anglin, and by J. H. Hutchison, of Jno. Heward & Company, for the Montreal Builders' Exchange.

Hon. G. P. Graham, Minister of Railways and Canals, turned the first sod last week in the construction of the Hudson Bay Railway. The ceremony was performed on the south shore of the River Saskatchewan near the approach of the bridge under contract by Mackenzie & Mann. It is probable that Fort Nelson will be the terminal point of the new railway. The construction of the bridge is in charge of R. W. Graham, who, during the summer, has done a great deal of bridge work and laid 600 miles of track for the Canadian Northern.

A defect was discovered in the new caisson for the north pillar of the Quebec bridge, according to a recent dispatch from Quebec, and it is probable that it will have to be removed to Roche's Cove and partly rebuilt, which will delay the completion of the bridge for about a year. It is stated that the contractors, Messrs. Davis, have received instructions from the Federal authorities to complete their work for the autumn of 1911. It was necessary to use 1,700 tons of timber in the construction of the caisson, and, after it was launched, ten feet of concrete were placed in it, which will have to be removed before the caisson will be placed in Roche's Cove. The loss is estimated at half a million dollars.

Controller Wanklyn and Alderman Lapointe, who represented the city of Montreal at the convention of the League of American Municipalities at St. Paul, Minn., were impressed particularly with the manner in which western American cities spend money on their parks and streets, and consider that Toronto and Montreal could learn much from them in this respect. Alderman Lapointe retired from the directorate of the League and was succeeded by Controller Ward, of Toronto, who was appointed 3rd vice-president. Next year the convention will be held at Atlanta, Ga.

Victoria, B.C. Making Steady Progress

The August building returns for Victoria, B.C., are \$212,814. The total for the year to date shows an increase of about 25 per cent. over the corresponding period of 1909. The following table shows the monthly reports for 1910 and 1909 up to August:

January	\$128,985	\$ 78,080
February	151,760	122,630
March	244,760	121,642
April	182,440	188,060
May	257,290	188,620
June	227,600	90,121
July	222,290	372,120
August	212,814	141,040
Total (8 months)	\$1,657,939	\$1,302,360

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Almonte, Ont.

Tenders addressed to Arch. McCallum, chairman, will be received until September 28th for construction of septic tank, etc. Plans, etc., at office of above.

Biggar, Sask.

\$15,000 will be expended on waterworks and fire protection. Commissioner Bayne has details.

Barrie, Ont.

Tenders will be received by E. Donnell, town clerk, up to October 1st, for the construction of sewers on Main street. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

County of Prince Edward, Ont.

A by-law has been passed to issue \$35,000 4½ per cent. 20-year road debentures.

Dundurn, Sask.

A by-law is being prepared to issue \$14,000 8 per cent. 20 instalment road improvement debentures.

Galt, Ont.

Tenders are being called until September 28th for purchase of \$26,000 worth of debentures for sewer and storm drains.

Gravenhurst, Ont.

The by-law to raise \$10,000 for the purpose of improving the highways in the Township of Muskoka was defeated.

Moose Jaw, Sask.

Tenders are being called by the city until September 26th for laying about 2,100 lineal feet of 10-inch tile sewer and 6-inch c.i. water main; selling necessary hydrants and valves, etc. Plans, etc., at office of J. M. Wilson, city engineer. W. F. Heal, city clerk.

Montreal, Que.

Tenders are being called until September 30th by Board of Commissioners for construction of sewers in the following streets: Boulevard street, Antoine, Tetraultville from River St. Lawrence to Dorchester and along the latter. Specifications with City Surveyor. L. N. Senecal, secretary.

Tenders have been opened for the 3,210 foot long steel pipe and concrete work in connection with the intake pipe, which it was estimated would cost about \$145,000. Eight firms tendered, including Munderloh & Company, John Inglis, Limited, Laurin & Leitch, Lemoine & Sons, L. A. Desy, Harris & Company, M. Connely and Beaudry Leman. In some cases the tenders were for the complete work, and in others for the steel and concrete work respectively.

New Liskeard, Ont.

C. H. Fullerton is the engineer in charge of the waterworks extension for which by-law was passed. Debentures have not been sold. Estimated cost, \$5,250.

Nanaimo, B.C.

S. Gough, city clerk, writes that in the matter of pavements about as much is contemplated as the present contract (\$25,000) embraces. Sewers costing about \$70,000 will be installed. Present sewer contract embraces outlet and main trunk lines in portion of city.

Ottawa, Ont.

Carleton county council instructed the county clerk to call for tenders for a stone crusher and dump carts for the county.

Rouleau, Sask.

This municipality will borrow \$45,000 for installation of waterworks system.

Prince Albert, Sask.

Tenders will be received by C. O. Davidson, city clerk, up to September 30th for the supplying and erection of two centrifugal electrically driven automatic control sewage pumps. See advertisement in "Tenders and For Sale Department" of this issue.

Toronto, Ont.

Waterworks Engineer Fellowes has announced that new intake and conduit will be built next year. Estimated cost, about \$300,000.

Victoria, B.C.

The following bids were received for the paving of four streets under the local improvements plan: City Engineer — For standard asphalt — Fernwood road, \$19,000; Rockland avenue, \$18,425; Richardson street, \$12,080; Fort street, \$10,375. Worswick Paving Company — Fernwood road, as specified by city engineer, \$18,678; alternative, \$14,978; Rockland avenue, \$18,745 and \$14,895; Richardson street, \$11,705 and \$9,060; Fort street, \$10,375 and \$9,060. Pacific Coast Construction Company — The following figures are for standard asphalt, 4-inch foundation, 5-inch foundation and 6-inch foundation, respectively — Fernwood road, \$18,786, \$15,086, \$17,036 and \$17,972; Rockland avenue, \$18,153, \$14,303, \$16,613 and \$17,306; Richardson street, \$11,127, \$9,077, \$10,267 and \$10,654; Fort street, \$9,702, \$7,802, \$8,942 and \$22,840. These tenders were referred to the purchasing agent and city engineer.

Tenders for asphalt pavement were received as follows: Warswick Paving Company, Rockland avenue, approximately 7,100 square yards of pavement and 1,300 lineal feet of curbs and gutter pavement, \$2.35 per yard; curbs and gutters, 28 cents per foot. Total, \$18,745. Richardson street, 4,300 square yards of paving, 3,200 feet of curb and gutters. Paving \$2.35 per yard, curbs and gutters, 50 cents per foot. Total, \$11,705. Fernwood road, 7,400 yards paving, 4,000 feet curbs and gutters. Paving \$2.35 per yard, curbs and gutters, 50 cents per foot. Total \$18,678. Fort street, 3,800 gutters. Paving \$3.00 per yard, curbs and gutters. Paving \$3.00 per yard, curbs and gutters, 28 cents per foot. Total \$12,100. The above tenders are for a standard pavement on a concrete base, but the Warswick Paving Company also put in an alternative

bid for a pavement on a conglomerate base the same as on Linden avenue. These bids were as follows: Fernwood road, paving, \$1.85, curb, 28 cents; Rockland avenue, paving, \$1.85, curb, 50 cents; Richardson street, paving, \$1.90, curb, 50 cents; Fort street, paving, \$2.20, curb, 28 cents. In the above bid for Fort street the higher figure is accounted for by the fact that between the street railway tracks wood blocks will be used. The bids of the Pacific Coast Construction Company were as follows: \$2.18 yard for paving and 40 cents per foot for curb and gutters for a standard pavement according to the specifications of the city engineer, being a six-inch concrete base, with a two-inch wearing surface. Alternate bids were also put in by the company at \$1.19 and 40 cents respectively for paving and curbs, this pavement to be laid on a five-inch base with two-inch wearing surface. The above tenders were referred to the city engineer for report.

Welland, Ont.

The by-law to expend \$52,000 on improving the present system of waterworks was carried.

AWARDED.

Dauphin, Man.

Tenders for the construction of the waterworks and supply of material were let as follows: The contract for the piping to Canadian Pipe Company, of Vancouver; ditching and back filling, Flanagan & Murphy, of Weyburn and Fort William. The Canada Iron Corporation, of Fort William, secured the contract for the supply of iron pipe for the town distribution system, and the American Sewer Company, Akron, Ohio, were awarded the contract for the supply of sewer pipe. Hydrants and valves will be furnished by the London Foundry Company, of London, Ont. The general installation of the system in the town will be carried out by Flanagan and Murphy, in addition to the outfall sewer running into a septic tank near the Vermillion river. Chipman & Powers, consulting engineers.

Edmundston, N.B.

Messrs. Onellet & Jacques, Des Chailions, Que., were awarded the contract for distribution system of waterworks, at \$35,381. Others tendered as follows: J. J. O'Connor, Edmundston, N.B., \$55,000; Kennedy & McDonald, Edmundston, \$47,000; O. Pelletier, Cabano, Que., \$60,800. V. H. Dupont, 62 St. James street, Montreal, engineer in charge.

Ottawa, Ont.

T. S. Kirby & Company has been awarded the contract for supplying stone for macadamizing Metcalfe road. The company has opened up a new quarry for the purpose about six miles south of the city.

Regina, Sask.

Only two regular tenders were received for paving Albert street, one from R. S. Blome Company (accepted), and one from the Parsons Construction Company. The first named company offered to put in granolithic blocks at \$3.00 per square yard, and do the excavating at \$1.00 per cubic yard.

Another concrete mixer will be brought to the city at once and the whole work will be rushed to completion at an early date this fall. The Parsons Construction Company offered to put asphalt blocks in the subway at \$3.50 for 2½-inch blocks, and \$3.80 for 3-inch blocks. Their tender bound them to complete the work by October 15.

The paving contract was divided as follows: The lowest tender for the work was made by the National Paving & Contracting Company, their price being \$2.90 per square yard, if given the whole work, or \$3.00 if given a fraction of it. They, however, could not promise to complete all the paving this year. The next lowest tender was from the Bitulithic Contracting Company. They will bind themselves to do all the work given to them this season. Their price for the paving was \$3.05. The Western Pavers were given the contract for putting in all the curb and gutter at 67½ cents per lineal foot, and the straight curb at 37½ cents. Other tenders for the paving were as follows: R. S. Bloome & Company, \$2.99; R. Bangham, Windsor, Ont., (2½-inch asphalt block), \$3.50; The Kettle River Company (3-inch 16-lb. wood block), \$3.94; 3-inch 20-lb., \$4.20. Sidewalks—Clement & Curran, Orillia, Ont., 17½ cents a square foot; R. S. Bloome & Company, 17¼ cents. Asphalt paving will be laid by the National Paving & Contracting Company at \$3.00 per square yard on McIntyre street, from Victoria to Sixteenth, and on Victoria from Albert street to Cameron. The Bitulithic Contracting Company will put in bitulithic at \$3.05 per square yard on Smith street, from Victoria to Sixteenth; on Lorne street, from Victoria to Sixteenth; on Cornwall from Thirteenth to Sixteenth; on Victoria, from Broad to St. John street. This total area is 21,500 square yards.

St. Boniface, Man.

Guilbault & Company were awarded contract for concrete culvert over Seine river on a bid of \$27,810.

Victoria, B.C.

The tender of the Worswick Paving Company was accepted for Fernwood road at \$14,978, Rockland avenue at \$14,895, Richardson street at \$9,770, and the tender of the Pacific Coast Construction Company for a standard asphalt for Fort street at \$9,702.

Winnipeg, Man.

The city has awarded the following works: Thomas Jackson & Son, sewer on Elmwood avenue, from Kelvin to Riverton avenue, \$1,119.72; sewer on Riverton avenue to Elmwood avenue, \$1,158.60; block pavement on the lane in the block bounded by Furby and Sherbrooke street, Cornish and Wolsley avenues, \$1,792.83; granolithic walk west side of Vaughan street, \$1,180.50. G. Dewitt, granolithic walks, totaling, \$9,512; engineer of construction, water ling \$9,512. Engineer of Construction, water mains, \$1,260; asphalt pavement, \$11,335, etc.

Railroads, Bridges and Wharves

RAILROADS

Calgary, Alta.

The C. P. R. have plans for the construction of a large irrigation dam at Horseshoe Bend to cost \$500,00.

Digby, N.S.

Tenders are asked by government for breakwater at Digby.

Edmonton, Alta.

The C. N. R. is again baulked in its efforts to locate a line west from Edmonton

towards the Yellowhead Pass. Plans for the line from St. Albert west have been disapproved by the Railway Commission at Ottawa, on the grounds that the route proposed lay too close to that of the G.T.P.

Hazleton, B.C.

W. A. Willisroft is in charge of the bridge to be erected across the Nadina river. Bridge and approaches aggregate 1,189 feet, 1,000 feet of pile causeway, with three King truss spans of 63 feet each.

L'Assomption, Que.

Tenders are called by Department of Public Works, Ottawa, for ice pier here. R. C. Desrochers, secretary.

Ottawa, Ont.

See "Business Buildings."

Paspeblac East, Que.

Tenders are being called by the Department of Public Works, until October 10th for construction of breakwater here; also for construction of wharf at Bic. R. C. Desrochers, secretary.

St. John's, Que.

Tenders addressed to J. A. Raymond, secretary-treasurer, St. John's, Que., will be received until September 26th for construction of concrete piers and abutments, etc., for bridge between St. John's and Ipperley. Tenders are also called until the same date for construction of steel. Plans, etc., at office of Messrs. Baulue & Mercier, civil engineers, 1173 St. Hubert street and at office of secretary-treasurer.

Toronto, Ont.

The C. P. R. is soon going to begin work on the construction of a new steel span for the Humber bridge. The bridge will be about 120 feet in length.

The Bloor street viaduct by-law will be voted on again by the people next January. It calls for an expenditure of \$769,000, of which \$150,000 is for land damages. The plan is that the viaduct consist of two sections: one 1,200 feet long to span the first Rosedale ravine, from Sherbourne street, and the other 1,450 feet long crossing the Don river.

Vancouver, B.C.

City Engineer Clement has been instructed to prepare plans for a wooden bridge to span the ravine between Glen and Keith drives, on Eighth avenue.

Virden, Man.

Tenders addressed to J. F. C. Menlove, secretary-treasurer, will be received until September 24th for supply and construction of a 60-foot reinforced concrete bridge. Plans, etc., at Department of Public Works at Winnipeg, and at the office of undersigned. Work to be completed by December 1st.

Winnipeg, Man.

Residents of Fort Rouge are anxious to have a new bridge replace the Osborne, or to have a new one constructed at the foot of Edmonton street.

AWARDED.

Dauphin, Man.

The Algoma Steel Bridge Company, Limited, have the contract for construction of steel bridge across Vermillion river at \$4,350. Manitoba Bridge & Iron Works Company tendered at \$4,300, concrete work extra at \$15 a cubic yard.

Fredericton, N.B.

The contract for the Porter mill stream mouth bridge in Charlotte county, has been awarded to Jos. McVay & Sons. Tenders for either concrete or granite were asked for, and the former proved the lowest successful tender, being for about \$1,400. The

tender for the Inglewood mill bridge, in the parish of Musquash, has been awarded to John S. Hargrove, of Musquash, \$800. The contract for the Nightingale brook bridge, parish of Lepreaux, Charlotte county, has been awarded to F. M. Cawley, of St. George, \$1,300.

Halifax, N.S.

The government have awarded the following work: New wharf at Shelburne to Frank A. Rannan & Company; breakwater at Jiggins Mines to S. J. Reid, Musquodobod.

Public Buildings, Churches, Schools, etc.

Almonte, Ont.

St. Andrews congregation has decided to repair the "Auld Kirk" at the 8th line, and will construct a vault in the rear end for use in connection with the cemetery.

Brantford, Ont.

The Wellington Street Methodist Church has decided to spend \$16,000 in church improvements, including a new organ.

Brandon, Man.

The Redemptorist Fathers here are to build two new Catholic churches near here.

Calgary, Alta.

A jail will be erected by the provincial government, and the police barracks are to be extended.

Carleton Place, Ont.

J. A. Ewart, architect, Ottawa, has prepared plans for the new Zion Presbyterian Church here to take the place of the one recently destroyed by fire. The plans are for a church which will seat about 650 people. It is of plain gothic design and will be 75 feet by 96 feet. It will have Beckwith stone walls trimmed with Indiana limestone. The church board is considering the plans. The estimated cost is \$20,000.

Darlington, Man.

A public school, costing \$8,000, will be erected here.

Edmonton, Alta.

The Alberta Government has purchased a site on Capital Hill, comprising 29 acres, for the provincial government house.

The city will erect a number of large exhibition buildings next spring.

Forest, Ont.

Tenders for heating and ventilating of high school addressed to J. M. Mackenzie, secretary, will be received until September 28th.

Gilbert Plains, Man.

The ratepayers voted on September 20th on a by-law to issue \$10,000 6 per cent. 20-year school debentures. J. C. Turner, secretary-treasurer.

Gladstone, Man.

It has been decided to rebuild the skating rink which was blown down on June 20th. A new company has been formed.

Headingley, Man.

Tenders will be received for \$4,200 6 per cent. 20-year school debentures. C. W. Johnstone, secretary-treasurer, Phoenix S. D., No. 1528, Headingley, Man.

Hanover, Ont.

Tenders will be received by John Taylor, town clerk, up to October 22nd, for the erection of the Public Library Building here. For further particulars see "Tenders and For Sale Department" of this issue.

Tenders will be received by John Taylor, town clerk, up to October 22nd for the

erection of the Town Hall. For further particulars see "Tenders and For Sale Department" of this issue.

Halifax, N.S.

The Department of Naval Service is advertising for tenders until September 26th for alterations and repairs to the Naval Hospital at the Dockyard.

Tenders will shortly be called by the Navy Department, Ottawa, for the work of converting the old Marine hospital into a college for naval cadets.

Specifications for tenders for the work on Halifax tower are being prepared.

Plans have just arrived from Ottawa for the Naval Academy. This is an extensive alteration to the Naval Hospital at the Dockyard for the use of the Canadian Navy and forms the nucleus of an extensive lot of work to be tendered for in the near future. It is also reported that plans will soon be out for a new office building at the Dockyard for the use of the Marine and Fisheries Department, to be built of brick. Tenders not yet awarded.

The Halifax Board of Trade have accepted the plans of Dumares & Cobb for a memorial tower in honor of Sir Sandford Fleming, to be erected in the park at the northwest arm. It is to be constructed of stone, with granite trimmings.

Moose Jaw, Sask.

The estimated cost of the Presbyterian Boys' College is \$100,000, and private bids for the work will be accepted within a few weeks. J. D. Atchison, architect, Winnipeg.

Minnedosa, Man.

Tenders addressed to M. G. Williamson, this place, were received until September 16th for erection of school at Rookhurst, near here.

Mortlach, Sask.

The Church of England have decided to erect a new church here.

Medicine Hat, Alta.

The plans for the new St. Barnabas' Anglican Church have been accepted; 90 x 60 feet, brick, costing \$22,000.

Montreal, Que.

Hon. Mr. Lemieux, postmaster-general, in a letter read before the Board of Trade, in answer to one of criticism on the condition of the old post office, replied that the matter had been laid before the Department of Public Works.

Nanaimo, B.C.

The sisters of St. Anne's hospital, Nanaimo, are collecting subscriptions for the rebuilding of their hospital recently destroyed by fire.

New Westminster, B.C.

Tenders for the Y. M. C. A. building will be called for as soon as the specifications have been approved. C. R. Sayer, travelling secretary.

Niagara Falls, Ont.

The General Hospital Board have decided to begin preparations for erection of Nurses' Home.

Ottawa, Ont.

Another golf club is to be formed. A meeting has been called to elect officers and select a site for the club house.

J. A. Ewart, architect, has submitted plans for the new Bethany Presbyterian church. It will seat 500 people and will be a solid brick structure. Estimated cost, \$17,000.

Pembroke, Ont.

The Library Board here are arranging for plans for the new Carnegie Library. J.

H. Reeves, secretary. Estimated expenditure, \$12,000.

Portage la Prairie, Man.

Plans for the new armory here arrived. Two storeys, 54 x 68 feet.

Rock Bay, B.C.

The hospital here recently destroyed by fire will be rebuilt.

Rosetown, Sask.

A town hall and fire station are to be built at once.

Saskatoon, Sask.

A new Labor Temple is to be erected, three storeys and basement, 58 x 90 feet, cost \$45,000. Plans by R. M. Thompson.

South Vancouver, B.C.

The plans for the new fire hall at this end of the city were accepted. Architect Borter will have specifications ready in a few days, at which time tenders will be called for.

St. Thomas, Ont.

The Y. M. C. A. will have a membership campaign this week, closing on Friday evening. This is preliminary to the building campaign which it is planned for next May.

Tenders will be received until October 1st by Reverend T. West, for masonry and plastering, carpentry and roofing, etc., required in erection of stone church here. Plans, etc., at office of the architect, A. W. Holmes, 10 Bloor street east, Toronto, or at the Presbytery, this city.

The building committee of the Board of Education will endeavor to get options on the Barr property, corner of Palm street and East avenue, with a view to the erection of a school on the north side. The committee will also ascertain the cost of securing new grounds at the Scott street school, so that the grounds and the building may both be increased in size.

Smith's Falls, Ont.

The Department of Education has approved of the site selected by the school board for their new high school.

Dr. E. H. Wickware, Chairman of the Board of Education, will receive tenders up to the 29th inst. for the erection and completion of the collegiate institute building in this town. See advertisement in "Tenders and For Sale Department" of this issue.

St. John, N.B.

Specifications are being prepared at Ottawa for the drill hall. Tenders have not yet been called.

Thorold, Ont.

Tenders were invited until September 17 for work in connection with new addition to St. John's Church. Plans, etc., with the architect, T. H. Wiley, St. Catharines.

Tp. of Burke, Ont.

A by-law has been passed to issued \$7,000 school debentures. H. McQuerie, clerk.

Toronto, Ont.

Permits were granted to the following: Boon Avenue Methodist Church, 2-storey church and Sunday school, \$25,000; Board of Education, 2-storey brick school on Howard Park avenue, \$35,000, and 2-storey brick addition to school, Kingston road, \$40,000.

The preliminary plans for the new technical school have been inspected by Mr. J. A. Houston, the government inspector of school buildings. Estimated cost, \$500,000.

No tenders having been received for the erection of the new bird and monkey house

at Riverdale Park, the park commissioner was instructed by the Board of Control to erect it by day labor.

The plans for the proposed art gallery and museum on Grange road have reached a definite stage. Work will not be commenced until the necessary land on St. Patrick and Beverley has been acquired. Estimated expenditure, about \$150,000, of which about \$40,000 has been already secured.

The congregation of St. David's Presbyterian Church, Earls court, have decided to extend the church accommodation by building a new Sunday school room. Plans are being prepared.

Property Commissioner Harris is looking for a site for a new jail with grounds, probably within ten miles from the city.

The firm of Shattuck & Hussey, Chicago, Ill., will be engaged as consulting architects for the new Y. M. C. A. buildings. Messrs. Burke, Horwood & White, local architects. General secretary, Warburton.

Tenders are being called until September 27th by Board of Control for hot water heating in connection with police station No. 9, West Toronto. Plans, etc., at office of City Architect. G. R. Geary, chairman, Board of Control.

Vernon, B.C.

This municipality is seeking an armory site, the Dominion authorities declining to erect a new drill hall on leased property.

Victoria, B.C.

W. N. Mitchell, real estate dealer, it is stated, intends erecting in the near future another block on Pandora avenue, off Douglas street.

Tenders have been invited by the Department of Public Works for the erection of a two-room school building at Howe Sound and a one-room school at Graham Island, the former being receivable up to the 26th inst., and the latter until the 10th of October. Tenders and completion of the new Court House at Kaslo, receivable until October 10th.

Welland, Ont.

Inspector Marshall, of the Public School Board, is of the opinion that additional school accommodation would probably be necessary by next summer.

Wynyard, Sask.

At a meeting on the 13th inst. it was decided to purchase land on McInnes street for a Presbyterian church and work on the cement basement will begin at once.

Winnipeg, Man.

A new provincial agricultural college is to be erected which will form another section of the farm education campaign being carried on by the Roblin government. It is also stated that the deaf and dumb institute will be rebuilt in the western suburbs of the city at an early date and that a prison farm will be inaugurated, a few miles to the south of the city on property recently purchased for the purpose.

A building permit was issued for the erection of Children's Hospital, \$65,000; architect, J. H. G. Russell; contractor, W. J. Davidson.

It is reported that the present Manitoba Club Building will be sold to the G. T. F. and that a large new building will be erected elsewhere.

The Winnipeg Beach Club will have a new club house erected.

The government has concluded the purchase of 500 acres of land, located on the Red river in St. Vital, St. Norbert, exactly two and a half miles from the city limits. The property contains about 500 acres

approximately. It is said all the government buildings, including the Parliament Buildings, will be placed here.

The board of control is to call for tenders within the next two weeks for a two-storey public swimming bath. The plans for this structure are being prepared by Wm. Bruce, architect, and the rough draft has been submitted. Estimated cost, \$50,000.

Zealandia, Sask.

A new town hall and fire station is to be erected.

AWARDED.

Balgownie, Sask.

J. H. McDonald, Regina, was awarded the contract for addition to school on a bid of \$5,365.

Calgary, Alta.

The by-law to spend \$484,000 on railway extensions was carried.

Camrose, Alta.

Keyes & Baird secured the contract for buildings for Exhibition grounds.

Chatham, N.B.

The contract for the new Roman Catholic cathedral has been awarded to A. P. LeBlanc, contractor, of Moncton, N.B. It will be built of stone at a cost of \$15,000.

Duncan, B.C.

The contract to build the Convalescent Home and Emergency Hospital has been let to L. Tinney, late of Vancouver.

Ottawa, Ont.

The contract for supply of electric light fixtures for the city hall was awarded to Garrioch & Gorard, Elgin street, at \$183. P. Ackroye, 184 Bank street, tendered at \$225. Architect, J. A. Ewart.

Strathcona, Alta.

Ald. Congdon was the successful contractor for the carpentry and masonry work in the improvements on Immigration Hall. S. Humeston tendered successfully for the painting.

Souris, Man.

Excavation work was started on the 12th inst. on the new post office. Piggott & Son, of Hamilton, Ont., are the contractors.

Saltcoats, Sask.

The contract for additions to and remodelling public school here has been awarded to W. J. McCandless & Company and Crossley Bros, this place, at \$8,060.

St. Mary's, N.B.

The contract for the Roman Catholic church has been awarded to A. P. LeBlanc, contractor of Moncton, N.B. It will be built of wood at a cost of \$20,000.

Winnipeg, Man.

The city council has awarded contracts to the engineer of construction for the first wing of the hospital for advanced cases of tuberculosis and for the structure which is to encase the fire engine to cross the Red river, in William Whyte Park. The plans for the hospital are by Dr. Sharpe and the contract price, \$23,507, which was \$6,000 below the second lowest tender. The cost of the other structure will be \$1,894.

The contract was let last week for the Children's hospital to W. J. Davidson at \$65,000. The building is to be two storeys high and will be constructed of brick and reinforced concrete.

The contract for the electrical work on Young Church was let to J. H. Tooray, \$1,650.

Residences

Chilliwack, B.C.

Gamble & Knapp, architects, Vancouver, submitted plans to A. N. Smith for the construction of a forty-roomed Swiss chalet at the Vedder creek, Chilliwack.

Chatham, Ont.

Recent building permits include: Chatham Fruit Growers' Association, 2-storey frame building, iron clad, 50 x 100, west side of Raleigh street, \$5,000; Jos. Neff, 2-storey brick building, 26 x 30, north side of McKeough avenue, \$2,000; William H. Wetsman, 2-storey brick building, 24 x 125, north side King street, \$5,000; Knights of Columbus, 2-storey brick building, 24 x 125, north side of King street, \$7,000.

Edmonton, Alta.

The following permits have been issued: Jas. Mathews, dwelling on 24th street, \$3,000; J. Goldsbury, dwelling on Kirkness street, \$2,000; K. A. Macleod, repairs to a dwelling on Macdougall avenue, \$3,500.

Halifax, N.S.

Tenders are called for new residence for A. L. Meloin on Tower road. Dumaresq & Cobb, architects.

Ottawa, Ont.

C. P. Meredith is calling for tenders for a fine residence for Hon. Sidney Fisher on Salisbury avenue. It will be of solid brick.

Nimmo and Soper will erect three more residences on Carling avenue to range in value, including lots, at \$6,800 to \$8,000.

Among the recent building permits are: Fred Hunt, dwelling, Balsam street, \$6,000; E. A. Parsons, dwelling, Ann street, R. J. Mackey, builder, \$2,800; Wm. St. George, Russell avenue, dwelling, \$3,000; R. F. Harris, Holland avenue, dwelling, \$2,500.

Souris, Man.

J. Curtain has started to build a residence.

Toronto, Ont.

W. T. Clarke will erect two residences on Dunvegan road. F. A. Wood, 47 Adelaide street east, effected the sale of the lots.

F. B. Robins, real estate dealer, has effected the sale of extensive suburban property lying south of Lake Shore road.

Vancouver, B.C.

Mr. J. A. Bealey will erect on Nelson street, between Thurlow street and Burrard street, a 32-roomed house. Estimated cost \$18,000. Architect, Mr. G. A. Horel.

Victoria, B.C.

Permit has been issued to James Moggy for a dwelling to be erected on Battery street to cost \$2,500.

Building permits have been issued to H. Bunting for a dwelling on Chamberlain street to cost \$2,500; E. Hurst, dwelling on Graham street, \$2,500.

Vancouver, B.C.

Building permits issued recently include: Akroyd & Gall, 525 Pender street, \$6,000; J. W. Parker, 1463 Eleventh avenue east, \$2,500; Vancouver Home Builders, Fifth and Macdonald, four houses, \$7,200; Vernon Bros., 2143 Broadway west, 4 houses, \$10,000; Parker & Allan, 2475 Seventh avenue west, \$3,200; C. E. Smith, 2104 Slemmin drive, four houses, \$8,000; F. Buchanan, 2436 Seventh avenue west, \$2,600; L. E. Chenier, 2406 Seventh avenue west, \$5,000; W. W. Beard, 1786 Eleventh avenue west, \$4,500; R. Stewart, 1336 Tenth avenue east, \$3,000; F. Melton, 1736 Thirteenth avenue east, four houses, \$6,400; Harvey & Dargavel, 2366 Seventh avenue west, two houses, \$6,000; D. McArthur, 1106 Fif-

teenth avenue west, \$3,200; J. Wickham, 1219 Barnard street, \$2,600; Prudential Investment Company, two houses, 2026 and 2046 Fourteenth avenue west, \$6,000; Mr. Price, dwelling, 1317 Walnut street, \$3,200.

Winnipeg, Man.

Building permits issued recently include: J. Forseng, two houses, east side of Bur-nell, \$4,400; A. Conde, house, east side of Beverly, between Notre Dame and Wellington, \$2,700; W. Hanbury, house, north side Jessie, between John and Hugo, \$2,500; E. E. Wise, two houses, north side of Rosser, between Hugo and Helen, \$4,000; Paulin-Chambers Company, stable, east side of Paulin, between Ross and Pacific, \$4,000; G. Baskin, dwelling, south side Roland and Grey, \$2,000; J. F. Parker, four dwellings, Lipton, east side, between Portage and Buell, \$10,000, dwelling, Raglan road, \$2,800; W. J. McLoughlin, dwelling, Jessie, south side, between Hugo and Helen, \$2,400; West End Realty Company, dwelling, Banning, west side, between Livinia and Einarson, \$3,000; Ernest Marsh, dwelling, north side, between Salter and Powers, \$2,000; David Jones, two dwellings, on Hetherington, south side, between John and Nasau, \$3,600; Ridley Taylor, dwelling, Dorchester, south side, \$4,000; Armstrong & Brown, dwelling, Horne, west side, \$4,000; E. W. Andrews, dwelling, Chestnut street, \$4,500; Rosedale Methodist Church, church, Beresford, \$2,500; J. Isenburg, dwelling, south side Mulvey, \$2,500, two dwellings, south side of Fleet, \$5,000; Ven. Archdeacon Scott, dwelling, north side Jessie, \$3,600; Mrs. H. B. Ketchen, dwelling, 111 Nasau and River, \$3,000; Lewis Furniture Company, warehouse, west side McGee, \$8,000; F. Lynn, dwelling, northeast corner Nasau street and Arnold avenue, \$3,000.

AWARDED.

Brandon, Man.

J. A. Twiss has been awarded contract to erect residence for E. L. Stady to cost \$6,000.

Ottawa, Ont.

The contracts have been awarded for G. L. Orme's residence at the Golf Club. A. Fahey has the masonry; E. J. Shuttleworth, the carpentering; W. J. Carson, the painting and glazing; Brooks & Davis, plastering; McCallum & Company, electrical work; M. M. O'Connell, plumbing and heating. W. E. Noffke is architect.

J. P. MacLaren has been chosen architect for remodeling C. Stratton's residence, Cooper street. John Hague has been awarded the general contract.

Business Buildings and Industrial Plants

Balfour, B.C.

The local C. P. R. officials have received the revised plans for the tourist hotel here from the company's architects in Winnipeg. Approximate cost, \$140,000.

Camrose, Alta.

The Sawyer-Massey Company have secured a site here and will build a warehouse.

Calgary, Alta.

Lang & Dowler are architects for ... R. Hall's new hotel.

Como, Que.

Hodgson's lumber mill and 400,000 feet of lumber were destroyed by fire on the 14th inst. Loss, \$50,000.

Campbellton, N.B.

The I. C. R. Board of Management has

decided on the plans for extensive new railway buildings to replace those destroyed by the fire of last July. The total cost will be about \$200,000.

Edmonton, Alta.

It is reported that the Hudson Bay Company may enlarge their store here and those in other western cities.

It is stated that the G. T. P. are considering the erection of modern hotels here and at Prince Rupert in time for the completion of the main line.

Fredericton, N.B.

We are informed that the work on the 3-storey Lanigan Factory and Tannery on York street for J. Palmer Company, Limited, will not be commenced until next spring. Materials, brick or cement; estimated cost, \$25,000. R. W. McLellan.

Granby, Que.

The sash and door factory owned by M. Bruneau was destroyed by fire on the 18th inst. Loss about \$50,000.

Grand Valley, Ont.

The McIntyre Block occupied by J. McIntyre & Sons was destroyed by fire on the 18th inst. Loss not stated.

Galt, Ont.

A by-law is being prepared to loan \$15,000 to a manufacturing concern which is willing to locate in the town.

Halifax, N.S.

On the 16th inst. fire destroyed the buildings owned and occupied by Miss Fahie, grocery, A. Adams & Company, warehouse owned by Beamish estate.

Levis, Que.

A big hotel may be erected in Levis shortly. Mr. C. M. Colmay, of New York, is interested. Estimated expenditure, \$1,000,000. Mayor Bernier.

London, Ont.

The following have taken out building permits: Mr. John Hayman, apartment house on Wellington street, \$30,000; Flavell & Silverwood, a three-storey warehouse on Bathurst street, \$11,000.

Macleod, Alta.

The C. P. R. will erect a large dining hall annex to the depot here.

Mahone Bay, N.S.

Dumaresny & Cobb are asking for tenders for a new building at Mahone Bay for the Bank of Montreal.

Moose Jaw, Sask.

A company to be known as the Moose Jaw Dairy Company, has been organized and has secured a three-quarter section within three miles of this city. Construction has been commenced on the barns, in which the most up-to-date plumbing will be installed.

Montreal, Que.

The premises occupied by McArthur, Corneille & Company, paints and oils establishment, was damaged by fire to the extent of about \$30,000 on the 16th inst.

The Royal Exchange Assurance Company has purchased property on the northwest corner of St. Francis Xavier and St. Sacrament streets, where it is understood they will erect a ten-storey building. The directors of the company include some of the leading bankers of London, Eng. Mr. Arthur Barry, Canadian manager.

J. J. Palmer, president of the Toronto Type Foundry, has completed the purchase of a site for a new warehouse which the company is to erect in this city next spring

on Hermoine street, near Craig. A six-storey structure is to be erected.

New Westminster, B.C.

The Walsh Sash & Door Factory are planning the erection of a large factory, with a capacity of 1,000 feet per day. A small sawmill will be operated in connection.

The B. C. Packers' Association, if arrangements can be made with C. P. R., will erect a large addition to the Columbia Cold Storage Plant. Mr. Geo. Cassidy, manager.

Ogemo, Sask.

The Union Bank of Canada has purchased lots here and will erect a branch shortly.

Ottawa, Ont.

A. W. Henderson, of Bruton, Somerset, Eng., has secured a site on McKay street, 100 x 155 feet, as the location for his patent saw factory.

The C. P. R. has notified the city of their project for extending its limits in the neighborhood of the Wellington street viaduct for the purpose of increasing the yard facilities and putting up new buildings. Vice-president McNicholl; Mayor, Hope-well.

The directors of Slinn-Shouldis Company, Limited, held a meeting last week, adopting the plans for the new bakery on Catharine street, and instructing James Mather, architect, to call for tenders at once.

The Bank of Hamilton has purchased 120 feet of property at the corner of Princess street and William avenue for \$75,000. It is stated the bank intends to build a handsome financial edifice upon the site next year.

W. E. Noffke, architect, is calling for tenders for the steel work in the Blackburn Building, corner of Sparks and Metcalfe streets. The present buildings are being demolished and the excavation is being done by day labor.

Building permit was issued to J. E. Taggart for solid brick office building, \$12,000.

Peter Farah sold a property on corner of York and Dalhousie streets, 137 by 246 feet, for \$40,000. He had expected to erect a commercial block on this site and it is understood that the new owner is in negotiation with a syndicate to erect such a building.

M. Landreville contemplates erecting a three-storey building, with two stores on the main floor, and flats above, on Clarence street.

Dr. J. E. Taggart will erect an office building with stores and a theatre on the ground floor, at the corner of Little Sussex and Besserer street. The estimated cost is \$12,000. The building will be 60 feet on Little Sussex, 78 feet on Besserer, and the side farthest from Little Sussex will be 100 feet. It will be erected by day labor chiefly. Weeks & Keefe are the architects.

M. C. Edey, architect, has been instructed to prepare plans for a store house and mill for the Maple Leaf Milling Company to be erected on Broad street. The building will be 148 feet by 55 feet, one storey high. The foundation will be of concrete, the front of brick and the remainder iron-clad. Tenders will be called for soon.

Port Mann, B.C.

D. McKee, of the Canadian Northern Railway, has announced that car building shops for the entire system, employing 5,000 men, will be erected here.

Penticton, B.C.

Outside capitalists are negotiating with the council for a large site on the Esplan-

ade reserve for the location of a box manufacturing company.

Port Hope, Ont.

The International Tool Steel Company, Limited, in return for civic privileges, will erect four buildings here. Estimated expenditure, \$35,000. J. E. Murphy, president; Mr. Chapman, representative. Mayor, Mr. Mulholland.

Preston, Ont.

Clare Bros. & Company intend to enlarge their factory considerably, the adjoining property having been purchased. Work may not start until next spring.

A by-law to give certain privileges to Baetz Bros., formerly of Galt, will be submitted to the ratepayers on October 10th. A large factory will be erected.

Qu'Appelle, Sask.

The Moore Milling Company will erect a flour mill to replace the one recently burnt down.

The Bulyea block, owned by P. Bears, destroyed by fire will be rebuilt.

Regina, Sask.

A permit was taken out by the National Drug & Chemical Company for their new \$25,000 warehouse. Simpkins Bros. are putting an \$18,000 addition to their store.

Stoney Mountain, Man.

L. P. Brault & Sons' store, which was burnt down, will be rebuilt.

Sarnia, Ont.

The council are in communication with Mr. F. A. Case regarding the establishment of a collar factory here. In return for civic privileges the latter will erect a building, 40 x 100 feet, and employ about 300 persons.

Sault Ste. Marie, Ont.

The directors of the Lake Superior Corporation have decided to expend the sum of \$12,000,000 during the present year on extensions to the steel plant, railway construction, as well as on the company's mines and forests.

Trenton, Ont.

The cooperage mills here were destroyed by fire on the 8th inst. Loss, \$15,000.

Toronto, Ont.

F. B. Robins, president of Robins, Limited, has purchased the corner of Victoria and Richmond streets, where he will erect a large steel and concrete building.

Permits were granted to C. S. Boone for a 2-storey brick warehouse, \$10,000; Smith Manufacturing Company, 2-storey brick factory, Campbell and Sarnia streets, \$25,000; Gelber Bros., 4-storey brick warehouse, corner Richmond and Duncan, \$30,000.

Plans are under way for the construction of a new 8-storey building on Victoria street for the Imperial Life Insurance Company. Architects, G. M. Miller & Company.

Vancouver, B.C.

T. E. Julian is the architect for the Royal Bank of Canada being erected, corner of Westminster avenue and Vancouver street. Estimated cost, \$25,000.

A permit has been granted to Mr. W. T. Whiteside for the erection of a six-storey warehouse on Water street, \$45,000.

Victoria, B.C.

Mr. C. Kocot, from Sault Ste. Marie, will erect a cooperage factory here for which the estimated expenditure will be about

(Continued on page 28)

Tenders and For Sale Department

Tenders Wanted

Separate or bulk tenders will be received by the undersigned, sealed and marked "Tender for Town Hall," until SATURDAY, 22ND OCTOBER, at 4 o'clock p.m., for the erection of a Town Hall Building in the Town of Hanover.

Plans and specifications may be seen at my office, Hanover, and at the office of Forster & Clark, architects, Owen Sound.

The lowest or any tender not necessarily accepted.

JOHN TAYLOR, Town Clerk,
Municipality of Hanover.

September 12th, 1910. 39

Tenders Wanted

Separate or bulk tenders will be received by the undersigned, sealed, and marked "Tender for Public Library," until SATURDAY, 22ND OCTOBER, at 4 o'clock p.m., for the erection of a Public Library Building in the Town of Hanover.

Plans and specifications may be seen at my office, Hanover, and at the office of W. E. Binning, architect, Imperial Bank Building, Listowel.

Tenderers to state what allowance will be made for brick building now on the premises.

The lowest or any tender not necessarily accepted.

JOHN TAYLOR, Town Clerk,
Municipality of Hanover.

September 12th, 1910. 39

Tenders Wanted

Bulk and separate tenders for all or any of the different branches of work and material required in the erection and completion of a

Bank and Office Building

to be erected in Brantford for the Imperial Bank of Canada, will be received up to 12 o'clock noon, TUESDAY, SEPTEMBER 20TH, 1910. Plans and specifications may be seen at the office of

TAYLOR & TAYLOR, Architects,
Hope Chambers, Brantford, Ont.

Lowest or any tender not necessarily accepted. 38

City of Moose Jaw, Saskatchewan

Tenders

Tenders will be received by the undersigned up to 8.30 p.m. on MONDAY, OCTOBER 10TH, for supplying (for the use of the City Fire Department), one standard combination chemical tank and hose wagon with capacity 50 gallons chemical tank and 800 feet of 2½-inch fire hose, or 40 gallons chemical tank and 1,000 feet of 2½-inch fire hose. Wagon to be fitted to carry one 20-foot extension ladder on top.

Tenderers are asked to quote prices for either 2½-inch steel or 2½-inch rubber tired Archibald wheels; also for one extra set of Archibald wheels, 1½-inch axle, 2½-inch steel or rubber tires.

Tenderers are asked to furnish detailed specifications and cut of wagon and equipment, and give price f.o.b. Moose Jaw.

The lowest or any tender not necessarily accepted.

W. F. HEAL,
City Clerk.

Moose Jaw, September 10th, 1910. 39

To Contractors

Sealed tenders, separate or bulk, will be received by the undersigned up to 12 o'clock noon on THURSDAY, 29TH INST., for the erection and completion of a Collegiate Institute Building in the Town of Smith's Falls, Ont. Plans and specifications may be seen at the office of the secretary-treasurer, Board of Education, Smith's Falls. A deposit of five per cent. must accompany each tender, or the names of two responsible persons who are willing to become sureties for the due performance of the above mentioned works.

The lowest or any tender not necessarily accepted.

DR. E. H. WICKWARE,
Chairman, Board of Education,
Smith's Falls, Ont.

39

Tenders

Church of Holy Angels St. Thomas, Ont.

Tenders will be received by the Rev. T. West, St. Thomas, Ont., until 5 o'clock on SATURDAY, OCTOBER 1ST, for the Masonry and Plastering, Carpentry and Roofing, etc., required in the erection and completion of a stone church at St. Thomas, Ont.

Plans and specifications may be seen at the office of the undersigned and also at the Roman Catholic Presbytery, St. Thomas.

Security to the extent of one-third the amount of contract will be required for the faithful performance of the work.

The lowest or any tender not necessarily accepted.

ARTHUR W. HOLMES, Architect,
10 Bloor St. E., Toronto.

39

Tenders Wanted

Town of Barrie, Ont.

Sealed tenders addressed to the Town Clerk will be received up to noon of the FIRST DAY OF OCTOBER, 1910, for the construction of main street sewers. The work will be let in four sections and tenders received for one or more sections.

Contract A.—Clapperton Street. Approximately 2,077 feet, 10-inch pipe. 5 manholes, 1 Flush Tank.

Contract B.—Small Street. Approximately 1,675 feet, 10-inch pipe, 3 manholes, 1 Flush Tank.

Contract C.—William Street. Approximately 713 feet, 8-inch pipe, 1 Manhole, 1 Flush Tank.

Contract D.—Bradford and Ross Street West. Approximately 1,738 feet, 12-inch pipe, and 746 feet, 8-inch pipe, 6 Manholes and 2 Flush Tanks.

Plans and specifications may be seen at the office of the Town Clerk, Barrie; at the office of the "Canadian Engineer," Toronto, and at the office of the engineer, Collingwood, after the 17th of September.

All tenders must be sealed and plainly marked as to the work tendered on. The lowest or any tender not necessarily accepted.

K. S. MACDONELL, THOS. BEECROFT,
39 Engineer. Barrie, Ont.

City of Prince Albert

Tenders

Sealed tenders addressed to the undersigned and marked "Tender for Pumps," will be received until noon on FRIDAY, THE 30TH DAY OF SEPTEMBER, 1910, for the supplying and erection of two (2) Centrifugal, Electrically Driven, Automatic, Control Sewage Pumps.

Specifications may be secured from the City Engineer of the City of Prince Albert.

The lowest or any tender not necessarily accepted.

C. O. DAVIDSON,
City Clerk.

Dated at Prince Albert Sask., August 31st, 1910. 39

Positions Wanted

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra.

ENGLISH ARCHITECT AND SURVEYOR of seven years' experience, will arrive in Toronto in October, and will be open to engagement as assistant. Age 25. References. Address "E. B. B.," care CONTRACT RECORD. 39

Miscellaneous

Advertisement under this heading two cents a word per insertion.

STEEL RAILS FOR SALE.—One hundred tons of steel rails, 56 pounds to yard. Will be ready for delivery early in October. Apply Box 134 CONTRACT RECORD, Toronto. 38

Business Buildings and Industrial Plants

(Continued from page 27)

\$100,000. Vancouver Island Development League was instrumental in directing his attention here.

Tenders were called on September 17th for erection of a three-storey brick buildings on Fisguard street for Lee Mong Kow and Lee's Benevolent Association. C. E. Watkins, architect.

Permit was issued to Grand Trunk Pacific for their new brick and stone ticket office, \$5,500. Architect, J. C. M. Keith; contractors, Dinsdale & Malcolm.

The Union Bank of Canada has purchased a site at the corner of Government street and Trounce avenue for a price in the neighborhood of \$150,000, on which will be erected handsome banking premises. Mr. G. H. Balfour, general manager, Mr. H. B. Shaw, assistant general manager, and Mr. F. W. S. Crispo, superintendent of western branches.

White Rock, B.C.

White Rock has been destroyed by fire. Loss estimated at \$20,000.

Woodstock, Ont.

The ratepayers carried by-laws offering inducements to the Linderman Machine Company and the Fibre Board Folding Company.

Windsor, Ont.

Plans are being prepared for the new exchange for the Bell Telephone Company

here. Site has been purchased on Goyeau street.

Winnipeg, Man.

J. Graham, of this city, will build a \$15,000 block of stores and apartments in Norwood.

It is reported that an extension will be built to Reidle's Brewery at Elmwood.

President Wm. Mackenzie is authority for the statement that the C. N. R. will begin shortly to build the proposed hotel here to cost \$2,000,000 on the corner of Water and Main streets. Pratt & Ross, architects.

The building occupied by the Manitoba Clothing Company, collapsed through the foundation giving way. Excavation next door is given as the cause. Estimated damage, \$150,000.

Tenders are called until September 26th by C. P. R. for construction of brick ice house here. Frank Lee, division engineer.

Yarmouth, N.S.

The Royal Bank of Canada has purchased a building site on Main street, where it is understood it will erect a modern four-storey building.

AWARDED.

Montreal, Que.

The contract for the construction of the new station and hotel at Place Viger has been awarded to Messrs. John Stewart & Company.

Ottawa, Ont.

Paisley & Chisholm have been awarded the contract for furnishing the inside terra cotta for the Rosenthal building. About 80,000 blocks will be required.

The contract for the Workman-Warde Building will be let this week by H. E. Matthews. Mr. Matthews, who is the architect for the Speirs-Parnell bakery, announced that that contract will be let within a few days, tenders already having been secured.

The contract for the masonry work on the basement and foundation for the Imperial Oil Company's office building on Logan avenue and Trinity street, has been let by the architect, J. H. G. Russell, to John Delman. It was expected that this building would be erected this year, but the strike and lockout decided the builders that the main building would be left over until next spring.

Riverside, B.C.

The contract for the erection of a hotel at Riverside, B.C., near Proctor, has been awarded to Messrs. C. W. Sharp & Son, Winnipeg. Cost \$150,000. W. W. Blair, architect.

Toronto, Ont.

The Dominion Bridge Company has the contract for the steel work in the erection of Hobberlin's building, corner of Richmond and Yonge streets. Total expenditure reported as \$150,000.

Vancouver, B.C.

The contract for wrecking the old building at the southwest corner of Hastings and Seymour streets and excavating for the foundations and basement of the proposed Bank of Ottawa office building on the same site, has been awarded to Campbell Bros. of this city. Work was started recently. Estimated cost, \$300,000. Tenders for the foundations and superstructure will close shortly.

Victoria, B.C.

The contract for the office building of the G. T. P. Company has been awarded to Dinsdale & Malcolm. The part of the structure below Wharf street line is to be built

of stone and of brick for the one storey above the roadway.

Permit was given to the Victoria Terminal Railway for the erection of depot and sheds on Blanchard street. Messrs. Dinsdale & Malcolm have been awarded the contract for \$17,800.

Walkerville, Ont.

The general contract for the 3-storey, 80 by 90 feet, factory for the Ford Motor Car Company, has been awarded to Wells & Gray Company, of Toronto; cost \$21,000. Albert Kahn & E. Wilby, Detroit, Mich., architects.

Winnipeg, Man.

The contract for the warehouse for the W. J. Guest Fish Company, to be built on Alexander avenue, was let this week by Jas. Chisholm & Son, architect, to Carter-Halls-Aldinger at \$18,000.

Power Plants, Electricity and Telephones

Brockville, Ont.

Tenders are being called for debentures to be issued for the light and power department.

Edmonton, Alta.

Engineer Fielding, who has been appointed by the city to investigate the Athabasca river power proposition will renew his conference with City Engineer Laternel shortly. Mr. Fielding will likely start about the 20th of the month for the scene of operations and will take with him a party of about three. It is thought that it will be possible to harness several of the falls on the Athabasca river, including Grand Rapids, Pelican Rapids, Stony Rapids and the Rap du Joli Falls. Grand Rapids is about 25 miles north of the Rap du Joli Falls, while the others are about six miles apart.

Fort Saskatchewan, Sask.

Tenders are being considered for machinery and electrical equipment for hydro-electric plant at River Sturgeon. Construction on the dam has commenced. Thos. J. Stacey, secretary-treasurer.

Rouleau, Sask.

Tenders will be received until October 1st for construction of the Adelaide telephone line from Rouleau in a northwesterly direction. Tenders will also be received for supply of material. Plans, etc., at Department of Telephones, Regina. F. R. Fitzpatrick, secretary-treasurer.

Toronto, Ont.

R. T. Fleming, manager street railway, has issued orders for the laying of rails on the streets. Work has been commenced at corner of Harbord and Ossington avenue. Estimated cost, \$30,000 per mile.

Surveyors and engineers have about completed their work of locating the best available route for part of the electric railway for the district east of Toronto. The company which is undertaking the construction of the line, secured a franchise at the last session of the Dominion House enabling it to construct a line from Brockville to Toronto. It is stated that this fall tenders for construction of the line will be called for, and even some of the work may be done before the snow comes. In the early spring it is expected work will be rapidly pressed on, and part of the line be opened in the late summer of next year.

Windsor, Ont.

See "Business Buildings."

AWARDED.

Regina, Sask.

A tender for steel switches for the new street railway was received from United

States Steel Product Company and the contract awarded to them.

Miscellaneous

Dundas, Ont.

No tenders were received for the dredging of Desjardins Canal. J. F. Armour, engineer in charge.

Montreal, Que.

The Board of Control has instructed Fire Chief Tremblay to inspect the tender from the Watrous Company for a new steam fire engine to cost \$5,300. The tender from Merriweather & Company, whose cheque, however, was not enclosed, was for \$6,500.

Recent building permits include: A. Michaud, 1259 Des Erables street, house containing six dwellings on Rachel street, \$3,000; John Allan, 354 St. Catherine street west, a four storey store building, \$33,000; Marson & Freres, Notre Dame street, three houses containing nine dwellings on Ste. Elizabeth street, \$10,000; Damien Lalonde, 1234 St. Lawrence Boulevard, three houses containing eight dwellings and one store, Dufferin street, \$6,000; D. Labelle, 796 Drolet street, house containing six dwellings, St. Georges street, \$4,000; O. Morin, Brown street, house containing four dwellings on Brown street, \$4,000; A. Levesque, 3072 Berri street, house containing two dwellings on St. Denis Boulevard, \$3,000; A. Louette, 633 Bourbonniere street, four houses containing twelve dwellings, \$12,000; H. B. Woodrow, Langueuil, a 2-storey house on Prudhomme avenue, \$5,000.

Nanaimo, B.C.

Tenders are invited for the construction of a concrete dam, two miles from the city. Particulars with City Engineer.

Truro, N.S.

A company called the Maritime Engineering Company, Limited, has been incorporated under the Nova Scotia Companies' Act, to carry on the manufacture of castings and general machinery here or at Belmont.

Toronto, Ont.

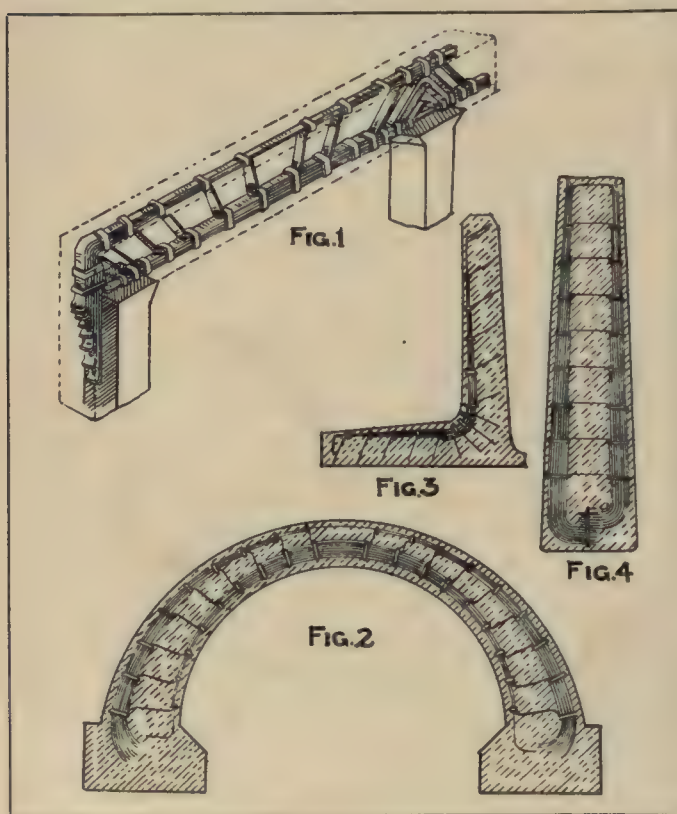
Recent building permits include: Robert Beatty, pair semi-detached 2½-sty. brick dwellings, Marmaduke, \$5,000; John Walk-ey, pair semi-detached 2-sty. brick dwellings, Halton street, \$4,000; Jas. A. Courtice, pair semi-detached 2-sty. brick dwellings, Gerrard street, \$4,000; W. E. McLaughlin, pair semi-detached 2-sty. brick dwellings, Wroxeter, \$4,000; M. B. Bentley, 2 detached 2-sty. brick dwellings, Quebec, \$4,000; J. T. Myth, 4 attached 2-sty. roughcast dwellings, brick fronts, Carlaw avenue, \$6,000; Fred Smith, 2-sty. brick dwelling, near Indian road, on Hewitt, \$4,000; H. J. Rea, 2-sty. and attic brick dwelling, Indian road, \$5,500; H. S. Mara, 5 attached 2-sty. roughcast dwellings, brick fronts, St. Helen's avenue, \$7,000; Smith & Spark, pair semi-detached 2-sty. brick dwellings, Crawford, \$4,000; Imperial Varnish & Color Company, 2-sty. concrete paint factory, Morse street, \$6,000; C. H. Dias, 2 detached 2-sty. brick dwellings, 126 Kenilworth avenue, \$5,000; D. Todd, pair semi-detached 2-sty. roughcast dwellings, brick fronts, Franklin avenue, \$4,000; J. J. Downey, 2-sty. and attic brick dwelling, Walter, \$4,000; Mrs. C. Goode, 2½ sty. brick dwelling, Whitney, \$7,000; R. Temple, pair semi-detached 2-sty. brick dwellings, and 2 detached 2-sty. and attic brick dwellings, Chicon, \$11,000; Mrs. B. M. Weaver, 4 attached 2-sty. roughcast dwellings, Northern Place, \$4,000; J. M. Walker, pair semi-detached 2½-sty. brick dwellings, Sunnyside, \$6,000; Eyre & Reid, pair semi-detached 2-sty. brick dwellings, Concord, \$5,700.

The Burrowes Patented System of Reinforcement for Concrete

This reinforcement consists essentially of the novel arrangement of a plurality of flat bars of steels, whereby the sectional area of metal is distributed in proportion to the strains to which the reinforcing member is subjected, and whereby the shear members form a continuous part with the tension members.

This reinforcement was developed with the object of having a reinforcing member which could be disposed economically in various forms of structures with scientific accuracy, to add the greatest sustaining strength to the structure, to eliminate the necessity of special machinery in the formation of the reinforcing members, to eliminate all joints in the said members, and to provide a reinforcement of cheap construction, not readily injured in the transportation.

In the attached illustration are shown, greatly exag-



gerated, views of this reinforcement applied to different constructions. Fig. 1 is a perspective view of the reinforcement adapted to a plain form of beam, extending between and over the supports shown. It is not, of course, necessary for the reinforcement to be carried over the supports into the next span as shown, but it may be found more economical or convenient to do so, where the span is short. Fig. 2 is a sectional view, showing the arrangement of the reinforcement as applied to an arch. Fig. 3 shows the arrangement for reinforcing a retaining wall. Fig. 4 is a sectional view, showing the arrangement of the steel for reinforcing concrete poles, to replace wood and steel ones on transmission lines, telegraph and telephone lines, etc.

The Siemens Dynamo Works, of London, Eng., are in correspondence with the Ottawa city authorities with a view to sending their purification expert, Dr. Frank, to the federal capital to explain the firm's system of treating water by ozone. Mr. Herbert, the Canadian re-

presentative for the company, contends that the report on the Lindsay plant was of little significance. He states that his company has installed many plants in Europe with absolute success. In view of the fact that Mr. Allen Hazen, the New York expert, is expected to report upon the whole question of Ottawa's water supply within a few weeks, it is improbable that any action will be taken at present.

Excavating in Wet Sand

Manhole excavations in wet sand are handled readily by the Commonwealth Edison Company, of Chicago, by using hand-operated well-point pumping outfits. A threaded 2-inch tee is screwed into the suction of a Goulds diaphragm pump. Attached to this tee is a 2-inch manifold pipe fitted with six 1½-inch branch pipes. Each branch carries a globe valve so it can be cut out separately. A 12-foot length of 1½-inch pipe with a Cook well point on the end of it is connected to each branch by a hose. One of these points is driven at each corner and two near the centre of the excavation. In most cases one man working the pump is able to lower the water level and keep it below the bottom of the hole. Where the amount of ground water is excessive two men work on the pump. When a job is finished the pipes carrying the well points are drawn and disconnected. The pump and manifold pipe can then be delivered on a wheelbarrow to an adjacent job, since two men can lift it readily.

The several increases in the estimated cost of the construction of the Panama canal aroused the usual run of jibes about such work always running heavier in cost after it was well started. But there will be much less comment made upon a late change in estimate. The amount of excavation needed has been increased by 7,000,000 yards, but it is expected to add this amount of work without increasing the cost over the estimate. This is possible because the work has proved to be costing less than the estimate. The engineers in their estimates, made them heavy enough to allow for unseen contingencies, and they have been fortunate in being able to carry on the work at lesser expense. They are entitled to full credit for the accomplishment. The cause for increasing the excavation is due to the facts, developed since the excavations were well along, that a greater width was necessary to avert slides of earth, upon the completed work.

A six-storey reinforced concrete building, in Boston, for the use of an automobile company, has circular columns of the same diameter in the upper and lower storeys and has a long span floor construction permitting a deep turntable well of large diameter in each storey. The exterior faces of the walls are relieved by panels and mouldings integral with the body of the wall. The front wall corresponds with the brick and stone face of an adjacent building and has a rather elaborate trimming of cornice, dentals and carved stone, all of which, except the last, are cast integral with the body of the wall. The surface of the concrete will be dressed to resemble cut stone. The window sills are large blocks of artificial stone cast at the contractors' yard.

The approximate value of buildings erected at Toronto from January 1 to August 31, 1910, was \$13,486,973. For the same period in 1909 the total was \$12,018,812. The figures for August, 1910 and 1909 were respectively \$1,713,040 and \$1,335,382.

Contract Record

ESTABLISHED 1886

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

PUBLISHED EACH WEDNESDAY BY

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto September 21, 1910

No. 38

Satisfactory Conditions Prevailing

As will be noted by the building returns from various cities, there has been no general subsidence in construction this fall. As might be expected there is a certain amount of hesitancy in regard to the preliminaries for the larger projects, but the conditions generally are satisfactory and the outlook for fall business is good. The supply market is holding its own in pretty good shape and there has been practically no indication of any slump in prices. Cement, iron, brick and other materials are holding steadily. Maintenance of the prices now obtaining will, of course, be governed greatly by temporal conditions.

A Perennial Observation

It would seem that the ultimate economy and satisfaction derived from an adequate advertisement of projected work are advantages not yet sufficiently appreciated by the average municipality. If the purpose of these advertisements is to stimulate competition for the work and to secure the completion thereof at the lowest price consistent with good workmanship, it is certainly essential that they be published well in advance so as to give everybody a chance not only to put in a figure but to put in the best figure possible after a thorough investigation of the requirements. The city of Toronto does not offend frequently in this respect, but last week an advertisement appeared calling for tenders for transformers, pole line supplies, storage batteries and motor generator sets, the same to reach the chairman of the Board of Control by September 20th. The advertisement was dated at the City Hall, September 14th, but we believe that its first insertion in a Toronto paper was on September 16th. It may be that the authorities had a pressing and unforeseen need of the supplies in ques-

tion and that they considered that they would get all the competition needed from local sources, but even in such case it seems to us that an extra week or so might have been allowed with a little foresight.

Nowadays everything depends upon competition, but especially is this true in municipal circles where everything tending towards monopoly must be discouraged. In the case of important contracts the opportunity to figure should be extended not only to American concerns—and certainly to British firms, but also to the leading European supply houses.

"Improved" Methods of Transporting Mixed Concrete

"Concrete is conveyed into place by wheel-barrows, carts, cars or buckets." This statement from a well known text book summarizes current practice with a fair degree of accuracy, says "Engineering-Contracting," our Chicago contemporary. It is interesting to note, however, that improvements in methods of transporting concrete have been recently undertaken by a number of contractors and others engaged in concrete work. Doubtless the prevailing methods named by the text book have features open to criticism. They are comparatively slow and rather expensive in labor and plant charges and, because of the runways and trestles required, are somewhat of a hindrance to other operations. On the other hand, they are adaptable to a wide range of conditions, and this cannot be truly said of the improvements that have been offered. We are reminded of these matters by a number of jobs of concrete work which have incidentally come under our personal observation where unusual methods of handling concrete from mixer to forms are being employed.

In some of the recent concrete building work in Chicago concrete has been distributed from hopper towers to floor and column forms by means of gravity chutes.

Gravity chutes obviously involve certain requirements as to elevations with which it is often inconvenient to comply and this has led to various attempts to secure means of making the concrete flow on level grade or even up-grade. The editors recall an instance some years ago where concrete was conveyed some scores of feet at nearly level grade in a temporized V-shaped trough by stationing men with shovels at intervals along the trough, these men keeping the concrete moving by "paddling." In a large building work recently noted practically the same method was employed except that, instead of men with shovels, mechanically operated paddles were used.

Briefly, the conveyor consists of four sections of V-shaped steel troughs, each about 25 feet long. Into one end of this trough the concrete is discharged from a hoist tower hopper, and from the other end of the trough it flows into the forms. The trough is supported at approximately a level grade, and above it and over its centre is supported a rod having a reciprocating motion of about 30 inches. To this rod at intervals of about 20 inches, are attached downward extending shovel blades which reach nearly to the bottom of the trough. These shovel blades are so hinged that they stand rigid during the forward stroke of the reciprocating bar, but during the return stroke will tip up and ride over the concrete. The reciprocating bar is operated by a small motor located at the hoist tower. The trough is pivoted to the hoist tower so that it can be swung over a wide area and is supported by guys from the tower and by wooden horses underneath. We are informed that with this arrangement 180 cubic yards of concrete have been placed in floor forms in 12 hours, with only four men

tending the conveyor, levelling and tamping. It will be seen that about 100 feet is the conveying distance at which this device has worked. A 7 h.p. motor was sufficient for its operation.

A conveyor of the type described is obviously restricted to grades rising only very slightly above level. For steeper runs, as most of our readers know, use has been made of belt conveyors and in a future issue we shall give some account of such a plant, accompanied by cost data. One disadvantage of belt conveyors which has been noticed on several pieces of work is the slopping over the belt edges of the concrete. This means some waste, but far the greater objection is the hardening of the slopped material about the conveyor mechanism, and on the ground or structure underneath. In one case recently observed there were series of hardened concrete cones standing as high as a man's head all along under the belt. A remedy for this was found by mixing the concrete quite dry for conveying and wetting it down at the distributing point for placing in the forms. In most cases where belt conveyors have been made for concrete the conveyor construction and operation have not been well studied out with the characteristics of the materials to be handled in mind.

Two methods of conveying concrete which seem to have been very attractive to inventors are direct pumping and propulsion by compressed air. Knowing what has been done in hydraulic dredging in pumping mud and other mixtures of water and earth it would seem reasonable to assume that concrete might be similarly handled. We have, however, never heard of its being done successfully, while we do know of several attempts which have been absolute failures. Propulsion by compressed air has met with more success, experimentally at least. We are speaking, of course, of propulsion of concrete proper; as is well known, neat cement and mortar grouts are both handled successfully by compressed air, and grout pumps or grouting machines are familiar manufactured articles.

The most notable experiments with compressed air propulsion of concrete that have come to notice, were those made a year or two ago by Messrs. G. W. Buzzell and W. H. Larkin. After several trials these gentlemen devised an iron tank having a door at the top for charging the tank with concrete, and which could afterward be closed air tight, and at the conical bottom a discharge pipe connection. In the side of the tank there was a connection for the compressed air pipe. It will be seen that this is substantially the construction of the ordinary grouting machine; the tank was charged with concrete and sealed, after which the air and discharge valves were opened and the batch forced out through the piping. A 4-inch discharge pipe was used and concrete was delivered through 400 feet of piping, having several 90 degree bends, and one 180 degree bend on a 4-foot radius. It was also delivered to a height of 100 feet above the mixer. A 1:3:5 concrete of 2-inch stone mixed wet was employed, and of various air pressures tried 50 pounds per square inch was found most efficient.

The crucial tests of any or all of these methods of conveying are their effect on the quality of the mixture and their cost. There seems to be no reason to fear that any of the methods mentioned except pumping cannot, with proper care, be made to deliver a mixture in good condition. As to cost of conveying, they all show very attractive figures. Practically, however, the gravity chuting system is the only method that has been widely employed in actual work. From the records available this can, we believe, be considered a successful method from all points of view within the limits of its working range. It is not our purpose to make comparisons,

however, as the data are not available for true comparison, but merely to point out that ways lie open for other than the common methods of handling mixed concrete, and that they offer possible means of economy.

Note and Comment

The Winnipeg Board of Control has issued special instructions that contractors doing work for the city must observe the provisions of the fair wage clause. In future, copies of pay rolls must be submitted at regular intervals to the city authorities.

Applications closed recently for the position of mayor of Magdeburg. The salary was 21,000 marks (\$5,250) a year, including the rental of a dwelling in the city hall. The German idea of making the mayoral office competitive and of filling it with one possessing knowledge and skill of a technical and professional character is one that commends itself in many ways.

The Michigan Central Railway's tunnel under the Detroit river, the construction of which was described in our last issue, was subjected to further test last week by means of running electric Mogul engines with trains of coal through the tunnel, the loads being gradually increased until a full train had gone through at the regular rate of speed. It is expected that passenger trains will be using the big twin tubes by the end of the present week.

It is instructive to note that a line of railway extension under way in the Northwest has had construction suspended—not because of the crop damage or because of adverse legislation, past, present or threatened, but because farmers had employed so many of the workmen for harvest work that it was not possible to make any progress in the work with the decimated crew remaining. It is apparent that there has been something of a crop remaining, to call for a wholesale raid upon railroad graders.

It appears that the city of Montreal will have to pay about \$12,000 for "an error in sewer construction made by an engineer in Notre Dame de Grace Ward." It seems from the explanation given that after the annexation of the above suburb it was seen that it would not be possible to complete the sewer as originally contemplated, the designer having provided for the water to flow uphill. Another bill which the city will have to discharge is one for \$2,213, expenses of *ex-officials* for trips made by them to the Legislature to prevent the annexation of Notre Dame de Grace. Montreal rate-payers certainly appear to be in a hard case.

A special rammer was recently devised in order to avoid making different kinds of concrete simultaneously for the floors and thus avoid also the danger of lamination incurred when the floor surface, in the first case, is made with special concrete on the wet body mass, or when, in the second, it is finished after the body has set. The flat surface of this rammer is deeply scored by longitudinal and transverse grooves making a series of small projections very much resembling those of an old fashioned meat pounder. The projections force the stones below the surface and flush up the mortar so that after being well rammed it is easily worked by trowels and floats to give a dense smooth surface integral with the body of the concrete.

Power Development at Hound Chute Falls

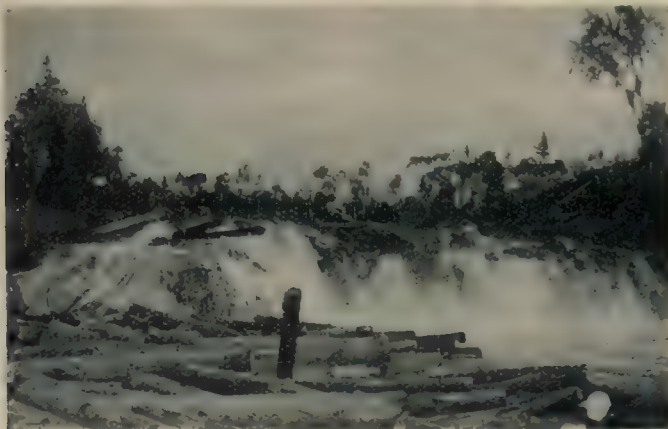
Description of the Cobalt Power Company's Hydro-Electric Plant— Constructional Details of Interest to Engineers and Contractors

The record of construction on the Cobalt Power Company's hydro electric plant at Hound Chute Falls, on the Montreal river, presents many features of interest to engineers and contractors engaged in this class of work.

The Cobalt Power Company was incorporated in December, 1906, with a capital of \$500,000, to develop power at the above named falls, on the Montreal river, approximately six miles south of Cobalt. The necessary surveys and the preparation of plans occupied a portion

capacity of the plant of 5,700 horse power at the turbine shafts, under a head of 33.4 feet. The location of the power house was on the river bank, about 1,400 feet below the head race intake.

The dam referred to above is a rock filled timber dam, 34 feet wide, 200 feet long and 27 feet high in the centre. In the river bed and on the north bank, hard rock foundation was found. The east side extends 60 feet into a clay and gravel bank. The construction of the cribs was effected in the usual manner by building them at various points along the river bank, floating them into place and sinking by means of rock, hauled



Hound Chute Falls, Montreal River



Power House under construction—intake side

of 1906 and the whole of 1907. The actual construction was not commenced until the fall of 1908.

In order to locate a proper foundation for a dam, it was necessary to take soundings in the river above the falls and also in the old river bed to ascertain its depth. The lumbering operations on the Montreal river also had to be taken into account. After a careful consideration of these and other local conditions, it was decided to construct a timber dam at the narrows, above the Hound Chute Falls, of sufficient height to raise the water level 15 feet; to cut a head race following the old river bed for a flow of 2,000 c.f.s., corresponding to a maximum

to the site from the canal and power house work. While the construction of this dam was carried out with great care, it is intended only as a temporary crib work. A concrete spillway will be erected in the near future.

Two stop log piers and concrete abutments were built at the intake for the head race. The piers are reinforced with steel rods and are anchored to rock. The tops of the piers and bottoms are 5 feet higher than the crest of the dam. The construction of this intake was completed first in order to afford protection against high water while the work was being carried on and also to facilitate repairs to the canal and power house. The



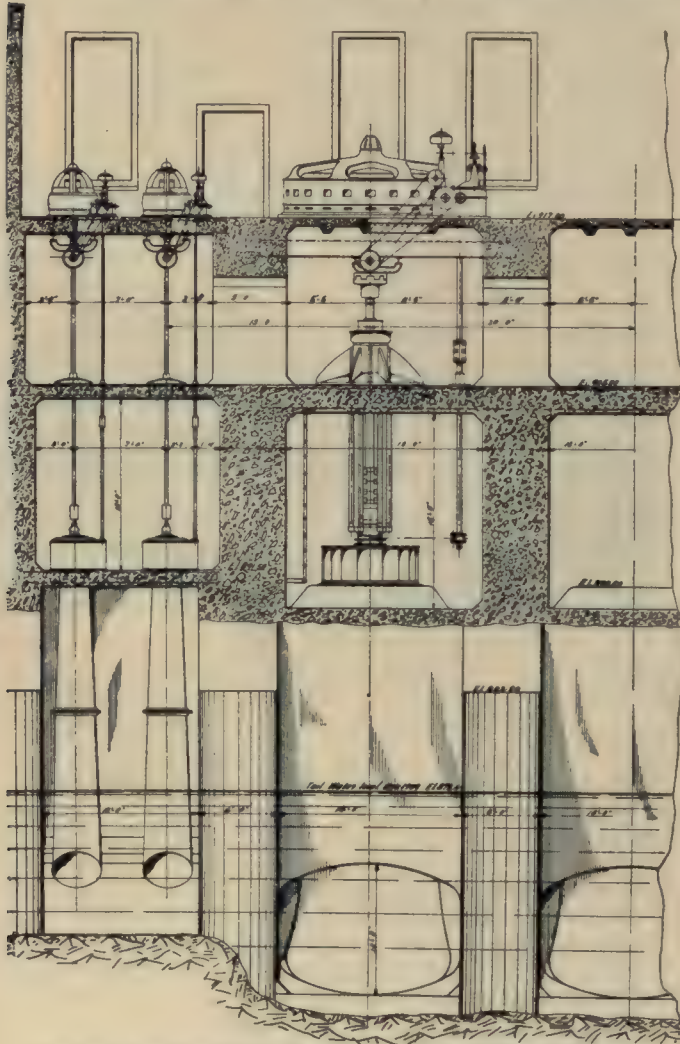
Power House of Cobalt Power Company—discharge side



Framework for Constructing Concrete Draft Tubes

piers and abutments are 16 feet apart. The area of the intake at normal water level is 67 square feet. A course rack will be put in between the piers and abutments. From the abutment core walls, rock filled cribs were built extending to rock bottom. The canal banks were protected with cribs wherever necessary. The west side of the canal being of rock, it was left in its natural state; the east side was rip-rapped 1:1. Little blasting had to be done as it was possible to follow the river bed a considerable distance.

The power house construction is illustrated herewith. The building is 130 feet long and 31 feet 6 inches

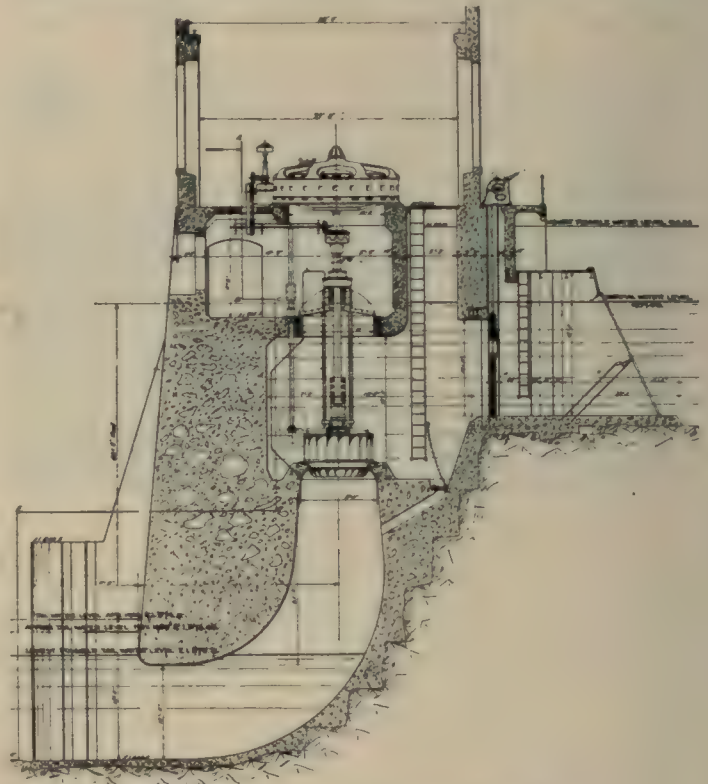


Vertical Longitudinal Section of Power House Showing Generators, Turbines and Cement Draft Tubes.

wide. It is constructed of concrete, partly reinforced, and rests on solid rock.

Vertically the power house might be divided into the following four sections, making a total of 82 feet in height; the foundation with the draft tubes, the wheel chambers, the thrust and the generator decks. The thrust deck has not been built the full width of the power house, in order to get a clear opening of 5.25 x 15 feet from the generator floor direct into the wheel chamber through which any part of the turbine may be lifted up on to the generator deck by means of the crane, without removing either the thrust deck cover or the generator. At the intake of each turbine chamber there is a gate 10 feet high by 15 feet wide with by-pass and gate lifting apparatus as well as two stop log checks. This renders the turbines very much more accessible for inspection and repair, a factor just as essential in a hydro-electric plant as the accessibility of the dynamo. Pro-

vision is also made to take care of the leakage through the intake gate by a ditch and drain pipe with valve leading into the draft tube. At the head of each intake there is the usual rack with special platform. Canal and turbine intake are connected by a large fore-bay, the bottom of which has been arranged a foot deeper than the intake. Two under flow sluices large enough to take care of all the water at low water line have been built at the south end of the power house. The calculations for the stability of the building were made by assuming the highest possible water level at elevation 915.00, a wind pressure of 25 pounds per square foot and a snow pressure on the roof of 20 pounds per square foot. It was found that the maximum compression at the piers in the tail race is 132 pounds per square inch. Further it was found that under certain conditions the intake



Vertical Cross Section of Power House

piers are subjected to tension; to take this up, they were anchored to the rock with two steel rods, 2 inches diameter, in each pier.

In the excavation for the fore bay and power house 7,600 cubic yards of rock were taken out. Six thousand cubic yards of concrete were required.

This plant, which has been in operation since April, 1910, was designed by Mr. A. Vonaesch, M.E., engineer for William Kennedy & Sons, Limited, Owen Sound. Mr. A. Gillies, B.A.Sc., was resident engineer.

The hydraulic machinery was furnished by William Kennedy & Sons, Limited, Owen Sound, and the electrical equipment by the General Electric Company, of Sweden, through Messrs. Kilmer, Pullen & Burnham, Toronto.

The Victoria, B.C., councillors did not approve of the recent action of the labor unions in urging them to give contracts to labor shops only, and so far as possible, to labor shops in the city. They thought this application an attempt on the part of the labor unions to run the council, consequently they went on record as favoring an open shop.

Materials in Use for Road Construction

Adequate Drainage Essential to Efficient and Economical Construction—Practical Directions as to the Application of Refined Tar—Its Various Advantages

By R. O. WYNNE-ROBERTS, M. Inst. C. E. London, Eng.

The materials usually employed and the conditions to be fulfilled in the construction and maintenance of roads in large towns, differ considerably from those found on rural and suburban roads, for the financial resources at the disposal of the municipal authorities of large towns enable them to use materials which are quite beyond the means of rural and suburban road authorities. In view of the extraordinary growth of rapid transit locomotion and the difficulties created thereby, the following observations will be confined to roads of the latter category.

In the first place, the satisfactory construction and maintenance of roads on wet subsoil is admittedly difficult and expensive; efficiency and economy, therefore, require that adequate drainage should be provided, for which purpose stoneware or concrete pipes are suitable. The former should be thoroughly vitrified, strong and of good form, the latter should be made of high grade air slaked Portland cement and clean hard aggregate, in correct proportions and well mixed. Reticulating drains of strong agricultural pipes or stonework should be laid to remove water from all parts of the subsoil to the main conduits.

The foundation of the road constitutes the main strength of the structure and should be built of durable stone, hand-packed and well bedded. Inasmuch as the bulk of the traffic traverses the crown of the road the foundation should be stronger there than at the sides. If heavy traction engines use the road, the thickness of the foundations should be from 9 to 12 inches at the crown, and for a width of about 12 feet to 18 feet along the centre, thinning out to about seven inches at the sides; the thickness will, of course, depend largely on the nature, the composition and the weight bearing capacity of the subsoil, and the character and magnitude of the traffic which it has to sustain.

Application of Macadam

The surface material should consist of the most durable macadam obtainable, and in this connection it may be stated that there is ample room for standardizing, for at present there is no satisfactory method of correlating the value of different kinds of macadam. Attrition tests, etc., do not always conform with the results obtained in practice. The minimum thickness of macadam on the centre of the road should be about six inches and at the sides about four inches. The macadam should be spread in thin layers and rolled dry, the interstices being well filled with small graded stones, so as to reduce the voids as much as possible; a minimum of hard grit should be thrown on to bind the whole mass.

Taking into account the disintegrating effect of high speed traffic on the roads, it is necessary to employ a bituminous binder, such as coal tar, so as to keep the macadam together, to form a coherent and resilient surface, to prevent rain percolating into the fabric of the road, and to reduce the quantity of dust produced by the traffic. Tar is one of the by-products of gas manufacture, but it is also produced in connection with coking ovens, blast furnaces, etc.; this communication, how-

ever, will in the main only deal with that produced from coal at gas works.

The writer having also had some experience as a gas engineer, is therefore acquainted with the methods of gas manufacture. The quality of the tar depends on the composition of the coals carbonized, the quantity distilled in each retort, the class of retort installed, the heat employed, methods of dehydration, etc. The constituent parts of the tar are differently grouped in each case, and it is therefore not surprising that the results obtained on road works differ so much under apparently similar circumstances. The space and time at the writer's disposal do not permit a description of the process of tar production, in detail; suffice it to state that water, light oils, and an excess of free carbon contained in crude tar have a deteriorating influence on the durability and effectiveness of its application on roads.

All crude tars retain a quantity of water in intimate admixture, and the latter increases, in most cases, in proportion as the temperature employed at the gas works is raised, and no extended period of rest will cause the same to be entirely eliminated. If, therefore, crude tar is used, it should be carefully boiled, which work entails some risk, as owing to the presence of water and free carbon, it is liable to froth over and cause trouble. When crude tar is used on roads, it is, owing to the emulsifying action of these light oils, liable to pollute the neighboring streams, but, given a period of dry, hot weather, the oils will volatilise on the road surface. Some engineers maintain that these oils are driven off by boiling in portable boilers, or kettles, but the writer submits that they are not material reduced in their proportions, except, possibly by prolonged firing, which is seldom done, owing to the loss of time and the expense.

Advantages of Refined Tar

Refined tar is superior for road works, as the water and light oils have been extracted by effective distillation. Its quality is more uniform and reliable. It will not foam over when boiled, nor will it tend to peel off dry stone surfaces if it is applied hot. It also adheres better and is more durable. If the naphthalene and anthracene, which are crystals possessing no binding properties, are also extracted and the dead oils returned to the still, the refined tar will be further improved. The tar distillers will have also extracted the most valuable and remunerative products, and thus permit the refined tar to be sold at a low rate.

The percentage of free carbon contained in the tar increases with higher temperatures of the retorts and in some modern gas works one-third of the pitch obtained by the distillation of tar consists of free carbon, which has no binding qualities necessary for road works. The specific gravity of crude tar is largely controlled by the proportion of free carbon it contains; that crude tar is thick and viscous, is therefore not a true indication of its value.

Before old road surfaces are tarred, they must be even and in good condition, and free from pot holes. The dust should be removed by energetic brushing, and the joints exposed as much as possible. The road should be

dry and warm; damp surfaces prevent the tar from adhering firmly, and cold surfaces chill the tar and reduce its penetrative powers. The drier and warmer the surface, the more it will absorb liquids, capillary attraction being probably more pronounced, and the material is hungry and thirsty.

The tar can be distributed by hand or sprayed by machine. In the former process the temperature of the tar is, perhaps, under better control, and advantage can be taken of local climatic conditions, but it is slow, whilst the machine is able to cover a large area in a minimum of time. In either case, the tar should be given ample time to soak into the surface, to assist which and also to prevent ponding and streaming, squeegees or brushes should be energetically used. The traffic should be diverted, so that the newly tarred road is not disturbed, until a durable and plastic skin has been formed.

The use of grit, dust, or chippings does not seem warranted, especially immediately after the road has been tarred, for the tar should be allowed to sink into the surface rather than be retained on the top. The sand, grit or chippings, if used at all, should be evenly and frugally spread. Tarring of roads on wet subsoil and having no efficient under-drainage is almost useless.

Tarring of newly macadamized roads is preferable, as the joints are then more open, permitting the tar to get in between the stones and thereby to become a true binder, and if the voids have been reduced by a rational proportion of small stones, the coating and metal will become more solid and the durability of the work extended.

The methods of testing the materials used on roads cannot be dealt with in a short communication, but it is nevertheless an important matter and merits a more general consideration and adoption.

The construction and maintenance of up-to-date roads require careful selection and scientific employment of suitable materials, and this desirable consummation can only be achieved by the aid of science and experience, hence the need for a fuller and more concentrated effort in this direction.

Municipal Ownership

As compared with a few years ago, little is seen in the public press of to-day concerning the matter of municipal ownership; but among municipal officials the subject is still an important one, and in individual cities it comes up from time to time as a subject of most absorbing interest. We are continually being reminded of this, says the "Municipal Journal," by receiving from time to time requests for information as to how many cities own and operate waterworks, electric light plants and other utilities, and our advice as to the desirability of such municipal ownership.

There is nothing mysterious about municipal ownership, nor should there be any difficulty in understanding when such ownership is or is not successful. The measure of such success should be in terms both of efficiency of service and of cost, the former being generally the more important. The conditions which will secure or militate against such success, however, are not so easy to understand or recognize. The too common mode of endeavoring to decide whether or not to adopt municipal ownership is to learn in how many cities it is practiced; which inquiry is too seldom supplemented by the additional one—how successful have these plants been? Seventy-four per cent. of the cities of over 30,000 population have municipal waterworks plants, according to the latest census report. Also, according to this report, less than ten per cent. of these have operated at a profit. Those who ask simply the first question would find the

evidence greatly in favor of municipal ownership. Those who ask the second also would be greatly discouraged against it if they should look no deeper than this mere statement, and make financial success the touchstone. We have always maintained that the books of a water department and its finances, including the arrangements with the other departments of the city, should be such as to show clearly whether or not the water department was operating at a profit. But in the majority of cases this is not done, and the city receives a great many benefits from the department which do not appear on the ledger. These may be in the form of public use of water for which no payment is made, low rates for private consumption, general fire protection, and possibly others, for which a private company would be paid and for which a municipal department should receive credit. Many reports of municipal plants would take on another complexion were this done.

Theoretically a municipal plant should give better service and at less cost than a private one. Better service, because the necessity of earning a dividend is not always present before the manager, and he can, for instance, lay extensions before they will be remunerative and in other ways seek the public benefit rather than the department's gain. On the financial side, the city can float bonds cheaper than a private company; should be able to obtain supplies somewhat more cheaply because being a larger purchaser, and would have certain other advantages. Practically, it is found that these advantages are largely offset if not greatly outweighed by disadvantages, the greatest of these being that of politics; others being "eight-hour" and "standard rate of wages" laws.

The incubus of politics may make itself felt either in the form of control of employees, or in a direct effort to use the plant for private gain regardless of effect upon the municipal property. No kind of public appliance can be operated successfully where the latter condition obtains; but where it is a matter only of favoritism in the employment of common labor, plants where no great amount of such labor is employed may not be fatally handicapped. Waterworks afford one illustration of this, the expenditure for common labor in these forming a comparatively small portion of the entire expense. On the other hand, in such work as street cleaning, where practically all the expense takes the form of wages, the reverse is the case, and the cost is usually much higher than would be tolerated by a contractor or other private individual.

There are, of course, other considerations affecting the decision, such as the ability of the city to raise the funds necessary for constructing a plant, the risk involved in constructing and operating it, the latitude which state and municipal laws allow the city in conducting such business operations, etc. In general, we would say that if a city government is fairly free from the dominion of politics there would seem to be no good reason why it cannot engage successfully in any public service which is to a greater or less extent a public monopoly; but that the probability of success diminishes as the apportioning of the expense of operation increases on the side of common labor and decreases on that of the skilled artisan or scientific expert.

A building by-law is in course of preparation at New Westminster and will be submitted to the city council. The by-law will probably provide for the appointment of a building inspector. The Provincial Government has given permission for a re-survey of the entire city. In the latter connection the Board of Works will secure data and report at an early meeting of the city council.

New G. T. R. Hotel and Station at Ottawa

Building up the Federal Capital—Continued Article Detailing Progress and Methods of Construction—Interesting Features of the Various Contracts

The stone work of the new Chateau Laurier, the hotel being erected by the Grand Trunk at Ottawa, will be completed in September. The building was designed and superintended by Messrs. Ross & MacFarlane, architects, Montreal, and is situated on the southwest corner of Major Hill Park, with its south side and main entrance facing the two bridges which connect Rideau street with Sparks and Wellington streets, and is directly opposite the new Grand Trunk station which is nearing completion on the south side of the bridges. The gap between the two bridges is to be closed in forming a broad plaza between the two magnificent white limestone buildings. Views of the earlier part of the construction of the Chateau Laurier appeared and were described in the February 9th, 1910, issue of the "Contract Record." The building will be fourteen storeys high, including the two extra storeys of each of the five towers and the two basements. It is about 185 feet high from the level of the railway tracks shown in the accompanying illustrations to the top of the towers. Its entire circumference is 880 feet.

The hotel will contain 350 guest's rooms, of which 230 will be supplied with baths. The equipment will be most complete in all service features and in devices for the convenience of guests.

The building consists of two wings set at an angle of about 120 degrees to a central tower of circular shape. Each of the ends of the wings and the points of intersection is finished with a tower.

The exterior of the structure on all sides is of limestone, from Bedford, Indiana, above a granite base, which stops at the sills of the windows on the main floor. The cost of the stone used in the erection of this building will reach \$250,000. All the stone comes already cut to Ottawa.

The long sloping roof is built of book tile supported on T irons, fastened to the structural part of the roof. The entire will be covered with copper.

The structure will be entirely fireproof. The floors are all reinforced concrete arches, finished in marble tile or cement. The only wooden floor is that of the ball room. The stairs are of cast iron. Three thousand tons of steel were used in the construction of the building.

The first illustration, taken on May 13th, is a view

of the west side of the building, parallel to the tracks and also to the locks which connect Rideau canal with the Ottawa river. This side is 285 feet long. The picture shows the steel work completed except the roof and towers. The concrete arches or slabs of the flooring are cast up to the eighth storey. The lower two storeys of this side have an exterior of concrete which is shown for the most part completed. When the hotel is finished this concrete work will not be visible. A promenade will run along the entire length of the hotel, level with the second floor. It will extend over all the tracks shown in the picture. It will be of steel and concrete, supported on a wall of cut stone built along the west side of the tracks and corresponding with the granite work which forms the exterior of the first two storeys for the remainder of the building. In this view a start has been made in the granite work.

The second floor, level with the bridges, will be the main floor of the building. On this floor the office and rotunda will be situated.

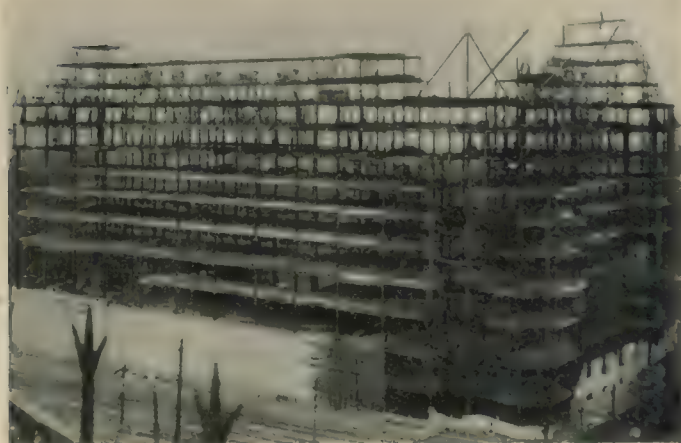
The second view, taken on July 1st, shows the stone work up to the fourth storey. The base of the bay window on the northwest tower is completed and that on the southwest tower is in course of construction.

At almost equal intervals around the steel work, derricks have been installed which facilitates prosecuting the stone work on all sides at the same time. The stone has to be hauled from the sidings on the other side of the bridges for this structure by wagons, as the tracks shown in the pictures belong to the C.P.R.

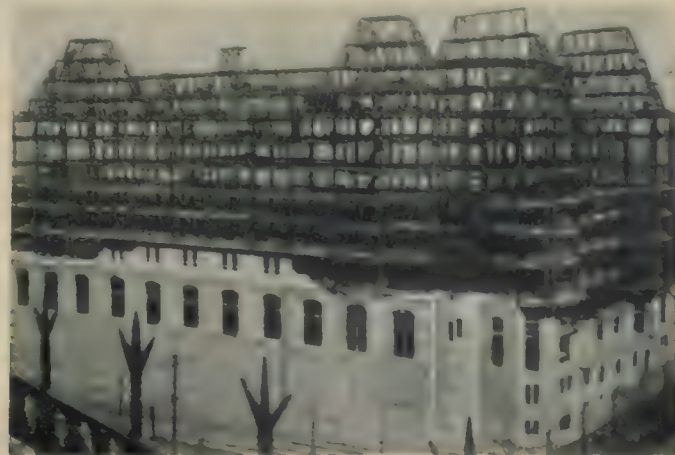
Illustration number three, taken on July 15th, shows the south side of the building and the main entrance. A loggia will extend from the main entrance of the hotel to the bridge. The stone work on the tower on the reader's right has reached the windows of the ball room. It will be noticed that stone balconies project from these windows. This side is 135 feet long. The picture gives an excellent idea of the beautiful location of the Chateau with the Parliament Buildings on the left.

The next photo (No. 4) is a sectional view of the roof, showing the complex nature of the steel work and the T irons in readiness for the roof tile.

Illustration No. 5, taken on August 26th, shows the



1—Chateau Laurier construction at Ottawa. May 13, 1910



2—Stone work up to 4th storey. July 1, 1910



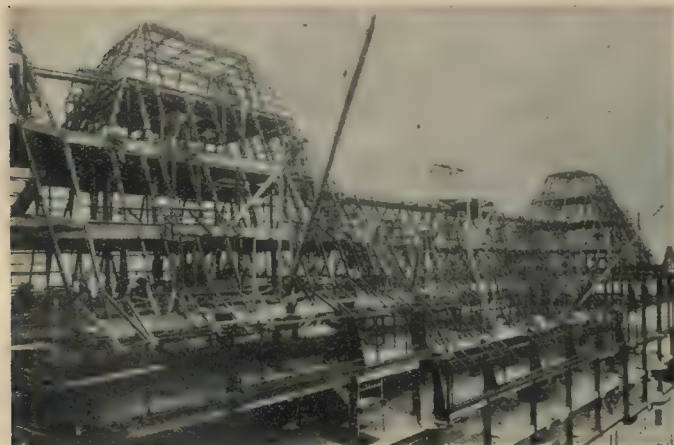
3—Progress view from south side. July 15, 1910

stone work of the south side nearly completed. The work shown in the foreground of this picture is the excavation for the pipe tunnel which starts from the power house in the rear of the station at the end of the baggage annex, and is carried under the passenger platform to the station, and from there under the basement of the station to the bridges, and through the excavation mentioned above to the Chateau. The tunnel is to conduct the electric wiring, steam pipes, water pipes, etc., from the power house to the station and hotel. There will be no boilers in the Chateau. A passage will also be constructed from the hotel, under the bridges, to the station for convenience of guests leaving or arriving on trains.

The last photograph of the Chateau work, taken Sept. 2nd, shows the stone work of the west side almost completed, including the bases of the turrets, which are architectural features of each tower, and the tops of the bay windows.

The work proceeded expeditiously all the summer, but in spite of this there has not been a serious accident to any of the employees since the excavation work first started.

The George A. Fuller Company, of New York, have



4—Section of roof, illustrating complex steel work

the general contract. E. F. Giberson & Company, of New York, are supplying the cut stone, and the C. E. Edwards Company, Ottawa, are doing the mill work. The reinforced concrete work has been entrusted to the Clinton Fireproofing Company, Limited, of Montreal, and the Dominion Bridge Company are supplying the steel. The Keystone Fireproofing Company, of New York, are supplying the fireproof partitions. McNulty Brothers, New York, are doing the metal furring and plastering. The Stanstead Granite Company, of Beebe, Que., furnished the granite and the Canada Foundry Company, of Toronto, the ornamental iron work. McFarlane & Douglas are doing the copper roofing. The plumbing will be installed by the Garth Company, Montreal.

The interior work for this hotel is selected red birch generally, excepting the ground floor and ball room,



5—Stone work on south side of Chateau Laurier nearing completion. Aug. 26, 1910

which are in quarter-cut red oak. The inside winter sash are all in three pieces, of birch and oak to match the rooms, while the doors are of a splendid design with heavy double frame mouldings and one large panel, made in five-ply to prevent warping. The outside window frames are pine with Georgia pine pulleys, stiles and patent overhead pulleys. The trim is of a very neat design and will all be assembled at the works of the W. C. Edwards Company. The mitres will all be clamped with the Universal Appliance Company's patent clamp, ensuring a perfectly tight glue joint. This clamp is claimed to be the only perfect mitre clamp on the market. It is made by the Universal Appliance Company, of Ottawa. The outside sash are all clear white pine, of special design. All the interior work of this building, with the exception of the ground floor, is



6—Stone work well advanced on west side of Chateau Laurier
Sept. 2, 1910

being supplied by the W. C. Edwards Company. The birch supplied on this contract is all cut from the company's own limits.

The total area of the reinforced concrete floors at the Chateau Laurier, for which the Clinton Fireproofing Company of Canada, Limited, Montreal, have the contract, amounted to slightly under a quarter of a million square feet. The floors were composed of cinder concrete, reinforced with metal fabric, the floor slab itself being 4 inches thick, which was carried on steel beams and girders. The whole of the structural steel beams and girders were fireproofed, so that at no point were they covered with less than 2 inches of concrete. In some cases the girders of a large span were three feet in depth. The rate of progress for putting in these floors was between 5,000 and 6,000 feet per day, until the floors which are in the roof were reached. Here



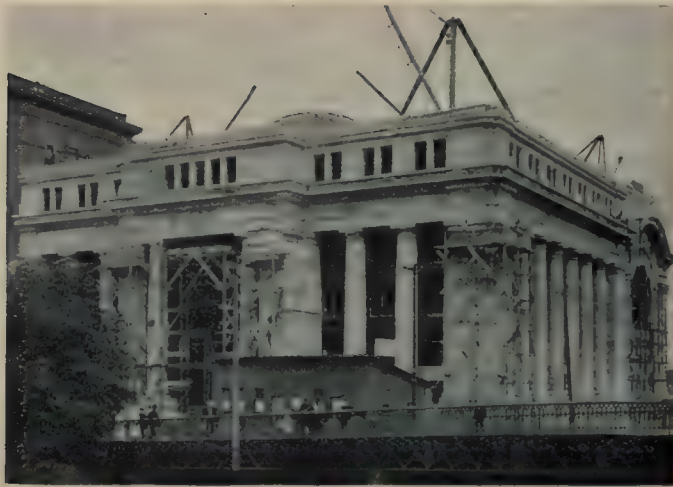
1a—Central Union Station, north side. Feb. 11, 1910.

the rate of progress was somewhat less, owing to the difficulty in setting the structural steel to keep ahead of the gang of carpenters putting in the forms for the concrete. The bulk of this contract was completed in practically two months, which is very expeditious work. Progress was facilitated by the steel work having been erected during the winter, when concreting would not have been advisable.

The ornamental iron construction throughout the building (Canada Foundry Company, Limited, Toronto, contractors), will be of the highest class, the principal stairs being executed in a fine design of wrought and cast iron. The elevator enclosures will be executed in bronze screens. The work generally will be of the same type and class of workmanship and design as has been adopted for the high class hotels in New York City.



2a—The beautiful location of the new Central Station as seen from the west side of the building. Apr. 1, 1910



3a—Constructional progress of new station. July 1, 1910.
(Compare with 1a.)

When completed, the entire equipment will be a credit to Canadian designers and manufacturers of this class of material.

A descriptive article detailing the progress of work on the G.T.R. station at Ottawa will be published in an early issue.

Central Union Station, Ottawa

The exterior work of the new central station being erected in Ottawa by the Grand Trunk Railway is almost completed and the accompanying illustrations give an excellent idea of the beauties of this fine structure of classical architecture. The earlier part of the construction of this building was described in a former issue of the "Contract Record." Ross & MacFarlane, Montreal, are the architects, and Peter Lyall & Sons the general contractors.

Illustration 1A shows the north side of the building. The columns are all completed with capitals. The piers with the exception of one are finished. The columns are 40 feet high. The picture was taken on February 11th last, showing Sappers' bridge in the foreground. It shows the main entrance and the temporary roadway from the bridge over which much materials are taken to the upper storeys. The anchors for the marquee which is to cover the main entrance are shown in place in the piers and columns near the entrance.

Illustration 2A is on the west side. The beautiful

entablature is completed and the top storey finished. The glass has been placed in the dome which supplies light for the upper storeys, which are to be used as offices. The stone used in this building and in the Chateau Laurier across the street, is the same. The baggage annex at the back of the station is shown completed.

The third photograph, taken July 1st, is the north side with the scaffolding partially removed. The fourth, taken on July 15th, shows the beginning of the steel work for the extension of the wing at the rear part of the station.

In a later issue we hope to illustrate the final stages of the work and give further interesting details in connection therewith.

A Concrete Skew Arch

The old steel bridge across the Illinois & Michigan canal at Kedzie avenue, Chicago, was recently replaced by a reinforced concrete arch having an extreme length of 140 feet, and a width of 38 feet between railings. The roadway is 24 feet wide, including a double-track street railway, and there is a sidewalk on either side. The arch has a clear span of 75 feet, a rise of 15 feet, and is built on a skew of 68 degrees 30 minutes to the general direction of the canal. The following notes concerning it are taken from a paper in the "Armour Engineer" by Mr. John C. Penn:

Four spandrel walls were built directly on the arch-ring. The outer spandrels support the cornice, railing and the outer half of the sidewalk, and the intermediate spandrels carry the curb and the inner half of the sidewalk, besides acting as a retaining wall for the fill between the walls.

Twisted bars were used for reinforcement. In the arch-ring they were spaced 12 inches apart in both the top and bottom of the concrete, and the splices were alternated by varying the length of rods. Gravel concrete mixed 1:2:4 was used for the arch and spandrel walls, while the railing, cornice and ornaments were made of a 1:2:3 mixture with roofing gravel for the aggregate. Two-inch dressed and matched lumber was used for forms.

The arch-ring was concreted in three sections, each of which contained 113 cubic yards, and 25 men completed one section in a day. The concrete was put in rather wet and all outside surfaces were spaded. Drainage through the ring was provided for by wrought iron pipes. The upper surface of the ring and the inner sides of the spandrel walls were waterproofed with Sarco materials. Wherever spading was impossible, mortar was plastered on the inside of the forms before placing the concrete. The entire railing was built in place, and all horizontal surfaces were trowel-finished. The forms were very carefully removed and all rough spots were scoured with emery bricks.

Four expansion joints were built in each spandrel wall, one on each springing line and one at each quarter point. All rods except those in the upper hand-rail were cut at the joints. During the coldest weather last winter the joints over the springing line opened a full eighth of an inch, with no apparent ill effects. The falsework at the crown of the arch was built $1\frac{1}{4}$ inches too high to allow for settlement, and the crown is now within $\frac{1}{4}$ inch of its calculated position.

In the tunnel work for the trunk sewer at Toronto several fine samples of old trees have been discovered. These trees were excellently preserved although embedded in the clay upwards of 100,000 years.



4a—Commencement of steel work for wing extension.
July 15, 1910

Instructive Data for Municipal Engineers

Extracted from the Annual Report of City Engineer Rust of Toronto —Roadways and Sidewalks— Bridge Construction and Maintenance

The annual report of the city engineer of Toronto, Mr. C. H. Rust, issued last week, contains much interesting information in regard to the work of the department.

The area of the city is 28 square miles. Altogether, Toronto has 407.57 miles of streets, of which 262.13 miles are paved and 145.44 miles unpaved. There are 118.44 miles of asphalt pavements, 45 miles of macadam roadway, 25 miles of brick and 17.71 miles of cedar block pavement. There are 397½ miles of concrete sidewalk and 50 miles of wood, besides nearly 2 miles of stone flags and 3.66 miles of brick walks. The mileage of sewers is placed at 298½. The cost of the waterworks system to date is \$7,000,000. The filtration plant at the Island will cost approximately \$750,000.

The following extract from the report of Mr. A. Stewart, assistant engineer, relating to the construction of roadways and sidewalks, will be of interest:

Roadways and Sidewalks

Asphalt Pavements—During the year there were laid a total of 86 asphalt pavements of all classes—of these 86 pavements, 41 were of the light type and 7 were heavy.

As was forecast in last year's report, a new class of asphalt pavement, known as the medium type, was introduced, and 37 were laid. It is noticeable that while the number of these pavements laid is slightly under that of the light type, the yardage is largely in excess, and consequently the necessity of such a pavement is evident. The total yardage laid was 230,657 square yards, of which 49,139 square yards was of the heavy type having 2-inch asphalt surface, 1-inch binder course, and 6-inch concrete foundation; 69,179 square yards of light pavement composed of 2-inch asphalt surface, and 4-inch concrete base; 110,743 square yards of medium asphalt pavement, having 2-inch asphalt surface, 1-inch binder, and 5-inch concrete base.

In several cases where brick pavements have been down for a number of years, the residents preferring a less noisy pavement, have petitioned to have the bricks surfaced with asphalt. During the past year, the brick pavement was so treated, an asphalt surface consisting of 2 inches of asphalt, and 1 inch of binder being laid. This work was not necessitated by any disintegration of the original pavement, but was done expressly at the request of the property owners, who signified their willingness to pay for the asphalt surface. As the results have, as was expected, been good, it is probable that ratepayers, who live on other residence streets paved with brick, will take the same view of the matter, and have an asphalt surface laid.

The above yardage represents a total mileage of 15.411 miles, as against 21.031 miles laid during 1908.

Asphalt Block Pavement—There were constructed during the year, 11 asphalt block pavements, having a total yardage of 34,018 square yards, which is a large increase over the 9,469 square yards laid in 1908. Of the 11 pavements laid, 10 were composed of 3-inch blocks on 4-inch concrete base, and the remaining one was of 4-inch blocks on 6-inch concrete base. The above yardage represents a mileage of 2.334 miles.

The growth of this pavement is due solely to the activity of the agents of the company manufacturing the blocks, who circulate petitions among the property owners, and in the event of these petitions being sufficiently signed, it is recommended to council that the pavement be laid.

Below is found a table, brought to date, showing a comparison between the maximum, minimum and average prices for asphalt pavements, from 1901 to 1909.

		Maximum.	Minimum.	Average.
1901	Heavy	\$2.70	\$2.30	\$2.54 6/10
"	Light	2.23	1.88	2.04 1/2
1902	Heavy	2.60	2.45	2.54
"	Light	2.15	1.66	2.01 1/4
1903	Heavy	2.50	2.14	2.21 3/5
"	Light	1.88	1.60	1.70
1904	Heavy	2.30	2.15	2.22 6/10
"	Light	1.83	1.53	1.65
1905	Heavy	2.19	1.99	2.05
"	Light	1.66	1.36	1.51
1906	Heavy	2.01	1.79	1.91 4/5
"	Light	1.64	1.38	1.42 2/5
1907	Heavy	2.27	2.14	.219
"	Light	1.83	1.50	1.62
1908	Heavy	2.33	1.92	2.15 2/3
"	Light	1.96	1.33	1.51 2/5
1909	Heavy	1.95	1.59	1.72 2/3
"	Medium	1.80	1.40	1.60
"	Light	1.44	1.12	1.28

The extremely low prices shown for the past year were brought about rather by the keen competition existing among the contractors, than by a reduction in the actual cost of the pavement. As it is impossible for contractors to lay asphalt pavements at these prices and make a reasonable profit, it is not probable that the city will again obtain so durable a pavement at such a small cost.

Brick Pavements—During the year 9 brick pavements, and 10 vitrified block pavements were laid, aggregating 8,588 square yards, and 12,653 square yards respectively, or a total of 21,241 square yards. This is a decrease of 95.07 square yards from the amount laid last year, and is due to the prejudice in the minds of the public against the pavement on account of the noisiness and not to any lack of merit in the material.

The above yardage represents a total mileage of 1.611 miles, and the amount of concrete curbing laid in conjunction with this class of pavement was 12,188 lineal feet.

The quality of the blocks as determined by the standard abrasion test is indicated by the following ratio:

Canadian	(after 2,000 revols.),	21.7 p.c. loss in weight.
American	(after 1,000 revols.),	9.3 p.c. loss in weight.
Canadian	(after 1,000 revols.),	13.6 p.c. loss in weight.
American	(after 2,000 revols.),	14 p.c. loss in weight.

Track Allowance Construction and Reconstruction

During the past year eight new track allowances were constructed and eleven old ones reconstructed aggregating respectively 3.118 miles, and 7.070 miles.

All the new work consisted of a 12-inch concrete base with inset steel ties. This form of construction while giving good satisfaction is very noisy owing to the great rigidity of the foundation. It is the intention, during the coming season, to modify this, if possible, by the use of wooden ties or wooden blocks, embedded in the concrete.

Bitulithic Pavements—A total of 33 bitulithic pavements were constructed during the past year, the yardage laid amounting to 73,775 square yards. This yardage represents a

mileage of 5.001 miles and is very close to the amount laid during 1908.

It is proposed to lay a bitulithic surface on an old macadam roadway after the surface has been properly graded. If this pavement proves a success, it is possible that more of this class of work will be done. As far as can be seen at the present time, there is no reason why such a pavement should not give as good satisfaction as the earlier bitulithics, particularly as the macadam, which will furnish the foundation, has been thoroughly compacted by years of passing travel.

Macadam Roadways—The macadam roadway construction carried out this year shows a decrease from last year's work; only 2 roadways totalling 1,170 square yards, or .086 miles, were laid.

The shrinkage in the amount of this class of work is to be noted with satisfaction, as macadam, while being the most suitable type under certain conditions, is not desirable for city streets, owing to the dust and mud which it creates.

456 lineal feet of concrete curbing were laid in conjunction with macadam roadways, during 1909.

Standard Specifications for Bridges

More bridge work was carried out during the year than ever before in a similar period of the city's history. This department is in charge of Mr. R. E. Chadwick. During the year complete standard specifications for bridges have been prepared. While these will necessarily have to be revised from time to time, they will ensure a uniform system of loading and a uniform standard of workmanship for all city bridges. The specifications classify bridges according to loading as follows:

Class A.—Highway bridges with electric railway tracks.

Class B.—Highway bridges without electric railway tracks.

Class C.—Electric railway bridges.

Class D.—Foot bridges.

The loading finally adopted after considerable study of the class of traffic to be carried, and after consultation with the various standard bridge specifications, was briefly as follows:

For electric railway tracks, 40-ton cars with an allowance for impact on the floor system equal to the difference between the live and dead loads for members carrying single track, or one-half this amount for members carrying double tracks. On main trusses this is reduced to a uniform load varying from 2,250 to 1,400 pounds per lineal foot according to the span. For other parts of the structure, a 20-ton road roller for the floor system, with uniform loads for trusses varying from 135 to 80 pounds per square foot according to span. Foot bridges and sidewalks are figured for live loads varying from 100 to 40 pounds per square foot.

The loading specified, with the exception of street railway tracks, is about equivalent to Cooper's Class A1 and A2, or the Dominion Government Class 1 for highway bridges. Considering impact, the loading on street railway tracks would give about the same sections as Cooper's specifications, but would exceed the Dominion Government specifications by the amount of the impact. Actual tests carried out on the Dundas street bridge show that bridges carrying this class of traffic are subjected to considerably more impact than is generally supposed. In the case of badly maintained track, the impact on the floor members was shown to be as high as 100 per cent. of the live load for speeds of 15 miles per hour.

As regards unit stresses and details of construction, the city specifications are equal to the best practice prevailing in highway bridge construction, and are inferior to the most modern railway bridge specifications only in a few minor details. The unit stresses in timber, while higher than those usually specified, are in accordance with the latest recommendations of the American Railway Engineering and Maintenance of Way Association.

Lansdowne Avenue Subway—The new subway on Lansdowne avenue, under the tracks of the Grand Trunk Railway

and the Canadian Pacific Railway, has a total length of 900 feet, including the approaches. Eight tracks are carried across the street on through plate girder bridges, four of these being Canadian Pacific and four Grand Trunk. All the bridges are of the through plate girder type, those of the C.P.R. having a solid steel floor of 7/16-inch plate carried on transverse 18-inch 55-pound I-beams spaced 18-inch centres. The Grand Trunk bridges have wooden ties covered with 3-inch plank. These bridges were figured and designed in accordance with the C.P.R. specifications and Cooper's specifications, respectively. The retaining walls are of monolithic concrete construction resting on fine sand.

The total cost of the subway (exclusive of property damages), was \$119,778.98, as follows:

Excavation and substructure	\$49,115.54
Steel	54,517.71
Shoring tracks and maintaining traffic, sewers, pavements	14,942.15
Sundries	1,203.58

The Godson Contracting Company, Toronto, were the contractors for the substructure, and the Cleveland Bridge & Engineering Company, of Darlington, Eng., for the superstructure.

Harbord street bridge—A reinforced concrete arch has been built on the extension of Harbord street crossing over Beatrice street. It has a clear span of 34 feet 6 inches, and a clear height of 23 feet over the proposed grade of Beatrice street. The width is 54 feet clear between the parapet railings. The arch is full centered, 15 inches thick at the crown, and is reinforced with 3/4-inch round rods spaced 12 inches centres. The retaining walls are 24 inches thick, heavily reinforced with square twisted rods and braced as counterforts at 9-foot centres.

An extremely satisfactory foundation was secured which considerably reduced the cost of the work, so that it will be completed well below the contract price. Borings taken at the site showed about 4 feet of brown clay and 10 to 20 feet of hard blue clay. Under this is a stratum of fine sand. The original plans provided for piles under both footings of the arch, but these were found to be unnecessary, except at the south corner of the east abutment, where an old well excavation was encountered. A total of \$1,368.02 was saved on this account.

The General Contracting Company, Limited, of Toronto, were the contractors for this work, the contract price being \$14,440.

Maintenance and Inspection of Bridges

Considerable attention has been paid during the past year to the cleaning and painting of the steel bridges. A number show serious corrosion, those crossing over railway tracks especially. Excessive corrosion is also evident on all the bridges crossing over the River Don, possibly on account of the gases from the large quantity of sewage carried by the river. A notable example of this is the Queen street bridge, in which some of the lower chord angles have lost 50 per cent. of their cross sectional area in ten years.

In all, five steel bridges were cleaned and painted during the year, viz.: Eastern avenue, Gerrard street, Hallam's bridge, Lakeshore Road bridge and Huntley street. The railing only on the North Glen Road bridge was painted. Two wooden bridges were painted, viz.: Crawford street and Winchester street.

Sherwin-Williams' metalastic black paint (graphite) was used on most of the work. Hallam's bridge was painted with Canada Paint Company's grey graphite. Both of these paints have good covering capacity, and were satisfactory in all respects.

"Carbonizing coating," manufactured by the Goheen Manufacturing Company, Canton, Ohio, was used on the Eastern avenue bridge with excellent results. The paint has good

covering capacity and lasting qualities if applied in warm weather. This is, however, offset somewhat by the high price.

Canada Paint Company's "G.T.P. Magnetic" paint was used on North Glen Road bridge, but is not satisfactory for a finishing coat as the surface is rough.

"Elaterite," manufactured by the Elaterite Paint & Manufacturing Company of Des Moines, Iowa, was used on the west approach spans of the Gerrard street bridge. The resulting finish is good, but the paint lacks covering capacity, and on account of its sticky nature is very expensive to apply.

With the constantly increasing cost of lumber, I would recommend that concrete be used for flooring on all new bridges that are built. Taking the figures for the past ten years, the top wearing course on the wooden bridge floors (2-inch red pine) has a life of 2.58 years, and in all cases fails by wearing through. The lower course of planking (3-inch red pine), and the joists fail by rotting after an average life of 8.5 years. Based on these figures the annual cost of maintenance of bridge floors would be 5.60 cents per square foot, equivalent to a depreciation of 17.78 per cent., all figures being based on present prices of labor and material.

On September 25th a serious break was discovered in the Queen street bridge, the lower chord at the west end of the south truss being found broken through. Fortunately the

test of the broken chord. The tensile stress tests were good, being up to standard practice. The bending tests on flat pieces cut from the angles were satisfactory, but the angles themselves cracked after bending 40 degrees. Chemical analysis showed the material to be Bessemer steel with about 0.1 per cent. of both sulphur and phosphorus. There is no doubt that the high sulphur and phosphorus was the cause of any brittleness there may have been in the steel.

Main Drainage Works

A very complete report is submitted by Mr. A. C. D. Blanchard in connection with the work of the above department. Mr. Blanchard gives interesting details of the work carried out on the high level intercepting sewer described and illustrated in the December 15, 1909, issue of the "Contract Record." We hope to publish a further account of this construction at an early date. Excellent results have been secured by Mr. Blanchard in the bids received for work under contract, on account of extensive advertisement which is stated to have resulted in wide competition and a large saving to the city. Contracts have been awarded to competent contractors with excellent results as regards quality and progress.

Canadian Railroad Development

A meeting will be held in the near future to complete the financial reorganization of the Brockville & Westport Railway and the Marmora short lines, extending from the C.P.R., near Ivanhoe, to the iron mines. These two roads have been purchased by the Canadian Northern.

The Canadian Northern Railway has formally taken over the Bancroft & Irondale and Central Ontario Railway. The Irondale & Bancroft road is 50 miles long, and extends from Kinmount Junction to Bancroft, where the Central Ontario line runs from Picton to Maynooth, a distance of 132 miles. A stretch of 34 miles more, from Maynooth to Whitney, is now under construction.

As a result of the purchase of the Bay of Quinto Railway by the Canadian Northern Railway it is said that the construction of the Ottawa and of the Toronto-Ottawa line will be commenced at an early date. This will mean that the Canadian Northern line between Ottawa and Toronto will be completed several months earlier than was anticipated, and will be in operation not later than the fall of 1911.

Advices from Vancouver, B.C., state that another contract for the extension of the Kettle Valley Railway line from Rock Creek to Bull Creek on the west fork of the Kettle river, a distance of 35 miles, has been awarded to L. M. Rice & Company, of Vancouver and Seattle, Wash. Grading has already been completed from Midway west for 10 miles and construction work will be started within three weeks. The building of a 25-mile section of the same road from Merritt south through the Nicola Valley is now in progress. The company has authority to extend its line from a point south of Merritt across the Hope Mountains to Ruby Creek, below Hope. At Ruby Creek, after bridging the Fraser river, connection will be established with the Canadian Pacific Railway, whose tracks it already connects with the Midway and Merritt. The distance from Midway to Ruby Creek is about 271 miles. By means of its connections the Kettle Valley route will afford as direct a line between the coast and the Kootenays as the V. V. & E. Railway.

Sir Robert Perks, the British contractor, interested in the construction of the proposed dry docks at Levis and St. John, and the Georgian Bay canal project, arrived in Ottawa last Thursday, and interviewed the Minister of Public Works and other members of the Government, principally with reference to plans for dry docks. It is probable that nothing will be done for a year or so yet by the Government towards the construction of the Georgian Bay Canal.



Broken Chord, Queen Street Bridge, Toronto.

bridge did not collapse, probably on account of the stiffness of the upper chord and end post connection, aided by the arching effect of the whole chord and the connections of the buckled plate floor.

The broken chord was of box section, composed of four 5-inch x 3½-inch x ½-inch angles latticed, all of which broke through the rivet holes of the lattice bars.

The bridge was jacked up at the first two panels from a temporary crib built in the river, and a new chord was built and riveted in place. This work was done jointly by the Canada Foundry Company, Limited, and our own men in the remarkably short time of 46 hours from the time the work was commenced until the bridge was opened for traffic, jacked up at the two panel points with the new chord bolted in place.

The fracture was probably caused by temperature stresses, since the rollers were badly rusted, and it would require a considerable force to move them. From the dead load, the chord would have a tensile stress of 150,000 pounds in all, or 9,375 pounds per square inch. Figuring the live load at 75 pounds per square foot, the stress from this would be 4,690 pounds per square inch. This would not be sufficient to rupture the member.

The Canadian Inspection Company made a very complete

Vancouver and Coast Correspondence

Latest Returns Show Unabated Activity in Trade—Stability of Supply Market a Feature of the Situation—Current News

Vancouver Office of "Contract Record."
September 14th, 1910.

Already over \$200,000 ahead of the building permits total for last year, and with the greater part of four months yet to go, 1910 bids fair to surpass the records of other years by 50 per cent. The grand total for the first eight months of this year, as made up by the Building Inspector to Sept. 1st, amounted to \$8,745,235, as against \$7,270,645 for the full twelve months of the year previous. The total for the month of August was \$745,235, which is considered a very good mark for a month not generally classed among the busy ones in the Building Inspector's office.

The city statistics for August indicate a healthy tone in all departments. Not in a single item has there been a falling off, the increases in bank clearings and land registry receipts, customs and other good barometers of material progress being all in the neighborhood of 50 per cent. or over.

The land registry office receipts for August were \$15,024.51, showing a slight gain over July. The returns for August, 1909, were \$11,037.65, showing that the real estate business has been active despite the tendency of many owners to refuse tempting offers in the expectation of getting double a year hence.

The general state of trade is best indicated by the bank clearings, last month showing an approximate increase of 50 per cent. over August, 1909, and being considerably more than double the figures for 1908. August, 1910, \$36,533,143; August, 1909, \$24,969,077; August, 1908, \$15,483,153.

The customs receipts for August also constituted a record, being \$20,000 ahead of June last, the best previous month, and about \$200,000 in excess of the receipts for August, 1909.

Building Activity is Unabated

The leading city contractors unite in pronouncing this the busiest season ever. All of them are crowded with orders, and strenuous efforts are being made to get the contracts in hand finished up or at least closed in before the coming of the fall rains. The influx of newcomers into the city has caused a tremendous demand for houses to rent, and this has been further aggravated by the return to the city of hundreds of families from summer homes and camping resorts. Many of these people rented their homes furnished for three or four months, and the occupants now have to seek new quarters. As an indication of the number of new citizens to be accommodated, we may state that the customs authorities have inspected the household effects of almost 5,000 Seattle and San Francisco people who have removed to Vancouver within the past eight months.

The scarcity of houses for rental is due to the fact that up to the present no large company has made a specialty of erecting homes. They have confined their energies to the more profitable department of real estate transactions. As a result 90 per cent. of the building has been carried on by small contractors who—being hampered for means—make it their aim to sell as soon as the roof is on, and generally succeed. Many newcomers, however, even if possessed of the necessary means, prefer to defer the purchase of a home until they have had time to get acquainted with the city. This accounts for much of the congestion.

In connection with the scarcity of homes, it is pleasing to note that at least one company has risen to the occasion and has mapped out an ambitious building programme. The Pru-

dential Builders, Ltd., have purchased six blocks bounded by Thirteenth and Sixteenth avenue, Cypress street and the Lulu Island Railway, south of Shaughnessy Heights, in West Fairview, and will erect 75 residences, costing from \$3,500 to \$5,000 as soon as possible. The tract contains 105 lots, and the company have engaged a landscape engineer to lay out boulevards, and otherwise improve the property. The company will prosecute their building operations all winter. They aim to have fifty residences erected by the coming of spring.

Architects and contractors report that satisfactory progress has been made of late on all buildings in hand, there being an ample supply of materials and no shortage of men in any department.

Prices of Building Materials

(Delivered on Job)

Building paper, tarred, per roll, 90 cents.
Building paper, plain, per roll, 70 cents.
Bricks, common, per 1,000, \$13.
Bricks, pressed, per 1,000, \$40 to \$62.
Cement (Vancouver), per barrel, \$3.10.
Roofing felt, per 100 pounds, \$2.45.
Fire brick (Scotch), per 1,000, \$45.
Fire brick, small quantities, \$48.
Lime, per barrel, \$1.35.
Sewer pipe, per foot, 4-inch, 16c.; 6-inch, 33c.
Plaster of paris, per ton, \$18.50.
Putty, per pound, 5 cents.
Tar, 4-gallon tin, \$1.25; per barrel, \$8.50.
Hard wall plaster, per ton, \$17.50.
Nails, base, \$3.25.
Nails, cut, \$4.25.
Mixed paint, gallon, \$2; ½-gallon, \$1.10; quart, 60c.
Boiled linseed oil, gal., \$1.40; barrel lots, per gal., \$1.20.
White lead (genuine), 100 pounds, \$8.
White lead, N. 1, per 100 pounds, \$7.50.
Varnishes, furniture, 80c., \$1; hard oil, \$1.75; elastico-oak, \$2; elastico-floor, \$3.25.
Sash cord, per pound, 50 cents.
Sash weights, per 100 pounds, \$2.50.
Tacoma hair fibre, per ton, \$18 (including sacks).
Fire clay, per ton, \$20.
Plate glass (35 per cent. off local tariff).
Sheet glass (10 per cent. off local tariff).
Expanded metal lath (Hays'), 27 cents per square yard; Her-ringbone lath, 17 cents per square yard.
Ready roofing (Cendor brand), ½ ply, \$2.25; 1 ply, \$2.65; 2 ply, \$3.40; Malthoid, 1 ply, \$2.50; 2 ply, \$3.50; 3 ply, \$4.50.
Hexagon floor tiling, average 60 cents per square foot.
Wall tiling, average 65 cents per square foot.
Turpentine, per case, \$10.
Resin, per pound, 5 cents.
Elephant lead, per 100 pounds, \$8.

Lack of Loyalty to Canadian Contractors

Much dissatisfaction prevails among architects and builders at the quantity of work that is being given to outsiders. Several of the large business premises in course of erection are in the hands of firms from the States, and the local men contend that, given the same consideration and facilities, the work could have been done here as well if not better. The methods adopted by Americans to get an order can hardly be

followed here. Plans of buildings and photos of the premises in course of construction are submitted to intending investors, and statements made showing terrific speed in building, but it is never mentioned that all preparations were made months previously, and all material was on the job before the record piece of work was started. One case is instanced where a local firm lost \$100,000 on a contract of this kind.

Imperial Steel Car Company's Important Plans

All eyes in the railroad and financial world to-day are centered on the developments in Vancouver of the Imperial Steel Car Company, which proposes to revolutionize the building of private and sleeping cars for the travelling public.

Among the improvements that the Imperial steel car will have over competitors are its ventilation, dust and fireproof, non-telescopic, and hotel equipment at each berth, all of which will be at the regulation of the passenger, without the interference of or hindrance to others. Baths will be at the disposal of travellers, and an ice receptacle and a steel safe under the seats of each section will serve to fill a long-felt want. While en route on the cars all the luxuries of a first class hotel or club can be indulged in without entailing any more cost than is at present in vogue on the transcontinental lines. Storage batteries will be placed in each car to maintain heat and light regardless of the connection of the engine. Numerous other factors in favor of the new car make the company look a healthy contender for the future building of rolling stock.

Will Establish Model Town

The company has acquired 800 acres, with two miles of waterfrontage, on the north arm of Burrard Inlet, about five miles from Vancouver postoffice. Here it is proposed to establish the town of Rosslyn, surrounding the big plant to be located on a 30-acre site on the waterfront. Two eminent engineers have been engaged to lay out the town in the most modern manner; the plan will be circular, every street ending at the centre or hub, while the streets will be wide and the lots large. The new million dollar high level steel bridge soon to be proceeded with will give easy communication with Vancouver.

In addition to their steel car industry it is the intention of the company to put in a plant and manufacture its own steel. They will also establish a mammoth dry dock to comply with Dominion Government conditions, so as to earn a bonus of 3½ per cent. on the \$4,000,000 cost for 35 years.

Vancouver Aldermen Favor Automatic Phones

The business men of this progressive city are just at present at sixes and sevens over the action to be taken in respect of the following pertinent resolution, adopted at a recent meeting of the civic finance committee:

"In the opinion of this committee the present telephone service is unsatisfactory. We recommend that the British Columbia Telephone Company be given 30 days to decide as to the adoption of an automatic system. In the event of their failing to act in the matter, the city to take steps to allow a competing system to be installed."

The above ultimatum to the present company had its origin in the frequent complaints made by citizens as to the inefficiency of the present system, the decisive action having been hastened by a visit paid recently by the members of the committee to Bellingham, Wash., to inspect the automatic telephone system in use there, and by the application of New York capitalists for a franchise. Their representative, Mr. Woodworth, claimed that the service of the automatic system was far superior to the manual service, and presented letters from numerous cities in support of this contention. It was argued also by other speakers that the charges for the present telephone service were exorbitant on account of the increasing rates as the distance from the central station increased, and the statement was made that the plan now

under way of establishing sub-stations would lengthen the time occupied in replying to a call. For the new company Mr. Woodworth claimed lower rates, an up-to-date service and absolute privacy of communication. Where the two systems had been installed in the same city better service had been given by both concerns because of competition.

Since the passage of the resolution cited at the beginning of this article, various bodies of business men have met and drafted resolutions protesting against a dual service on the score of the increased cost. These will be considered at a meeting of council called to receive the recommendation of the finance committee.

News Notes of Interest

Victoria's building permits for the year are expected to exceed the two million mark for the first time on record. Things are healthy at the capital—politically and otherwise.

The Grand Trunk Pacific Railway Company has acquired over two acres of land on Government, Belleville and Elliott streets, Victoria, facing the Parliament Buildings, on which will be erected a first class hotel as part of the transcontinental system. The site cost \$291,000.

Fort George is to have a court house, registry office, jail, and other public buildings.

While the tax rate of the city of Nelson for 1910 has been fixed at 45 mills, it is claimed that this is deceptive inasmuch as the assessment is low. If this be true, the Board of Trade should take prompt steps to bring about a change. It will do the city no good to be tagged up with such a rate in the eastern papers.

Work has been commenced on the foundations for the 18-storey home of the Vancouver "World," on the corner of Pender and Beatty streets. It will be one of the model newspaper buildings of the continent.

Mr. G. H. Bryson, formerly assistant city engineer of Victoria, who recently resigned, has entered the employ of the Worswick Paving Company of that city. Thos. Donovan, foreman on paving work for the city, has been appointed superintendent of all outside work, the aim of City Engineer Smith being to place local men in charge of the works wherever possible.

A recent amendment to the Victoria, B.C., building by-law makes it compulsory that shingles on all buildings within the fire limits be laid in mortar or over asbestos paper.

Two hard working city officials, Building Inspector Jarrett and Chief Electrician McCrossan, are now comfortably located in larger quarters on the upper floor of the city hall. The business handled by these two departments is growing at a tremendous rate.

L. M. Rice & Company, contractors, of Vancouver and Seattle, have been awarded a contract to extend the Kettle Valley Railway line from Rock Creek to Bull Creek, on the west fork of Kettle river, a distance of 35 miles. Twenty-five miles of the same road from Merritt south through Nicola Valley is now in progress.

The Board of Park Commissioners for Vancouver has declared against the granting of a franchise to any company to construct a tram line around Stanley Park, believing it in the interest of the citizens of Vancouver to own and control all transportation in the park. The application and consequent discussion will, however, lead to the institution of some cheap mode of conveyance by auto bus or otherwise, in the interest of working people.

Tenders will shortly be invited by the British Columbia Electric Railway Company for an addition to their main station on Westminster avenue and a new sub-station on 24th avenue, in Point Grey Municipality. The erection of the proposed new tram station at the corner of Hastings street and Carrall avenue, has been postponed until next year owing

to the immense amount of work under way on various sections of the system.

The new cement plant at Princeton, B.C., is being rushed to completion, and the management hope to be able to supply the trade by the beginning of the year. The plant will cost \$250,000, and the output will be 1,000 barrels per day.

Work has been commenced on the new wire nail factory to be erected on Lulu Island water frontage, about half a mile south of New Westminster, by G. W. Laidlaw, formerly of Campbelltown, Ont. Wire nails and fencing will be manufactured, and later on a galvanizing plant will be added. There is an excellent opening for the industry, the Vancouver factory being unable to supply the large and rapidly growing market in British Columbia.

The "Saturday Sunset," of Vancouver, sits down hard on the proposition of the Nelson Board of Trade that the Dominion Government should co-operate with the city of Portland to establish water communication between that city and West Robson in order that the Kootenay country may escape from the excessive freight rates imposed by the C.P.R. The "Sunset" points out that too much of the trade of British Columbia is already absorbed by our American friends owing to the railway lines pushed into the country by "Jim" Hill, the Great Northern Railway magnate. The opening up of the river route between West Robson and Portland would cost between \$40,000,000 and \$50,000,000, and it would probably be cheaper to compromise with the C.P.R. and secure a fair deal by paying a lump sum.

City Clerk Gough, of Nanaimo, claims to be the oldest municipal clerk in Canada, having occupied the position in various capacities for over 35 years.

North Vancouver is taking on city airs. The old volunteer fire brigade is to be dispensed with, a start having been made by appointing a paid chief and four paid firemen. New apparatus worth \$10,000 has been ordered.

The members of the city councils of Vancouver, New Westminster, Burnaby, and other municipalities, were the guests of the Western Canada Power Company at Stave River Falls hydro-electric plant recently. The trip was made by special train to Ruskin, where automobiles were waiting to whisk them over the nine-mile route to the falls. The visitors were met and welcomed by Mr. Wm. McNeill, a director of the company, who piloted them about and explained everything lucidly.

The Fraser Valley Sugar Works, Limited, has been incorporated, with a capital of \$300,000. The company will commence at once the erection of a large sugar beet plant at Mission City, the farmers of the district having signified their willingness to devote a large acreage to the growing of beets. It is believed that the enterprise is peculiarly adapted to the Fraser Valley, and that other plants will be established at various points.

The citizens of Victoria are wisely hesitating about undertaking the Sooke water supply scheme owing to the excessive cost of the necessary tunnelling. The alterative proposition is to acquire the present Goldstream plant, which engineers declare can be made to supply sufficient water for a population of 300,000. The Goldstream Company claim that their revenue last year was \$51,000, with expenses of \$10,000, leaving a net profit of \$40,000.

An indication of the tremendous development taking place in the suburban districts surrounding Vancouver is afforded in the fact that Point Grey municipality is about to expend \$500,000 on a waterworks system, and \$250,000 on a sewerage system, in addition to other large sums for a street railway service and electric lights.

The early construction of the great bridge to be thrown across Burrard Inlet at Second Narrows, in order to afford a better means of communication between Vancouver and North

Vancouver, now seems assured. The amounts already in sight are: District of North Vancouver, \$250,000; Provincial Government, \$250,000; city of North Vancouver, \$100,000; company's borrowing power, \$750,000; a total of \$1,350,000, exclusive of the substantial assistance expected from Vancouver, Burnaby and South Vancouver.

The British Columbia Electric Railway Company's workmen are busy removing all poles in the west end, and the Telephone Company has notified the city electrician of its intention to take similar action immediately.

Litigation at Portage la Prairie

A dispatch from Portage la Prairie, Man., contains the information that suit will be brought against the local parks board for an amount between \$5,000 and \$6,000, as a result of the holding back of estimates of the contractors for the dam, which were approved by the engineers, but later ordered held back. This amount is practically the total of the final estimate on the work, less about \$500, which the contractors admit they are liable for. When the work on the dam was finished, the engineers inspected the work and approved of the final estimate, giving the contractors an order to that effect, but before it could be passed by the parks board there was a break in the dam and the engineers directed that the estimate be not paid, they claiming that the break was due to faulty construction. The contractors are Merriam & Symington. This action on the part of the contractors has been expected in certain quarters, as they have taken no steps to make the necessary repairs to the dam, which were ordered to be begun by the engineers on Sept. 1. The outcome of the action will be watched with interest.

Personal News and Notes

An address on "City Planning" was given at Halifax, N.S., on Sept. 19th before the Civic Improvement League, by Mr. Nolen, the landscape architect.

Mr. J. E. Cauchon, of the C.P.R. engineering staff, delivered an address last week before the Ottawa branch of the Canadian Society of Civil Engineers, on the Ottawa tunnel project.

Mr. Frank Adams, who for the past two years has been assistant city engineer of Brantford, Ont., has resigned in order to accept a position with Mr. Willis Chipman, consulting engineer, Toronto.

The holdings of the Lineham-Scott Sand & Gravel Company have been purchased by the Worsnick Street Paving Company, the concern which located in the city some months ago and which has already carried out several good sized contracts. The purchase price is placed at about \$250,000.

A lock-out has again gone into effect at Winnipeg, where the Bricklayers' and Stonemasons' Union refuse to yield the contested point as to the status of the Lyall-Mitchell firm. T. R. Preece, first vice-president of the International Bricklayers' & Masons' Union, was in the city last week and might have ordered the men back to work and so saved what may prove to be a long and costly dispute. He considered, however, as might be expected, that the union was justified in its action.

One of the most noteworthy features in connection with the equipment of the new Windsor street station at Montreal is the installation of eleven elevators. This contract, which is probably the largest of its kind ever awarded in Canada, has been given to the John McDougall Caledonia Iron Works Company, Limited, at a figure stated to be in the neighborhood of \$100,000. The John McDougall Company have secured the exclusive use of the patents of Mr. T. Larsen, of Worcester, Mass., a well known expert who is now in Montreal in connection with the Windsor Hotel contract.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Belleville, Ont.

The council will send the Mayor, Ald. Lott, and City Engineer Lindsay on a trip to other cities to inspect permanent pavements.

Estevan, Sask.

Tenders for purchase of \$10,000 cement sidewalks debentures will be received until Sept. 27th. L. A. Duncan, secretary-treasurer.

Gleichen, Alta.

R. B. Owens, the provincial health engineer, has been consulted in regard to the new system of waterworks.

Ladysmith, B.C.

The council has employed Mr. Topp, of Victoria, to prepare estimates for about four miles of concrete sidewalks.

Montreal, Que.

The following firms tendered for steel and concrete work for new intake pipe: Haney, Quinlan & Robertson, \$186,500; Laurin & Leitch, \$169,463; Lemoine & Sons, \$155,000; Harris & Company, \$197,623; Beaudry, Leman, \$185,000; M. Connelly, \$184,200. Besides this Munderloh & Company and John Inglis Company tendered for parts of the work.

Napanee, Ont.

Tenders will be received by W. A. Crange, town clerk, up to September 30th, for the construction and completion of various sewers in the town of Napanee. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

New Liskeard, Ont.

Tenders were called until Sept. 27th for supply and laying of pipe for waterworks extension; also for supply and laying of pipe for sewer extension. C. H. Fullerton, town engineer; F. W. Ferguson, secretary Water Commission.

Oakville, Ont.

The town council passed additional by-laws to raise \$20,000, by debentures for further extending the present waterworks system.

Oshawa, Ont.

Tenders will be received by Frank Campbell, town engineer, up to October 14th, for the construction of various sewers and manholes, etc., in the town of Oshawa. For further particulars see "Tenders and For Sale Department" of this issue.

Prince Albert, Sask.

Tenders will be received until September 30th for the supply and erection of two centrifugal, electrically-driven, automatic control sewage pumps. O. O. Davidson, city clerk.

Prince Albert, Sask.

On October 8th a by-law to expend \$26,300 for the purpose of constructing extensions to waterworks system will be submitted to the ratopayers, also for \$110,000

for trunk sewer system, and \$12,000 for filtration plant.

St. James, Man.

Tenders are being called by F. Ness, secretary-treasurer, until October 4th, to sink two wells in the municipality.

Tenders addressed to F. Ness, secretary-treasurer, will be received until October 4th for reinforced concrete culvert on public road at lot 60, St. Charles. Plans, etc., at office of above or at Public Works Department.

St. Andrews, N.B.

The council passed a resolution giving authority for the C.P.R. to excavate and lay water mains in the streets necessary for the projected water system from Chamcook Lake. Elliott Hume was appointed representative of the town. Engineer Lumsden is C.P.R. engineer. Noted in issue of Sept. 14th.

Toronto, Ont.

Tenders are being called by Board of Works until October 4th for construction of asphalt pavements, bitulithic pavements, brick block pavements, grading concrete pavements, concrete curbs, concrete walks, and sewers. G. R. Geary, mayor.

On the City Engineer's suggestion the Board of Control have decided to ask the Dominion Government for permission to build a temporary sand dam across the western channel to keep sewage from affecting the water supply.

At the last meeting of the council it was decided to submit a by-law to the taxpayers on January 1 for power to issue debentures for \$100,000 for the construction of good roads leading into the city, in accordance with the agreement reached between the members of the York County Council and the Provincial Government, for the creation of a number of good roads just outside the city limits. The recommendation of the city engineer that the Rosehill reservoir be concreted and that the city contractors be given a share of the work, was carried.

Victoria, B.C.

The council decided to lay permanent sidewalks on a number of streets in Hollywood Park, of which the estimated cost is \$22,000. The work of putting sewers in the same section will wait for the report from the city engineer on the whole problem of sewer extension.

The old by-law which provided for the laying of tar macadam for improvement of roadway on Menzies street and others will be altered to allow for a more modern type of pavement. Asphalt is suggested.

The large brick drain on Burnside road will be extended 600 feet at an estimated cost of \$3,000.

Tenders addressed to W. W. Northcott, will be received until October 24th for the following: brass goods, galvanized fittings, lead pipe, galvanized iron pipe. Specifications at office of above.

Welland, Ont.

Tenders will be received by the Board of Water Commissioners of this town for

the supply of c. i. pipe, special castings and flexible pipes. For further particulars see "Tenders and For Sale Department" of this issue.

A by-law was passed authorizing an expenditure of \$52,000, for building new concrete flume, installing new pumps and laying 14-inch water pipe from canal to pumping station. Work on new flume and laying piping to be done at once. B. Lundy, secretary Board of Water Commissioners.

Tenders are being asked by the Board of Water Commissioners for 2,000 lineal feet 6-inch and 2,900 lineal feet 14-inch cast iron water pipe and specials for same; also 300 feet 14-inch flexible pipe for crossing canal.

Winnipeg, Man.

The city engineer is now preparing a list of all the water mains required to complete the works ordered this year by council. When the list is made out tenders will be called for. There are several thousand feet of four, five and six inch mains required.

AWARDED

Hull, Que.

Mr. E. R. Bisson, of Hull, was given the contract for the repairs to old waterworks plant.

Montreal, Que.

The Board of Control have recommended that R. E. Tessier be given the contract for new pumping station at \$4,475; with concrete work at \$7.50 per cubic yard. Others tendered as follows: Montreal Ship Lining Company, \$4,640; with concrete work at \$10 per cubic yard; Felix Sauvageau, \$4,700; with concrete work at \$8.50 per cubic yard.

The Board of Control have recommended that the contract for new aqueduct intake at Point St. Charles be awarded to L. A. Desy and M. Lemoyne at the cost of \$155,500. Waterworks superintendent, Mr. G. Janin.

Trenton, Ont.

G. Crow & Son, this town, have been awarded contract for constructing the sewerage system, which includes the laying of 824 feet of 15-inch, 1,434 feet of 12-inch, 987 feet of 8-inch pipes and manholes, as well as the building of a sedimentation tank. Others tendered as follows: G. Crow & Son, Trenton, \$4,215; E. B. Merrill, Toronto, \$4,536; H. Taylor, Belleville, \$5,100; J. W. Liton, Kingston, \$7,045.

Toronto, Ont.

The City Engineer will construct the following pavements at the prices named:—Columbus avenue, Sorauran avenue to west end, asphalt, \$1,580; Southview avenue, from Westmoreland avenue to Bartlett, asphalt, \$2,388; Westminster avenue, Indian road to Keele street, asphalt, \$3,188; Lonsdale, Lawton avenue to Dunvegan road, bitulithic, \$16,820.

Virden, Man.

Prices per cubic yard for grading and gravelling were received from the following: E. H. Palmer, 14c., accepted; A. D.

Lancaster, 23½c.; W. A. Cook, 14½c.; A. Cammon, 16½c.; R. Ferguson, 19c.

Victoria, B.C.

The tender of the Pacific Coast Construction Company for grading and side-walking Forbes, Asquith, Cecil and Victor streets was accepted, while that of the city engineer for improvements to Sutlej street was successful.

Railroads, Bridges and Wharves

Bell Brook, N.B.

Tenders are being called by Department of Public Works, Fredericton, until Oct. 10th for rebuilding bridge here. Plans, etc., at office of the above and at office of G. B. Jones, M.P.P., Apohaqui. John Morrissy, chief commissioner.

Barrington's Cove, N.S.

Tenders are being called by the Public Works Department, Ottawa, until October 17th for construction of wharf here. R. C. Desrochers, secretary.

Comox, B.C.

The C.P.R. is calling for tenders for the construction of a branch to Comox.

Cartwright, Man.

Tenders addressed to J. B. Laughlin, clerk, will be received until October 8th for steel superstructure of a 58-foot span bridge, one mile northeast from here. Material to be in by Nov. 15th. Plans, etc., at Department of Public Works.

Chilliwack, B.C.

Within the next 30 days the Canadian Northern Railway will call for tenders for the construction of its line between here and Lytton, at the junction of the Fraser and Thompson rivers, a distance of about 90 miles. It is probable that tenders will also be called this fall for the 90-mile section extending north from Kamloops through the valley of the North Thompson.

Esquimalt, B.C.

The Messrs. Bullen, ship repairers, of Vancouver, have applied for a subsidy for a dock of the first or largest class, to be located here. They intimate that they will file plans shortly. It is believed that the Bullens are associated with some British shipbuilding firm in their enterprises, which will involve an expenditure of at least \$3,000,000.

Fort William, Ont.

Tenders are being called by the C.P.R. until October 3rd for bridge over McKellar river here. Plans, etc., at office of F. Lee, division engineer, Winnipeg; and at office of Superintendent, Fort William.

Halifax, N.S.

At the meeting of the council of the Board of Trade a letter was read from the management of the Intercolonial, stating that the Board of Management was working on plans with the view of increasing the facilities at the piers for the coming winter.

Margaree Harbor, N.S.

Tenders are being called by Public Works Department until October 5th for extension to breakwater here. R. C. Desrochers, secretary.

Montreal, Que.

It is understood that the principals in the company incorporated as the British Empire Bridge Company, Limited, this week are the British Construction Company, of Darlington, Eng., and the Railway Carriage Company, of Birmingham, and that their object in obtaining a Canadian charter is to facilitate their plan of

tendering for the superstructure of the Quebec bridge.

New Edinburgh, N.S.

Tenders are called until October 12 for construction of breakwater here by Public Works Department. R. C. Desrochers.

Prince Albert, Sask.

George Atwood, chief engineer of the Hudson Bay & Pacific Railroad, is authorized for the statement that he has been authorized to expend any moneys necessary to complete a detailed survey for a route from Prince Albert to Fort Churchill.

Point St. Charles, Que.

A petition is being circulated to connect Shearer and Congregation streets by a subway. Mr. W. Darlington, Coleraine street, is interested.

River des Prairies, Que.

Tenders are being called by the Public Works Department, Ottawa, until October 17th for reconstruction of piers at Ste. Genevieve and Ile Bizard. R. C. Desrochers, secretary.

Regina, Sask.

The Railway Commission have issued an order for the building of a subway under the Canadian Pacific Railway tracks at Broad street. The plans are to be filed within 60 days, and an apportionment of the cost as between the railway company and the city will be settled by the commission after the plans are submitted. The proposed subway will provide for nineteen tracks.

Salmon River, N.B.

Tenders are being called by the Department of Public Works, Ottawa, until Oct. 18th, for construction of breakwater here. R. C. Desrochers, secretary.

St. Leonard's, N.B.

Bids for the construction of the bridge between Van Buren, in Aroostook county, and St. Leonard's (N.B.), over the St. John river, have been opened. On the superstructure, foundations and abutments Elie Roy, Lewiston, bids \$22,245; Powers & Brewer, of Grand Falls (N.B.), \$23,895; E. J. O'Kelley, of Toronto, \$25,145, and J. L. Perkins & Son, of Fairfield, \$30,598. On the superstructure the Canton Bridge Company, of Canton, \$51,082; Boston Bridge Company, \$47,452; Pennsylvania Steel Company, \$54,000; American Bridge Company of New York, \$50,000; Penn Bridge Company, of Beaver Falls (Pa.), \$40,991. The amount appropriated was \$37,500. New Brunswick to expend a like sum. Award not likely to be made for ten days or more.

Toronto, Ont.

The Island Committee will ask the Board of Control to place on the estimates the necessary amount for bridge at island. Engineer's estimate, \$9,268.

The G.T.R. has commenced operations on the elevation and depression of tracks from Weston towards the city.

Victoria, B.C.

Tenders addressed to W. W. Northcott, will be received until October 3rd for building the Dallas road sea wall. Specifications at office of above. Estimated cost, \$100,000.

AWARDED

Colchester, Ont.

The contract for the construction of an extension to the pier has been awarded to Messrs. Michael, Matthew J., and Patrick J. O'Leary, of Ottawa, at \$14,500.

Edmonton, Alta.

The contract for pile driving in connection with high level bridge has been awarded to the Raymond Concrete Pile Com-

pany, of Montreal. In all there will be 1,800 piles.

Halifax, N.S.

The contract for construction of wharf at Dover has been awarded to Messrs. Girroir & Sweet, of Antigonish, at \$3,836; that for Port Felix at \$4,309.

Wallaceburg, Ont.

The contract for building two steel bridges over Running Creek drudge cut. Wallaceburg, has been awarded to the Petrolia Bridge Company, Limited, for the sum of \$4,550.

Public Buildings, Churches, Schools, etc.

Ahuntsic, Que.

Mr. L. R. Montbriant, architect, 230 St. Andre street, has prepared plans and specifications for the erection of a school building for the Catholic school commissioners.

Calgary, Alta.

A permit has been granted for the one-storey addition to the I.M.C.A., \$19,000.

Dresden, Ont.

This municipality will have a new post office. It is expected that work will commence immediately. D. A. Gordon, M.P.

Eastview, Ont.

W. Leger will enlarge considerably the planing mill he recently purchased here.

Elmira, Ont.

Tenders are called until Sept. 29th for the construction of lavatories in the Elmira public school. Plans and specifications can be seen at Israel Brubacher's, Elmira, or Chas. Magk, Waterloo.

Fernie, B.C.

The by-law to establish a public library was defeated.

Fredericton, N.B.

The council are considering the advisability of the erection of a new market building.

Fergus, Ont.

It is stated that Messrs. Whalen & Bleakney, of Ottawa, the successful contractors for the post office here, have not yet let the sub-contracts. The above firm have also contract for the post office at Elora. Cost respectively, \$13,449 and \$12,949.

Fort William, Ont.

The by-laws approved by the ratepayers on the 22nd inst. provide for an expenditure of about \$160,000; of this \$65,000 will be expended on police and court house purposes and \$16,000 for fire hall purposes. The plans prepared by Architect Mason for the new police station were approved and tenders will be called for.

The time for receiving tenders for fire hall alterations and additions has been extended until Sept. 28th. H. S. Hancock, city engineer.

Glenbank, B.C.

The Department of Public Works, Victoria, is calling for tenders for erection of 2-room school here until October 14th. F. C. Gamble, public works engineer.

Galt, Ont.

The committee in charge of the new theatre have decided not to build a new one, but to remodel the old Scott block, which was gutted by fire last spring.

Kingston, Ont.

Owing to the high rate of tendering on the Nicol Mining Building no contracts

have been awarded for the erection, the \$40,000 donated not being sufficient.

Kaslo, B.C.

Tenders are being called by the Public Works Department until October 10th for erection of new court house here. Plans, etc., at offices of government agents here and at Nelson; and at the above department. F. C. Gamble, public works engineer.

London, Ont.

The Board of Works and the city architect were named a committee to draft an agreement with the county council regarding joint municipal buildings.

North Vancouver, B.C.

The residents are feeling the necessity for a new fire hall.

Ottawa, Ont.

Corporation of Ottawa was granted a building permit for fire station on Cumberland street, \$24,000.

Mr. William Foran, Trafalgar Building, is the honorary secretary in connection with the proposed new golf club—Rivermead Golf Club—mentioned in last week's issue.

Prince Albert, Sask.

A By-law to raise \$10,000 for alterations in connection with the city hall, will be submitted to the ratepayers on Oct. 7th.

Prince Rupert, B.C.

Thomas R. Hooper, architect, Victoria, is the authority for the statement that another school would likely be required here within the next year. The policy of the government is to build small schools in preference to large ones, so that each district will be comfortably served.

Regina, Sask.

The Board of Governors of the Saskatchewan Methodist College has approved of the plans of Messrs. Brown & Vallance, of Montreal, for two big buildings which are to be erected next year. It is expected that the buildings, to cost \$250,000, will be completed by the fall of 1912.

St. Catharines, Ont.

The school board are considering the erection of a new school in St. James' Ward.

Stratford, Ont.

Mr. W. R. Marshall, a citizen of this city, has offered a site for the Children's Shelter.

South Vancouver, B.C.

The Oddfellows of Little Mountain decided to build a two-storey hall. Work on it will be started almost immediately. For this purpose a company will be incorporated at a capitalization of \$7,000. A site has been purchased between Twenty-eighth and Twenty-ninth avenues.

Toronto, Ont.

Tenders for carpentry work on the office building for fire department, fire alarm telegraph building, were received until Sept. 27th. R. Geary, mayor.

Tenders are being called for by W. C. Wilkinson, secretary-treasurer, up to Sept. 30th, for the construction and completion of new school buildings on Ossington avenue and on Annette street; hollow tile flooring at Humberstone Collegiate Institute; work benches and cabinet work, etc., for four new manual training centres, in the city of Toronto. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

The Board of Education decided to add a third storey to the new Earlscourt school, the two storeys of which will be finished by flat roof. It is expected that next May

tenders will be called for the extra storey.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until October 4th for new lathing and plastering together with repair, renewal, replacement and restoration, etc., in St. Lawrence Hall assembly room, lavatory, cloak room, etc. Plans, etc., at offices of Property Department, City Hall.

Building permit has been issued to the Greek Catholic Church, for a church building of brick and stone on Franklin avenue, near Royce avenue, \$5,500.

Uxbridge, Ont.

Tenders addressed to H. Bascom, M.D., secretary, will be received until Oct. 4th for erection of 8-roomed brick school. Plans at office of the above.

Victoria, B.C.

Public Works Department are calling for tenders until October 3rd for erection of school at Otter Point. F. C. Gamble, public works engineer.

Permit was granted for the construction of Grace Lutheran church, corner of Queen's avenue and Blanchard street, \$6,000. J. C. Keith, architect; contractor, L. P. Frederickson.

The directors are considering the proposition of a new building to supplement the Royal Jubilee hospital, which is overcrowded and out-of-date. J. A. Mars, president; Messrs. D. F. Campbell, Bolden, H. Robertson, Chas. Baxter and J. W. Vincent, directors.

Whitby, Ont.

The county council has been authorized to issue \$20,000 court house debentures. John E. Farewell, county clerk.

Woodland, Man.

On October 1st a by-law will be voted on to issue \$7,500 school debentures, Hanlan, S.D. Major P. Proctor, secretary-treasurer, rural municipality of Woodland.

Wallaceburg, Ont.

The by-law to raise \$20,000 for erection of new public school in North Wallaceburg and addition to school in South Wallaceburg was approved by the electors. Tenders will shortly be called. H. E. Johnson, town clerk.

Winnipeg, Man.

The Anglican church have under consideration the erection of a cathedral here to mark the founding of the church in the West in 1820.

Tenders addressed to the Chairman, Board of Control, will be received until October 4th for supply of labor and materials for erection of fire alarm signal service station on Rupert street. Plans, etc., at office of Inspector of Buildings, 233 James avenue. M. Peterson, secretary.

The civic hospital committee will secure plans for the new isolation hospital. The directors of the North Winnipeg hospital recommend to the council that a bylaw for \$350,000 be submitted to the ratepayers, the amount to be used for purchase of site and erection and equipment of a new general hospital. Ald. Potter, honorary president, North Winnipeg hospital.

Tenders for supplying the number of single adjustable school desks, required by the Public School Board for the next two years, will be received until October 6th. R. H. Smith, secretary-treasurer, P.S.B.

AWARDED

Dubuc, Sask.

The contract for erection of solid brick school here was awarded to Smider & Sutherland, Regina, at \$6,445. E. J. Reed &

Company tendered at \$8,450. Storey & Van Egmond, architects, Regina.

Montreal, Que.

The following contracts have been awarded in connection with construction of the new Young Men's Christian Association building on Drummond street: Carpentry, U. Pauze & Fils, Greene avenue and Notre Dame street; plastering, B. D. Clark & Sons, St. Luke street; painting and glazing, J. Lefebvre & Company, Mansfield street. Architects, Ross & McFarlane, 1 Belmont street.

New Liskeard, Ont.

Hill & Clarke, of New Liskeard, have been awarded general contract for Union Bank. The contract price, not including fixtures, \$9,000. J. P. MacLaren, Ottawa, architect.

Nelson, B.C.

John Brown & Son have received a contract from James Malcolm to build a new wagon and blacksmith shop 50 by 80 feet.

Quebec, Que.

The tender of Joseph Gosselin & Son, of Levis, for the construction of the new annex to the Parliament House was accepted. Architects, Messrs. Marchand & Tanguay.

Souris, Man.

The contract for the excavation in connection with the new post office was let to J. W. Fitzgerald & Company. Kitchen Bros. will have the contract for brick and stone. Plans were drawn by Fitzgerald & Company; general contractors, Messrs. Pigott & Son, Hamilton, Ont.

St. Eusebe, Que.

The following contracts for the erection of a presbytery for the parish of St. Eusebe have been awarded by Mr. G. A. Monette, architect, 97 St. James street, Montreal, as follows: Masonry and brick, F. Dufresne; carpentry, E. Dusseault; plumbing, heating and roofing, Jos. Laurier; plastering, R. E. Marineau; painting and glazing, Jos. Guy; electric wiring, C. Lapierre.

Thorold, Ont.

Wm. Justice, this place, was given the contract for the masonry and carpentry on enlargement of vestry for St. John's church here, at \$1,000. T. H. Wiley, architect, St. Catharines.

Victoria, B.C.

The contract for the new theatre, to seat 1,500 people, has been let to J. L. Skene. Contract calls for completion on January 1st, 1911.

Verdun, Que.

Messrs. Shearer, Brown & Wills, general contractors, 225 St. Patrick street, Montreal, have been awarded the contract for the construction of an addition to the English church at Verdun.

Yorkton, Sask.

The contract for electrical work in the collegiate institute has been awarded to Messrs. Stalker & Trott, electrical engineers, Winnipeg.

Residences

Edmonton, Alta.

Building permits were issued recently to W. M. Moore for residence on Edward St., \$2,800; Ed. Racey, a residence on Namayo, \$2,000; W. Wilson, residence on Fifth St., \$2,250; W. Cairns, a dwelling on Twelfth St., to cost \$2,000.

Montreal, Que.

Mr. S. D. Joubert, of Mount Royal West, has taken out a permit for the erection of

very handsome residence at 39 St. Catherine road, \$10,000. Mr. James Sawyer, architect; Damien Lalonde, contractor.

Mr. G. A. Monette, architect, 97 St. James street, is preparing plans and specifications for the erection of a residence at Lachute, Que., for Mr. J. E. Valois.

Ottawa, Ont.

W. E. Noffke has been chosen architect for the remodelling of W. J. Fraser's residence on Nepean street.

H. P. Gilmour's residence on Wilbrod street will be converted into a double tenement. W. E. Noffke, architect.

Victoria, B.C.

Building permit was issued Smith Bros. for a dwelling on Cowan street, \$2,550.

E. A. Harris, 1109 Langley street, has effected the sale of four lots at the corner of Vancouver and Humboldt streets, on which the owner, it is stated, is considering the erection of an apartment house.

Winnipeg, Man.

The Wellington Apartments was damaged by fire on the 19th inst., to the extent of \$75,000. Six houses, valued at \$5,000 each, in the same block were burned to the ground. Patterson & Hicks, owners and contractors, have begun work.

AWARDED

Vancouver, B.C.

John Watson & Bros. are the contractors for the brick apartment house to be erected corner of Broadway and Woodland for Dr. T. Glendon Moody. Henry B. Watson, 522 Pender street west, is the architect.

Business Buildings and Industrial Plants

Brandon, Man.

Robert Lane, who commenced the construction of a two-storey business block on Eighth street, south of Rosser and completed the excavation work, has decided that he will not go ahead with the construction of the building this year. The estimated cost of the new structure about \$8,000. The tenders ran to \$11,000. Mr. Lane has decided that he will let the work go until next year, when he will complete it.

Buckingham, Que.

The W. A. Graphite Company is erecting a large mill here.

Bala, Ont.

The summer hotel at Camp Sutton, Muskoka, was destroyed by fire. Loss \$4,000.

Calgary, Alta.

J. Cabouski has been granted a permit for a \$2,500 house on Thirteenth avenue east.

Collingwood, Ont.

The Board of Trade considered the draft agreement in regard to the proposed iron industry which is negotiating for a site here. President, Board of Trade, Mr. M. F. Byrnes; representative of the proposed industry, Mr. J. R. Roaf.

Blairmore, Alta.

The Western Canada Collieries, Limited, are calling for tenders until October 25th for the following: The building of twenty cottages; the building of six store buildings; the building of one residence; the excavation and diversion of river bed for a distance of about one mile. Plans, etc., at head office here.

Edmonton, Alta.

Adams Bros., it is reported, are planning to erect on 1st and Athabasca streets

a 5-storey brick and stone business block. Cost about \$80,000.

Fredericton, N.B.

This city has made a generous offer to the John Palmer Company, which will probably be accepted. In return for which arrangements for a new building to cost not less than \$25,000 will be taken up in the spring.

Fort William, Ont.

The Coalette Company have bought a site on the Industrial land between Mary and Christina streets. The plant is expected to be ready by December.

High Falls, Que.

James MacLaren Company will begin in a few days the construction of a large log slide here.

Hamilton, Ont.

The Bell Telephone Company has purchased the Kronsheim property on Main street, where, it is reported, the central exchange will be erected.

It is stated that A. Hewitt, the well known Grimsby millionaire, who built the Village Inn there, has secured an option on the property known as Wentworth Chambers, at Main and Hughson streets, and that on this site he will have erected a big modern hotel.

The Canadian Westinghouse Company secured a building permit for an addition to the foundry, to cost \$18,000.

The Canada Steel Company will locate their plant on the west side of Sherman avenue. Estimated expenditure, \$400,000. Directors: F. W. Baillie, Toronto, president; R. M. Bertram, Toronto, vice-president; W. M. Currie, Hamilton, managing director; A. L. Malone, Toronto; G. A. Morrow, Toronto. Mr. Baillie is a member of the financial firm of Baillie, Wood & Croft. He is also a director of the Black Lake Asbestos Company, and prominently identified with many important industrial propositions. Mr. Bertram was formerly president of the Bertram Shipbuilding Company, and at present is the head of the Collins' Inlet Lumber Company. Commissioner of Industries, Mr. Mulliss.

Milestone, Sask.

A joint stock company has been formed for the purpose of erecting a temperance hotel here. Mayor, Mr. J. B. McKenzie.

Montreal, Que.

A permit has been taken out by Quinlan Bros. for erection of the Eastern Townships Bank, corner of Crescent and St. Catherine streets.

Messrs. Montreal Smallwares, Limited, are contemplating erecting two additional storeys on their new factory now in course of erection. Tenders are being invited for the heating and plumbing of the present work. Architect, H. C. Stone, 84 St. Francois Xavier street.

Messrs. T. McAvity & Sons, Limited, St. John, N.B., will establish a branch of their large St. John works in Montreal. Negotiations are now on for a suitable site with exemption of taxes. Taken in connection with the new site secured at Port Arthur, this means an important extension of this firm's trade.

Masset, B.C.

It is understood that negotiations toward the erection of a mill here are well under way and that Victoria capital is identified with the new industrial enterprise. Indian Agent T. Deasy is promoting the enterprise.

Nelson, B.C.

Mr. A. Carrie, architect, has been asked to draw plans for the new business block

to replace the Carney block. E. B. McDermid effected the sale and estimates the cost of new structure to be about \$25,000.

Arrangements have been made and plans drawn for an enlargement to the C.P.R. depot building here. F. F. Busteed, general superintendent western lines, C.P.R.

The McGoldrick Lumber Company has purchased the Crawford bay site to use as a logging station for lumber cut in their limits. The company will now construct their mill at Fairview. T. C. Proctor is local agent. The company also operates mills at Chase, B.C., and at Spokane, Wash. U.S.A.

The establishment of a zinc smelter here is being considered. Mr. A. Gordon French, a metallurgical chemist, representing French's Complex Ore Reduction Company, organized by capitalists of Victoria, has been over the ground and considers it favorable.

New Liskeard, Ont.

Mr. C. B. Matthews, Kingslake, will in the near future build a mill without any aid from the town, for the granting of which a by-law was defeated.

Neepawa, Man.

It is reported that the match factory recently burned down at Selkirk will be built here.

Owen Sound, Ont.

The site for the new furniture factory has been chosen at corner of Second avenue west and Fourteenth street. Tenders are being received for brick and concrete construction.

Ottawa, Ont.

It is stated that the Ottawa Electric Railway has awarded a contract to Sanders Bros., of Ottawa, for building the car house in Ottawa. Cost estimated to be about \$50,000. The company will also erect a freight house at Princeton and Spring Valley.

George Latham has been awarded the contract for the excavation and concrete work of Maple Leaf Milling Company warehouse. M. C. Edey, architect.

J. E. Wilson has applied for permission to erect a factory, and have a lumber yard in Ottawa South. The Board of Control is considering the application.

Mr. Jas. E. Wilson is applying for permission to place a sash and door factory on Riverdale avenue.

Mr. J. G. Kilt and Mr. F. Sugerman are planning to erect a business block, with apartments overhead, on the northeast corner of Catharine and Bank streets. The opposite corner has been purchased by a firm as a building site for a large factory to cost about \$75,000, and will likely be of reinforced concrete and steel. Mr. Kilt effected the sale.

Portage la Prairie, Man.

The Equity Grain Bin Company, Winnipeg, will locate in this city and tenders for building will be called for shortly. Mr. Coleman, secretary, Board of Trade.

Princeton, Ont.

The Bank of Hamilton will rebuild their branch here. Mr. Forsayeth, manager of the Brantford branch, will consult with the bank's architects.

Penticton, B.C.

This municipality has now a building restriction by-law. All buildings constructed in the business section must be of brick or cement.

Quebec, Que.

The plans for the union station, which will be erected on the site of the Champlain market and which will accommodate

all the railroads running into Quebec, have been submitted by Mr. George E. Tanguay, architect, to Hon. S. N. Parent, chairman of the Transcontinental Railway.

Regina, Sask.

Tenders were called until Sept. 26th for erection of the Traders Bank here. Storey & VanEgmond, architects, Regina.

Sarnia, Ont.

The council have decided not to submit by-law to guarantee bonds of collar factory which has been negotiating in regard to locating here.

Saskatoon, Sask.

Robert Grey, president of the Gray Carriage Manufacturing Company, of Oshawa, Ont., and Manson Campbell of the Manson Campbell Fanning Mill Company of the same city, are here to make arrangements for the building of a large distributing warehouse. It is understood that the warehouse will cost in the neighborhood of \$50,000 and that branch offices will be established throughout the West.

Sydney, N.S.

The Dominion Iron & Steel Corporation have sent out specifications and are calling for tenders for construction of seven large buildings to be erected at their plant. These include: boiler house, machine shops, foundry, warehouse, oil house, carpenter shop, repair shop and finishing mill. The latter will cover an area equal to 400 feet square. Materials to be used, cement brick and structural steel. Hard pine will be used in the erection of finishing mill. New general offices may have to be erected owing to the expansion of the manufacturing departments.

Toronto, Ont.

Building permit has been issued to the Bank of Hamilton, for a three-storey stone and brick branch bank building, at 341 Bathurst street, to cost \$6,000.

Victoria, B.C.

D. E. Smith, manager, Jordan River Lumber Company, Limited, has announced that his company will erect a sawmill in the early spring. The site has not been chosen yet.

A building permit has been applied for by Messrs. Moore & Whittington for their sash and door factory on the site of the old Adams' mill in the upper harbor.

A building permit was issued to P. Jeune for block of stores on north side of Pandora street, \$11,600. H. S. Griffith, architect; Dinsdale & Malcolm, contractors.

Vancouver, B.C.

A building permit has been issued to Mr. A. F. McKinnon covering a brick block on Mount Pleasant, \$20,000; also to Mr. J. McMillan for 3-storey warehouse on the corner of Smith and Beatty streets, \$25,000; the B. C. Telephone Company has a building permit for the sub-station at Mount Pleasant, \$50,000.

Woodstock, Ont.

Tenders will be received until Sept. 28 for erection of building for the Tobin Arms Manufacturing Company. Plans at office of the architect, B. McNichol.

Niagara Falls, Ont.

Tenders were received until Sept. 24th for all trades required in connection with erection of warehouse for the Marland Woolnough Wholesale Grocery Company. C. M. Porter, architect, Niagara Falls South.

Winnipeg, Man.

A new one-storey pump factory will be erected by W. H. Wortman on the south-

west corner of Saskatchewan avenue and Dublin street, at a cost of \$10,000. Matthews & Lemaistre are the architects, and W. Richmond is the contractor.

The W. J. Guest Company has secured a permit to erect a large warehouse on the south side of Alexander avenue, \$16,400. The structure will be four storeys high, and will be built of stone, concrete and brick. Jams Chisholm & Son designed the building, and Messrs. Carter, Halls & Aldinger will erect it.

See "Power Plants."

Chas. Reid & Sons, paper box manufacturers, with factory in Hamilton, Ont., have bought all the property on the east side of Princess street between Henry and Logan avenues as a site for a large warehouse, of which the estimated cost is \$300,000. The firm will take possession on March 1st, 1911, when work will commence. E. M. Counsel effected the sale.

Wynyard, Sask.

It is rumored that the Toronto Type Foundry Company will install a \$10,000 plant here at once.

AWARDED

Fort William, Ont.

The board of health has awarded the contract for the plumbing of the new isolation hospital to Higginbottom & Company, and the contract for the heating plant of the new institution to Anderson & Company. The plumbing will cost \$1,400 and the heating plant \$835.

Montreal, Que.

The contract has been awarded W. Beverley Robinson, Montreal, for supplying "Carrara" (semi-glazed terra cotta) manufactured by the Royal Doulton Pottery, London, for the exterior and interior of the Canadian Pacific Railway Company's Place Viger station, Montreal.

Messrs. MacVicar & Heriot, architects, 104 Union avenue, have awarded the following contracts for certain additions and alterations to property at 102 Union avenue for J. O. A. Heriot, Esq., as follows: Masonry, brick and plastering, Gray & Wighton; carpentry, Wm. Evelyn; plumbing and heating, W. Graham; painting and glazing, R. E. Jones; roofing, Richardson-Simard Company.

The following contracts have been awarded in connection with the erection of the new factory building on St. Elizabeth du Portugal street, St. Henry Ward, for the National Acme Manufacturing Company, Montreal: Excavations, concrete, masonry, brick and carpentry, Griese & Walker; cut stone, John Quinlan & Company; lumber and millwork, R. McFarlane & Company, Limited; Shearer, Brown & Wills, Limited; brick, Lapraire Brick Company, Limited; supplies, Stinson-Reeb B. S. Company; painting and glazing, J. N. Arcand; roofing, Richardson, Simard Company; plastering, Geo. H. Knott & Company. The heating, plumbing and electric wiring work will be let later and all information may be obtained from Mr. Walker at the Builders' Exchange, Montreal.

Three Rivers, Que.

The contract for the pulp mill of the Union Bag & Paper Company at Cap de la Magdaleine, has been awarded to Frank P. Gilbreth, Incorporated, No. 60 Broadway, New York. George F. Hardy, New York, is the engineer.

Winnipeg, Man.

The Canadian Northern Railway Company has let a contract to Carter-Halls-Aldinger, to construct offices, freight shed

and a cold storage plant at the new Fort Garry terminals here. The contract price is \$87,000. The combined dimensions of the three buildings, which are to be built together, are 664 by 60 feet. The offices are brick and stone, two storeys high. The cold storage plant will be faced with metal as will also be the freight sheds. The announcement that the freight yards are to be removed from Water street to the new terminals strengthens the local rumor that next spring will see a big hotel on the site of the present station and freight department.

The contract for erection of bakery and stables for Speirs-Parnell Baking Company has been awarded to Pattinson & Eilbeck, general contractors, at \$60,000, 506 Furby street; Cotter Bros., Fort street, received the contract for plumbing and steam heating.

The contract has been let by the Manitoba Government Telephone Commission for the construction of the new telephone exchange known as the St. John's exchange, to be located on the northeast corner of Salter street and Burrows, to the firm of J. M. and J. J. Kelly. The contract amounts to \$38,000, exclusive of the plumbing and ventilating systems. The building will be 75 by 63 feet, and two storeys high.

Power Plants, Electricity and Telephones

Berlin, Ont.

A meeting has been called by the Berlin Light Commission for Sept. 27th to organize a union to secure a supply of natural gas for the towns and cities in central Ontario.

Collingwood, Ont.

It is probable that a producer gas plant may be installed in the new power house for which materials are now on the ground.

Coquitlam, B.C.

At the regular monthly meeting of the Coquitlam council, held recently in the Municipal Hall, the Western Canada Power Company's by-law was finally revised and read a third time. This will be voted on by the people of the municipality on September 28.

Comox, B.C.

Engineers are now at work making surveys in connection with the project of the Canadian Collieries (Dunsmuir) Limited, for the development of 50,000 horse power on the Puntledge river in the centre of the Comox coal field. Within six weeks hundreds of men will be engaged in building a dam across the river and erecting a power plant. About a year will be occupied in completing the big undertaking. The proposed improvements will cost about \$1,000,000.

Guelph, Ont.

The by-laws to take \$85,000 preference stock in the People's Railway, and to grant a franchise for running rights over the city streets were carried by substantial majorities. Work will commence immediately.

Montreal, Que.

The Board of Control will recommend to the City Council the acceptance of the Montreal Light, Heat & Power Company's offer for street lighting. The contract is for a period of ten years.

This, if accepted by council, means the possible adoption of two new grades of arc lamps, one of which will cost \$73.70 a year, and is best adaptable to main busi-

(Continued on page 28)

Tenders and For Sale Department

Tenders Wanted

Separate or bulk tenders will be received by the undersigned, sealed and marked "Tender for Town Hall," until SATURDAY, 22ND OCTOBER, at 4 o'clock p.m., for the erection of a Town Hall Building in the Town of Hanover.

Plans and specifications may be seen at my office, Hanover, and at the office of Forster & Clark, architects, Owen Sound.

The lowest or any tender not necessarily accepted.

JOHN TAYLOR, Town Clerk,
Municipality of Hanover.

September 12th, 1910.

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Tenders Wanted

Separate or bulk tenders will be received by the undersigned, sealed, and marked "Tender for Public Library," until SATURDAY, 22ND OCTOBER, at 4 o'clock p.m., for the erection of a Public Library Building in the Town of Hanover.

Plans and specifications may be seen at my office, Hanover, and at the office of W. E. Binning, architect, Imperial Bank Building, Listowel.

Tenderers to state what allowance will be made for brick building now on the premises.

The lowest or any tender not necessarily accepted.

JOHN TAYLOR, Town Clerk,
Municipality of Hanover.

September 12th, 1910.

39

Tenders Wanted

Sealed tenders will be received by the undersigned up to 6 p.m. SEPTEMBER 30TH, 1910, for the construction and completion of the following sewers in the Town of Napanee: John street, total length, 1160 feet; Dundas street, 2,672 feet and 907 feet; Adelphi street, 941 feet; Bridge street, 891 feet.

Plans and specifications are filed and may be examined in the clerk's office. Tenders will be received for each portion separately or for all the sewers in lump sum. Lowest or any tender not necessarily accepted. Certified cheque for 10 per cent. of tender must accompany each tender.

W. A. GRANGE,
Town Clerk.

Dated, Napanee, September 20th, 1910.

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City of Moose Jaw, Saskatchewan

Tenders

Tenders will be received by the undersigned up to 8.30 p.m. on MONDAY, OCTOBER 10TH, for supplying (for the use of the City Fire Department), one standard combination chemical and hose wagon with capacity 50 gallons chemical tank and 800 feet of 2½-inch fire hose, or 40 gallons chemical tank and 1,000 feet of 2½-inch fire hose. Wagon to be fitted to carry one 20-foot extension ladder on top.

Tenderers are asked to quote prices for either 2½-inch steel or 2½-inch rubber tired Archibald wheels; also for one extra set of Archibald wheels, 1½-inch axle, 2½-inch steel or rubber tires.

Tenderers are asked to furnish detailed specifications and cut of wagon and equipment, and give price f.o.b. Moose Jaw.

The lowest or any tender not necessarily accepted.

W. F. HEAL,
City Clerk.

Moose Jaw, September 10th, 1910.

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To Contractors

Sealed tenders, separate or bulk, will be received by the undersigned up to 12 o'clock noon on THURSDAY, 29TH INST., for the erection and completion of a Collegiate Institute Building in the Town of Smith's Falls, Ont. Plans and specifications may be seen at the office of the secretary-treasurer, Board of Education, Smith's Falls. A deposit of five per cent. must accompany each tender, or the names of two responsible persons who are willing to become sureties for the due performance of the above mentioned works.

The lowest or any tender not necessarily accepted.

DR. E. H. WICKWARE,
Chairman, Board of Education,
Smith's Falls, Ont.

39

Tenders

Church of Holy Angels St. Thomas, Ont.

Tenders will be received by the Rev. T. West, St. Thomas, Ont., until 5 o'clock on SATURDAY, OCTOBER 1ST, for the Masonry and Plastering, Carpentry and Roofing, etc., required in the erection and completion of a stone church at St. Thomas, Ont.

Plans and specifications may be seen at the office of the undersigned and also at the Roman Catholic Presbytery, St. Thomas.

Security to the extent of one-third the amount of contract will be required for the faithful performance of the work.

The lowest or any tender not necessarily accepted.

ARTHUR W. HOLMES, Architect,
10 Bloor St. E., Toronto.

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Tenders Wanted

Town of Barrie, Ont.

Sealed tenders addressed to the Town Clerk will be received up to noon of the FIRST DAY OF OCTOBER, 1910, for the construction of main street sewers. The work will be let in four sections and tenders received for one or more sections.

Contract A.—Clapperton Street. Approximately 2,077 feet, 10-inch pipe, 5 manholes, 1 Flush Tank.

Contract B.—Small Street. Approximately 1,675 feet, 10-inch pipe, 3 manholes, 1 Flush Tank.

Contract C.—William Street. Approximately 713 feet, 8-inch pipe, 1 Manhole, 1 Flush Tank.

Contract D.—Bradford and Ross Street West. Approximately 1,738 feet, 12-inch pipe, and 746 feet, 8-inch pipe, 6 Manholes and 2 Flush Tanks.

Plans and specifications may be seen at the office of the Town Clerk, Barrie; at the office of the "Canadian Engineer," Toronto, and at the office of the engineer, Collingwood, after the 17th of September.

All tenders must be sealed and plainly marked as to the work tendered on. The lowest or any tender not necessarily accepted.

K. S. MACDONELL, THOS. BEECROFT,
Engineer. Barrie, Ont.

TOWN OF OSHAWA

Outfall Sewer Extension

Sealed tenders for providing and constructing a Main Trunk Sanitary Sewer as an extension of the present outfall sewer, will be received by the Town Engineer not later than 12 o'clock noon of FRIDAY, THE 14TH DAY OF OCTOBER, 1910.

The work includes the construction of:

1,800 feet Sewer, 20-inch diameter.

1,860 feet Sewer, 24-inch diameter.

12 Manholes and all appurtenances thereto.

Yardage of excavation is approximately 2,700 cubic yards.

Plans and specifications may be seen and forms of tender, on which application must be made, obtained at the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

W. E. N. SINCLAIR, LL.B.
Mayor.

FRANK CHAPPELL,
Town Engineer.

Oshawa, Ont., Sept. 21, 1910.

39

CITY OF PORT ARTHUR

Debentures for Sale

Sealed tenders addressed to the undersigned and endorsed on envelope "Tender for Debentures" will be received up to 5 o'clock p.m. of SATURDAY, OCTOBER 1ST, 1910, for the purchase of the following City of Port Arthur Debentures:

\$30,000.00, July 1st, 1910, maturing 20 years, Telephone Equipment.

\$171,765.00, July 1st, 1910, maturing 30 years, Construction of Sewers.

\$127,775.00, July 1st, 1910, maturing 30 years, Extension of Waterworks.

\$800.00, July 1st, 1910, maturing 10 years, Purchase of Ambulance.

\$8,000.00, July 1st, 1910, maturing 20 years, Agricultural Society Grant for Buildings.

\$10,000.00, July 1st, 1910, maturing 30 years, Electric Street Railway.

\$6,000.00, July 1st, 1910, maturing 20 years, Y.M.C.A.

The preceding debentures bear interest at the rate of 5 per cent., payable July and January.

\$12,000.00, Oct. 1st, 1910, maturing 30 years, Erection of new Car Barns.

\$25,000.00, Oct. 1st, 1910, maturing 30 years, Laying Gas Mains.

\$3,000.00, Oct. 1st, 1910, maturing 20 years, Purchase Land Extension of Reservoir.

\$2,000.00, Oct. 1st, 1910, maturing 15 years, Grant for Swimming Pools.

The preceding debentures bear interest at the rate of 5 per cent., payable October and April.

\$25,000.00, May 1st, 1910, maturing 30 years, North Ward School. Interest at 5 per cent., payable May and November.

The following annual instalment debenture payable in fifteen annual instalments:

\$10,000.00, July 1st, 1910, Electric Lighting System.

Debentures and interest payable at Bank of Montreal Toronto.

Tenders will be received en bloc. Delivery at Port Arthur or otherwise to suit purchaser.

If debentures are delivered outside of Port Arthur, tenderer to pay exchange and insurance.

All tenders must cover accrued interest. Tenders will be considered in open Council at 8 o'clock, p.m., of Monday, October 3rd, 1910.

The highest or any tender not necessarily accepted.

Further information can be obtained from City Treasurer, W. J. Gurney.

J. McTEIGUE,
City Clerk.

Corporation Offices, Port Arthur,
September 17th, 1910.

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Tenders for WATERWORKS PIPE

Tenders are asked for following cast iron water pipe: 2,000 lineal feet 6-inch and 2,900 feet of 14-inch cast iron water pipe, and specials for same; also 800 feet 14-inch flexible pipe for crossing canal. Address

BOARD OF WATER COMMISSIONERS
Welland, Ont.

City of Prince Albert Tenders

Sealed tenders addressed to the undersigned and marked "Tender for Pumps," will be received until noon on FRIDAY, THE 30TH DAY OF SEPTEMBER, 1910, for the supplying and erection of two (2) Centrifugal, Electrically Driven, Automatic, Control Sewage Pumps.

Specifications may be secured from the City Engineer of the City of Prince Albert.

The lowest or any tender not necessarily accepted.

C. O. DAVIDSON,
City Clerk.

Dated at Prince Albert Sask., August 31st,
1910. 39

BOARD OF EDUCATION

Tenders Wanted

Sealed tenders addressed to the Secretary-Treasurer of the Board will be received until

Friday, Sept. 30th at 11 a.m.

for

New School Building on Ossington Avenue

New School Building on Annette Street

Hollow Tile Flooring at Humberside Collegiate Institute.

Work Benches and Cabinet Work, etc. for four New Manual Training Centres

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. H. SMITH,
Chairman of Committee.

W. C. WILKINSON,
Secretary-Treasurer.

Toronto, Sept. 28, 1910.

To Building Contractors

Tenders are invited for the erection in Newmarket, Ont., for a large four-storey Factory Building for the Office Specialty Mfg. Co.

Tenders in bulk or separately for concrete work, brick work, carpentry, painting, plumbing, galvanized iron work and gravel roofing, will be received by the architect up to THURSDAY EVENING, OCTOBER 20TH.

Lowest or any tender not necessarily accepted. The plans and specifications may be seen at my office, Queen street, Newmarket, on and after Monday, October 2nd.

O. E. TENCH,
Architect.

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

ENGLISH ARCHITECT AND SURVEYOR of seven years' experience, will arrive in Toronto in October, and will be open to engagement as assistant. Age 25. References. Address "E. B. B.," care CONTRACT RECORD. 89

Business Buildings and Industrial Plants

(Continued from page 27)

ness thoroughfares. The second is the Standard B. light, at \$63.15 per annum, which is suitable for residential streets. On this point, however, it is understood the city will maintain an option to select whichever light they please in any particular district.

St. Hyacinthe, Que.

Until Sept. 30th, tenders will be received for \$60,000 4½ per cent. bonds for electric lighting purposes. D. T. Bouchar, city clerk.

Watrous, Sask.

The clerk was instructed by council to wire National Securities Company to frame an agreement for approval for the installation of an electric lighting system and for the proposed car line.

Winnipeg, Man.

Smith, Kerry & Chace are preparing plans for the central power sub-station, to be constructed on King street. The building will cost about \$60,000 and the city will let the work this fall, completion being necessary by June of next year.

J. A. Fielding, C.E., of Toronto, and others have been in town prior to their departure for Grand Rapids, where they will investigate the possibility of obtaining electrical power there for the city of Edmonton. The party expect to be away about one month.

Tenders addressed to the Chairman, Board of Control, will be received until October 7th for manufacture and delivery of a motor car for use on standard gauge railway track. Specifications at office of power engineers, Smith, Kerry & Chace. M. Peterson, secretary.

Yorkton, Sask.

Tenders addressed to T. F. Acheson, secretary-treasurer, will be received until October 11th for apparatus for an electric light plant as follows: boilers, engines, piping, etc., generators, switchboards and arc lamps; transformers, motors. Specifications with W. E. Skinner, consulting engineer, Winnipeg, Man.

AWARDED

Medicine Hat, Alta.

D. Milne, mayor, writes that fifteen tenders were received for the supply of gas engines and generators for electric light and power plant here. Chapman & Walker, Toronto, were awarded the contract, supplying Crossley gas engines and generators at \$25,000.

The following tenders for two direct connected gas engine driven 125 k.w. alternating current units for the power plant were received: E. Leonard & Sons, engines, \$13,974, generators \$11,100; Kilmer, Pullen & Burnham (1) engines \$14,500, generators \$8,776, (2) engines \$17,500, generators \$8,776; Siemens Bros., (1) engines \$14,005, generators \$4,255, (2) engines \$17,500, generators \$4,255; Allis-Chalmers-Bullock, Limited, engines and generators \$24,215; Canadian Westing-

house Company, engines \$20,600, generators \$5,690; Canadian Boving Company (1) engines, \$14,500, generators \$4,255, (2) engines \$17,500, generators \$4,255; Vandeleur & Nicholls, (1) engines \$14,500, generators \$3,050, (2) engines \$17,500, generators \$3,200; Gorman, Clancy, Grindley, generator \$5,675; Canada Foundry Company, engine and generators \$21,050; Canadian Fairbanks Company, engine \$13,922, generators \$5,903; National Meter Company, engines \$13,495, generators \$6,500; Turner, Fricke, Pittsburg, engines \$16,706.80, generators, \$7,851; Chapman, Walker Company, engines \$17,060, generators \$5,630; Drummond, McCall & Company, engines \$13,500. M. A. Maxwell, consulting engineer to Medicine Hat.

Port Credit, Ont.

The Hydro-Electric Commission have awarded the contracts for the sub-station here to supply Brampton, Milton and other municipalities which have applied for power. The building will be erected by Stewart Bros., of Port Credit; the Allis-Chalmers-Bullock Company, of Montreal, will supply the transformers, and the switching equipment will be installed by the Canadian Westinghouse Company, of Hamilton.

Victoria, B.C.

The contract for the supply of 2,500 lbs. of copper wire required by the city was let to the firm of Drake & Hawkins at \$18 per 100 pounds. That firm was the only one to submit a tender.

Miscellaneous

Hamilton, Ont.

The following building permits have been issued recently: Howard & Webber, brick stables in rear of 127 James street south, for J. W. Hammond, to cost \$4,000; H. A. Keihl, brick dwelling, Barnesdale avenue, between King and Main street, to cost \$2,000; Thos. Wren, brick dwelling, Barton street, \$2,000; Carver & Phillips, brick store building, Francis street, corner Wentworth street, \$2,500; Y.M.C.A., brick addition to building, Barton street and Milton avenue, \$3,500.

Melfort, Sask.

Tenders addressed to A. McN. Stewart, secretary-treasurer, for purchase of \$2,500 5 per cent. 20-year debentures will be received until October 15th; also until same date tenders for \$1,700 5 per cent. 20-year debentures for local improvement.

Moose Jaw, Sask.

Tenders will be received until October 10th for supplying one standard combination chemical and hose wagon with capacity 50 gallons chemical tank and 800 feet of 2½-inch fire hose, or 40 gallons chemical tank and 1,000 feet of 2½-inch fire hose. Tenderers are asked to quote prices for either 2½-inch steel or 2½-inch rubber tired Archibald wheels; also for one extra set of Archibald wheels, 1½-inch axle, 2½-inch steel or rubber tires. W. H. Heal, city clerk.

Montreal, Que.

Recent building permits include: The Imperial Tobacco Company, St. Antoine street, additions to factory building, \$10,000; St. Denis School Commissioners, 92 Pontiac street, additions to property 210 Laurier avenue, and a three-storey school building on St. Andre street, \$17,500; J. C. A. Heriot, 104 Union avenue, alterations and additions to property at 102 Union avenue, \$8,000; J. B. Drapeau, 757 Marie Anne street, a two-storey residence on St. Hubert street, \$5,500; O. Dinelle, 595 Iberville street, house containing four

dwellings, on Rachel street, \$4,000; J. & Z. St. Pierre, 592a St. Denis street, two houses containing twelve dwellings at 94 St. Mark street, \$15,000; Children's Memorial Hospital, Cedar avenue, a one-storey addition to hospital building, \$11,000; A. Deschamps, 1308 St. Hubert street, house containing three dwellings on St. Hubert street, \$6,000; National Acme Manufacturing Company, 263 St. James street, a one-storey factory building, St. Elizabeth and Acorn streets, \$22,000; St. Eusebe Parish, Fullum street, a presbytery building, cost \$18,000; L. A. Jary, 3383 St. Hubert street, a two-storey house on St. Hubert street, \$2,500; A. Charbonneau, 2141 Esplanade avenue, two houses containing five dwellings on Waverly St., \$5,000; F. Pelletier, 220 Oufresne street, house containing three dwellings on Gauthier street, \$3,000; O. Benard, 1228 St. Denis street, house containing three dwellings on Park avenue, \$4,000; A. Brunet, 425 St. Antoine street, two houses containing six dwellings on Brewster avenue, \$5,000; P. Larose, 35 Montana street, house containing five dwellings on Montana street, \$6,000; F. Hottle, 1348 Boulevard St. Lawrence, house containing two dwellings and store on St. Lawrence Boulevard, cost \$3,500; E. Laframboise, 563 De Gaspe street, house containing three dwellings on De Gaspe street, \$3,000; O. Lefebvre, Mount Royal and Garnier streets, three houses containing six dwellings on Simard street, cost \$4,800; H. Peladeau, 2238 Park avenue, house containing three dwellings on Park avenue, \$4,500; J. Maisonneuve, 2202 St. Urbain street, house containing three dwellings on Waverly street, \$5,000; B. McLennan, 50 Ontario avenue, a two-storey dwelling on Simpson avenue, \$4,000; G. Martineau, 32 Villeneuve avenue, two houses containing six dwellings on Hutchison street, \$8,000; P. Blanchard, 615 Mount Royal avenue, house containing two dwellings on Mount Royal avenue, \$5,500; Mde. A. Hetu, 4631 Sherbrooke street, house containing two dwellings and two stores on St. George's street, \$5,000.

Ottawa, Ont.

The delay in awarding contracts for the vessels of the new Canadian navy is because the plans are being revised by the Admiralty. To ensure secrecy all tenderers are sworn not to divulge any of the details of the plans.

Recent building permits include: James Oliver & Sons, Limited, brick veneer warehouse, Wellington street, \$3,000; G. Cains, contractor; Maple Leaf Milling Company, Limited, ironclad and brick veneer warehouse, Broad street, \$6,000; Wolf Shenkman, brick veneer dwelling, four in row, Nelson street, \$6,000; R. F. Harris, frame dwelling, Holland avenue, \$2,500; W. St. George, brick double house, Russel avenue, \$3,000; E. A. Parsons, brick veneer dwelling and alterations, Ann street, \$2,800; J. A. Lafontaine, dwelling, Clarence street, \$3,000; O. Asselin, dwelling, St. Andrew street, \$3,000.

Port Arthur, Ont.

Tenders will be received up to October 1st by J. McTeigue, city clerk, for the purchase of various debentures of the city of Port Arthur. For further particulars see "Tenders and For Sale Department" of this issue.

Toronto, Ont.

Recent building permits include: T. Wright, 2-storey brick dwelling, near Algonquin, on east side Indian road, \$5,000; G. Buchanan, 2½-storey brick dwelling, near Bedford, on north side Chicora, \$4,500; W. S. Grimshaw, 2-storey brick theatre and dwelling, on 952 College street,

\$5,000; G. H. Webb, 2-storey and attic brick dwelling, near Wright avenue, on east side Indian road, \$4,000; W. S. McLelland, 1 pair semi-detached 2½-storey brick dwellings and stores, northeast corner Don Mills road and John street, \$7,000; F. Courtmanche, 4 detached 2-storey and attic brick dwellings, near College, on east side Keele street, \$16,000; James Kyle, 2 detached 2½-storey brick dwellings on 25-27 Triller avenue, \$7,000; T. E. Washington, 1 pair semi-detached 2-storey brick dwellings, near College, on west side St. Clarens, \$4,400; R. Burkell, 1 pair semi-detached 2-storey brick dwellings, on 5-7 Sulley crescent, \$4,000; Davis & Moore, 2-storey brick dwelling, on Schofield avenue, \$5,000; H. M. King, 1 pair semi-detached 2½-storey brick dwellings, near Garden, on east side Glendale, \$4,600; Wm. McRea, 2-storey and attic brick dwelling, near Bloor street, on west side Dalton, \$4,500; G. Wallis, altering 1 pair dwellings to apartments, on 37-37 St. Vincent street, \$5,000; A. A. T. Munnings, 2-storey brick store and dwelling, on 1052 Bloor street west, \$4,500; Canada Metal Company, 1-storey brick addition to foundry, near Liberty street, on east side Fraser, \$5,000.

Vancouver, B.C.

Building permits were granted recently as follows: Mrs. W. Sanford, 445 Dufferin street, \$4,500; a two-storey brick building to be erected on Water street by Mr. E. Gould, \$15,000; R. D. Cowan, frame building, 2052 Fifth avenue, \$5,000; Chas. Helman, frame structure, \$2,300, 1643 Third avenue east; R. J. Coleman, two frame buildings, \$2,600 each; J. Burns, 1516 Charles street, \$2,600; W. J. Jess, 1808 Sixth avenue east, \$2,500.

Winnipeg, Man.

Tenders addressed to Chairman Board of Control will be received until Sept. 30 for supplies for fire department including: 5,000 feet of 2½-inch cotton rubber lined fire hose; 500 feet of 3½-inch cotton rubber lined fire hose; 30 non-interfering fire alarm boxes complete; 2 15-inch electro mechanical gongs; reserving water tower on running gear. M. Peterson, secretary.

Tenders addressed to C. W. Sharp, chairman Public Works Board, will be received until October 3rd for 5,000 lineal feet wire fencing, delivered and erected at Kildonan Park. Specifications at office of Public Works Board, 229 Chamber of Commerce building. J. H. Blackwood, secretary.

Recent building permits include: R. F. McLean, house, west side of St. Cross, \$5,500; Alaska Bedding Company, additional storey on warehouse, northeast corner of Gomez and Point Douglas, \$7,000; Henrietta Rosholt, house, west side of Ashburn, \$2,500; German Lutheran church, southeast corner of McCalman and Grey, \$7,000; G. W. Ford, house, north side of Harvard, between Guelph and Wilton, \$8,000; J. Morcovits, house and store, Salter street, between Andrews and McGregor, \$5,000; M. Milskolz, tenement, north side of Mount, \$2,200; T. L. Kerr, house, east side of Arlington, \$2,500; D. James, house, north side of Alfred, between Aikins and Salter, \$2,200; G. A. Boehn, house, east side of Pine, between Portage and Lawn, \$2,000; West End Realty Company, two houses, west side of Ruby, \$9,000; G. A. Boardman, house, west side Campbell, between Godfrey and Wellington crescent, \$5,500; W. J. Parks, house, west side of Bannerman, between Andrews and McGregor, \$2,000; D. Kirkerod, two houses, west side of Arlington, \$6,000; Boyle-Higgins Company, house, south side Merriem between Nassau and Pembina, \$3,000;

Sprague Lumber Company, factory, Point Douglas avenue, \$3,000; W. T. Carson, house, north side of Dorchester, between Stafford and Wentworth, \$5,500; G. Wasilina, two houses, north side of Redwood, between McKenzie and McGregor, \$2,000; A. C. Galbraith, dwelling, west side of Basswood place, \$2,000; A. Simpson, dwelling, northeast corner of Home street and Buell avenue, \$4,000; W. Hall, dwelling, south side of Elgin avenue, \$2,000; P. McDiamid, two dwellings, west side of Walnut street, between Buell and Wolseley avenues, \$7,000; J. Harrison, dwelling, south side of Kylemore avenue, between Nassau and John streets, \$2,000.

New Companies

The British Empire Bridge Company, Limited, Montreal, Que., capital \$5,000,000. Incorporators: Robert C. Smith and Frederick H. Marker, K.C., both of Montreal.

Conduit & Cable Company, Limited, Toronto, Ont.; capital \$20,000. Incorporators: John F. MacGregor, accountant and Francis Walkingshaw, solicitor's clerk, Toronto.

The Dorchester Peat Company, Limited, London, Ont., capital \$75,000. Incorporators: John McWilliam, physician, and John M. McEvoy, barrister-at-law, both of London.

The Modern Pressed Brick & Stone Company, Limited, Winnipeg, Man., capital \$5,000. Incorporators: Anson E. Brown and Ephraim H. Fleming, contractors, both of Winnipeg.

Canadian Tube & Iron Company, Limited, Montreal, Que., capital \$1,000,000. Incorporators: Geo. V. Cousins, barrister, and Samuel T. Mains, bookkeeper, both of Montreal.

The Urban and Rural Telephone Company, Limited, Bothwell, Ont., capital \$4,000. Incorporators: George Mahler, manufacturer, and Wm. R. Hickey, solicitor, both of Bothwell.

Canadian Patent Scaffolding Company, Limited, Toronto, Ont., capital \$40,000. Incorporators: James E. Day, John M. Ferguson and Edward V. O'Sullivan, solicitors, all of Toronto.

The Canadian Box & Barrel Company, Limited, Pembroke, Ont., capital \$100,000. Incorporators: John C. L. White, barrister-at-law, and Finlay Watt, lumberman's agent, both of Pembroke.

British Columbia Portland Cement Company, Limited, Princeton, B.C., capital \$500,000. Incorporators: Robert P. McLennan, merchant, and James A. Harvey, barrister-at-law, Vancouver, B.C.

Canadian Dredging Company, Limited, Midland, Ont., capital \$750,000. Incorporators: David S. Pratt, lumber merchant; Frederick W. Grant, barrister-at-law, and Hercule J. Craig, banker, all of Midland.

Lickleys, Limited, Toronto, Ont., capital \$100,000. Incorporated to acquire and otherwise deal in timber limits, sawmills, etc. Incorporators: Hugh M. Lickley, manufacturer, and Arthur G. Randall, manager, both of Toronto.

Vulcan Tube Cleaning Systems, Limited, Montreal, Que., capital \$149,000. Incorporated to manufacture, deal in, etc., appliance for cleaning boilers, boiler flues, etc. Incorporators: Albert G. B. Claxton, K.C., and Thos. R. Kerr, advocate, both of Montreal.

It is stated that the Booth Copper Company, of Toronto, Limited, have been succeeded by Booth, Coulter Copper & Brass Company, Limited.

Contract Record

ESTABLISHED 1886

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Municipal Progress, Advance Information

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto September 28, 1910

No. 39

The Engineer as Sole Arbitrator

According to Webster, a specification is "a written statement containing a minute description or enumeration of particulars." We know it as the written document in which engineers and architects describe those portions of proposed work which they cannot show clearly by diagrams; wherein further, they are expected to specify the material and quantities required, and, with this, the manner of carrying out the work.

How many specifications drafted by engineers come up to these requirements? Frequently, according to some contracting concerns, they are not worth the paper they are written upon, being so one-sided that they could not stand in a court of law, and so unreasonable that even the engineer himself would not think of requiring the "pound of flesh" which might be exacted under the letter of the law.

The specification should be both definite and exact. Then the engineer not only fully understands what he requires, but where, in addition, he expects to enforce its carrying out. Some engineers fancy that they are able to shield themselves behind a host of unreasonable clauses should a mistake be made. The client must pay for these unreasonable requirements, and the engineer who inserts them places himself in an unfavorable light before the contractors—the men who do the work and are in a position to judge of the necessity of each clause.

Such a clause as "All works are to be done to the entire satisfaction of the engineer" causes considerable dissatisfaction. He is to be the sole judge of the work and material, and his decision, only, on all questions of dispute as to the meaning or interpretation of plans and specifications is to be considered final and binding on all parties. Why the engineer who prepares specifications, and who is a client's representative, shall be the

sole arbitrator in matters of dispute between himself and the contractor it is difficult to understand.

The engineer requires certain work to be done. The contractor, for a price, is willing to do the work. They both are agreed with the drawings and specifications covering the work required. It is unreasonable to expect the contractor to be content with the engineer as sole referee. It is doubtful if such a clause would hold in a court of law, and we cannot understand why engineers persist in inserting such clauses in the specifications. Such a clause as this places the men who make the drawings, prepare the specifications and contracts and issue the progress estimates, the arbitrator in matters of dispute. Is this fair to either the engineer of the contractor? It cannot be, since no contractor has any idea of abiding by this stipulation, should dispute arise.

This clause undoubtedly keeps a number of contractors from tendering on work where they are not personally acquainted with the engineer. It reduces the number of tenders considerably, and places the work practically in the hands of the friends of the engineer, which is not good business. The wording of specifications and the preparation of drawings and designs for the purpose of securing what is required should be in such a way as to place all contractors upon the same footing. Nor should the clauses be so stringent as to eliminate competition.

Basis for Contract Estimates

Specifications accompanying recent invitations to bid on a rather large piece of railroad construction in the East contained a clause stating that the railroad company would afford contractors "Every facility to make an examination of the ground, dig test pits, make borings, etc." Under the clause relating to piling was a provision that piles would be paid for at a price per linear foot for the length in the ground after being cut off, and a further provision that the length of the piles to be provided would be ascertained by driving test piles at the contractor's expense. The rest of the information shown on the profiles was of the most meagre description. There was no indication of the nature of the materials in the cuts or foundations, and there had evidently been little attempt to carefully distribute the quantities although the work averaged over 60,000 cubic yards per mile.

It is surely time for us to abandon this kind of contract. Most of the big railroad systems of the West long ago realized that the fullest information should be obtained and made available before asking contractors to bid, not only because the low prices thus obtained more than balanced the extra cost of getting the information, but also because they have learned that a proper location cannot be determined until the fullest information is obtained, particularly information regarding the character of the material to be moved. One of the most important factors governing final location is the distribution of the quantities, and this in turn involves an estimate of the behavior of the materials in the cuttings when placed in the embankments, whether they will swell or shrink, and how much. Of course this must be an estimate, in any event, based on the experience of the engineer, but his judgment should be, and certainly is, better, if it is based on such knowledge of the materials as may be obtained from a reasonable investigation of sub-surface conditions than if simply resting on observation of the surface only. When it is recalled that rock excavation, if entirely unmixed with earth, will sometimes swell nearly 100 per cent., that is, one yard in place will make two in an embankment, that the percentage of swell varies from this to nothing, that

many kinds of materials shrink, and that embankments often compress the soil on which they are built or force it out of place, it will be seen that an investigation of the materials is absolutely necessary for a reasonable determination of the distribution.

Most locating engineers realize the necessity of such investigations, and the large railroad systems of the country, especially in the West, as before stated, acknowledge the economy resulting from them, but nevertheless the specific instance of a contrary course, noted above, which recently happened, is only one of many where the contractor is asked to gamble, for, of course, no contractor is going to the expense of digging test pits or making borings for the benefit of the railroad company. The cost of piling must necessarily be increased by the cost of driving test piles all over the country before the piles are ordered, not only increasing the cost but thus necessarily delaying starting work on the foundations of bridge abutments, culverts, and the like, which are always wanted before they are ready.

The lack of this information is generally due to parsimony on the part of the management of the railroad, but the engineer in charge is always blamed for the trouble that ensues. When he finds after construction has started that his quantities are not going to balance, he has to rush around making frantic attempts to change the line to overcome the difficulty, or, if he is not conscientious he makes sure that he has plenty of material in his cuts and then widens his banks carefully, if he has to, so that no one is the wiser and 15 to 20 per cent. more excavation has to be paid for than might have been necessary.

On ordinary single track railroad work running about 20,000 cubic yards per mile, a saving of 1,000 or 2,000 cubic yards of rock per mile, which can very readily be made by careful work, and often a great deal more, will pay for considerable engineering investigation, besides avoiding complications and disputes; and on work involving 60,000 yards per mile it can readily be seen that the possibilities are large. It is conceded, of course, that minute exactness in railroad location or in the distribution of quantities is by no means necessary, even if it were possible, but every effort should be made to obtain reasonable information and to obtain from the management time and men enough to make adequate studies of its effect upon the location. This matter is by no means new, but the importance of the work referred to, at the outset of these comments and of the railroad of which the line is an addition, seems to indicate that someone in a pretty influential position is as yet not sufficiently educated to the importance of spending a small sum to save a large one.—Engineering Record.

The first section of the Kent and Queen street, Ottawa, 48-inch circular brick, 24-inch and 15-inch tile pipe sewers was completed last season. Actual rock levels showed much more rock than was estimated and in places running sand was found at the proposed line of grade. The Ingersoll Sergeant steam drill was used continuously on this work with steam supplied from the boiler of the traveller. The brickwork was constructed to the centre of Queen street. From this point in an easterly direction to the centre of Bank street, 24-inch tile pipe was laid which was reduced to 15-inch, and carried to 115 feet east of east building line of Bank street. An overflow 15-inch pipe diameter was built leading from the existing brick sewer on Bank street into the new 24-inch Queen street sewer and had the effect of relieving the flow of storm water.

The City Engineer's Estimate

Some Hard Facts as Presented by a Toronto Contractor—Is the System Right or Wrong?

Toronto, Sept. 17th, 1910.

Editor "Contract Record":—

I have read with interest your article on page 35 of the September 14th issue of the "Contract Record" and also Mr. Curtis' letter on page 36 of the same number, and agree with both, that the system of day labor as practised in Toronto (and also, apparently, in many other municipalities) and the principle of having the engineer tender for work against the contractor is unfair both to the contractor who makes the bid and the property owner who has to foot the bill.

The fact of the matter is this: the engineer puts a foreman on the work with no inspector over him, and the man can scamp the work as he likes, both in material and faulty labor. This new practice is vicious and dangerous, and it will be more so, if allowed to develop. The system gives the aldermen patronage, and the officials lots of room to work out increased salary by telling the public of the saving they have been able to make by doing the work by day labor; when, as a matter of fact, if the contractor had been given the same latitude, he would probably have done the work better and more economically.

There are many circumstances and opportunities favoring the engineer. He can use what he likes and do as he likes, whereas the contractor has to pay for all the material he gets and put it into the work, under the supervision of one or more inspectors. Contractors are compelled to live rigidly to the engineers' specifications. One may judge whether the engineer's foreman on a work with no inspector will not try his best to make the job pay, even if portions have to be somewhat scamped.

It is time property owners took more interest in these matters and it behoves all contractors to hold out the danger signal. The system under discussion is a menace to private enterprise and capital, and its influence is most insidious and widespread, as is shown in your article and in Mr. Curtis' letter.

Yours truly,

A. W. GODSON, TORONTO.

A Similar Complaint from Winnipeg

R. W., of Winnipeg, informs us that some 18 months ago, tenders were called for paving construction on Main Street and Colony Street East. He states that the work was let to the construction engineer at a price that no one else could approach; further, that the work has not been carried out yet, although the contractors' deposits on these jobs were not returned for a month. R. W. is pessimistic enough to express the opinion that conditions in this direction are getting worse.

The subject was discussed in a general manner by the Winnipeg Board of Control last week. As a result of this discussion the city engineer's department was notified that in future vigorous inspection would be made of its work. The question of outside supervision brought up some points relative to work by the engineer of construction, and it was found that he was often allowed some liberties in reading specifications. The board agreed that this should not be permitted, and a strict supervision of his work will be conducted.



Reinforced Concrete Arch Bridge of 70 ft. Span at Kirkham's Mills, Township of Scarboro', Ont.

Reinforced Concrete Arch Bridge, Scarboro', Ont.

The reinforced concrete arch bridge shown in the accompanying illustration, was opened to traffic on Monday, September 12th, 1910, in the presence of the council of the township of Scarboro', Ont. It has a clear span of 70 feet; the height of roadway above water is 20 feet and the roadway is 16 feet in clear width. For the north abutment the foundation rests upon well-compacted gravel while at the south abutment the material was hard clay. Especial care was taken to prevent cracking of the spandrels and railing by inserting expansion joints over the springings and at points in the railing approximately over the third points of the arch ring. The asphalt in these joints was prevented from running out at points where lap joints could not be provided by calking with rope. All reinforcement was of plain round steel bars except expanded metal in the railing.

The total amount of concrete in the bridge was about 425 cubic yards. The cost, including engineering and inspection, was about \$5,900.

The engineers for the work were Messrs. Barber & Young, Toronto, and the contractors, Messrs. Rutherford & Patten, St. Catharines, Ont.

Tensile Tests of the Bond of Cement Mortars

The strength of the bond between layers of mortar deposited after different time intervals has been investigated by tensile tests by Prof. B. Kirsch, of Vienna, and because the method has proved satisfactory it was described by him in a paper presented to the Copenhagen Congress of the Intercolonial Association for Testing Materials. The specimens resemble roughly in shape the ordinary tensile test specimen, the joint being at the smallest section, which has an area of 100 x 200 mm. The moulds were of wood, lined with zinc to prevent absorption of water by the wood, and when the first half of the specimen was moulded the other half of the mould was closed with a removable filler block.

Two mixtures of Portland cement were experimented with, a 1:2 and a 1:4 mortar. The intervals of rest between pouring the two layers in contact were 0, $\frac{1}{2}$, 2, 6 and 14 hours, corresponding to uninterrupted work, work interrupted by short intervals, as by the dinner hour, and by half and finally a full day or night. The charge was pressed into the mould with a pestle, but not rammed. The 1:2 mixtures were taken from the moulds after two or three days, the 1:4 mixtures after

eight days. After completion the specimens were allowed to harden for three months in a damp cellar.

The Portland cement used showed a tensile strength in neat tests of 269 pounds per square inch after one week, and 346 pounds after four weeks. It was of constant volume, took initial set in $4\frac{1}{2}$ hours and hard set in 15 hours. A quartz sand was used.

The adhesion values found are given in the following table in pounds per square inch:

Interval in hours	0	$\frac{1}{2}$	2	6	14
1:2 mortar	54	$17\frac{1}{2}$	$20\frac{1}{2}$	15	$14\frac{1}{2}$
1:4 mortar	$56\frac{1}{2}$	17	16	$22\frac{1}{2}$	17

From these and further tests Prof. Kirsch concludes that an interval of half an hour is sufficient to reduce the adhesion strength to about one-third of the concrete strength, and that with longer intervals the adhesion diminishes still further but more slowly than during the first half hour.

Toronto Filtration Plant

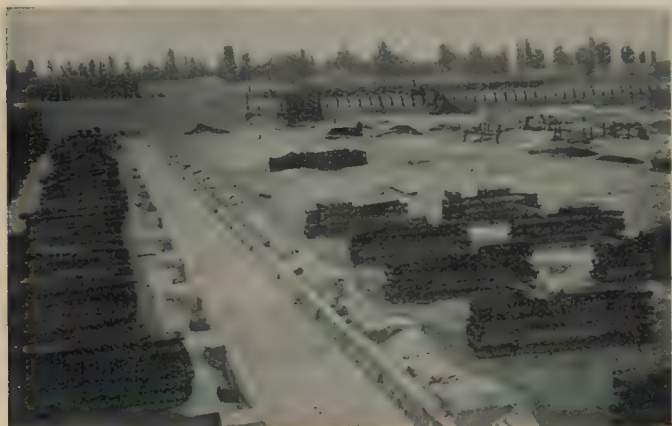
Attention is directed to the description of the above work appearing on the following pages. It is of interest to note that Mr. Allen Hazen, of New York, the city's consulting engineer, came out strongly in favor of the contractors upon the occasion of his visit to the city last Saturday. Mr. Hazen held a consultation with City Engineer Rust, Mr. H. L. Drayton, K.C., Corporation Counsel, and other officials regarding the progress of the work. He stated that, having regard to the difficulty experienced by the contractors in securing men they have done remarkably well. In his opinion the work might be continued throughout the greater part of the winter. It might cost a little more for labor, but that was an obstacle that should be overcome.

During 1909 a tar macadam pavement was laid on Waverly street, Ottawa, from Elgin street to Metcalfe street, the full width of the roadway between the concrete sidewalks. This was of the usual construction, 8 to 10 inches of spalls for the foundation, a 3-inch layer of 2-inch broken stone, a 3-inch layer of 2-inch tarred limestone and a top coat of 1-inch thick of $\frac{3}{8}$ -inch tarred limestone. The existing concrete sidewalk on the north side with the exception of about 180 feet, at the west end, was lifted and relaid in line with the west end. The cost of this tar macadam pavement, 1,625 square yards, laid by day labor exclusive of interest, was \$1.88 per square yard.

Progress on the Toronto Filtration Plant

Timely Description of the Details and Methods of this Work— Summary of Amount Completed—Fourth Article of Special Series

During the last few weeks a good deal of gratuitous criticism has been handed out from various quarters at Toronto concerning the alleged unsatisfactory rate of progress on the filtration plant under construction in that city. The subject has been discussed at much length by the civic authorities and by the press, and a number of suggestions have been made. One source of protest is



1—Floor of Filters Showing Main Drain for Collecting Filtered Water

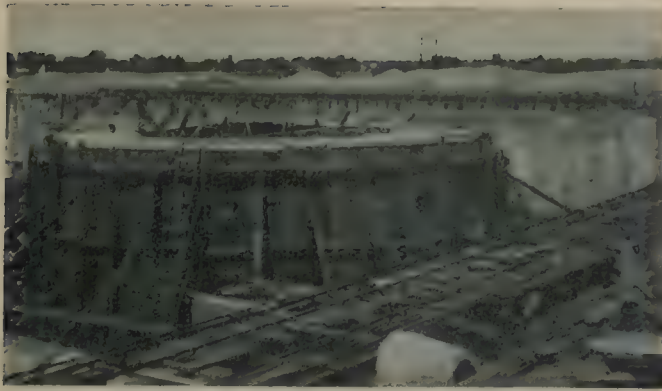
the Local Council of Women, who wrote to Mayor Geary calling attention to the prevalence of typhoid fever in the city and calling upon the council to hasten the construction of the filtration plant at the Island. An idea of the extent to which the ladies are alarmed may be gathered from their claim that the delay on the work is

likely to cause the loss of 100 lives or more. We do not hold any brief for the contractors, Messrs. Dill, Russell & Chambers, but we venture to think that if the Local Council of Women in common with the statisticians who computed the figures have not an exaggerated sense of the seriousness of the situation they certainly have underestimated the detail in the construction of this plant, the trouble caused by the scarcity of labor and the amount of work that has actually been accomplished.

While we do not propose to discuss at any length the several suggestions that have emanated from the Board of Control and elsewhere, we cannot refrain from criticizing the proposal to augment the supply of labor at the filtration works by offering an increased rate of wage for unskilled labor. The minimum rate required to be paid on city contracts is 18 cents per hour, but the actual rate varies from 20 to 25 cents per hour. What would happen if Messrs. Dill, Russell & Chambers offered an inducement of a minimum rate of 25 cents an hour, as suggested by one of the city controllers, is no difficult matter to foretell. At first there would be a general rush for the filtration plant, and the various other contracts under construction in the city, such, for instance, as the trunk sewer work, would be practically at a standstill. There are four or five hundred men engaged on the last named work, and if half of these were to throw up their jobs it would disorganize the whole department. Then the other contractors, in order to complete their contracts, would at once meet the increased rate, the men would return to their original positions and the conditions would remain unaltered, the net result being simply an increased rate of wages to all laborers in the city without having accomplished the end in view. Such a



2—General View of Filters Showing Covered Main Drain and Concrete Piers



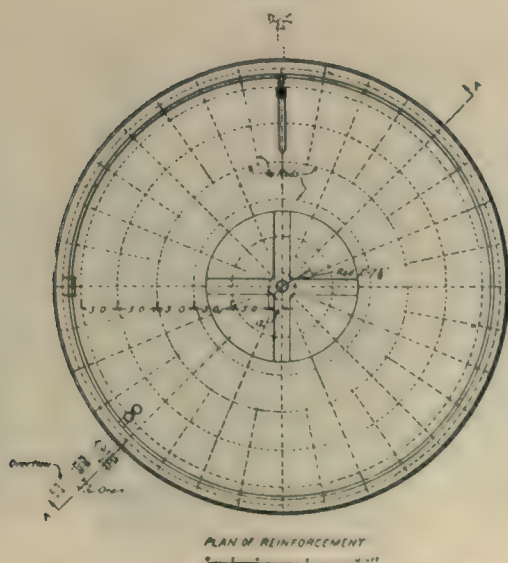
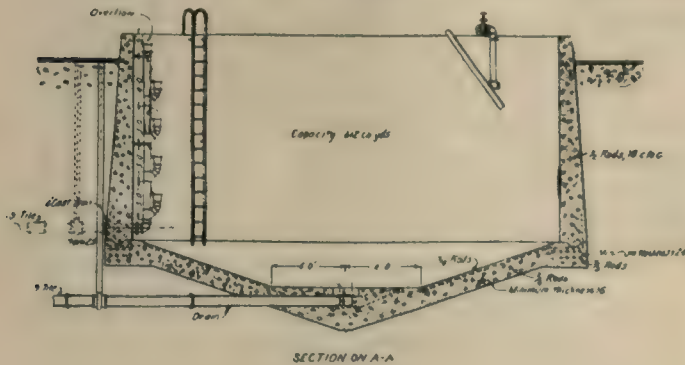
3—Bins for Storing Washed Sand for Filters

step would establish a bad precedent and one that would be hard to live down in contracting circles.

In one respect at least the work accomplished has called forth general commendation from visiting engineers and contractors, and that is in regard to quality. Upon a recent visit to the scene of operations, the city's consulting engineer expressed the opinion that if the quantity of the work done equalled the quality there could be nothing else desired.

A description of what is going on at the works, an account of the methods by which the construction is being carried on and a summary of what has been accomplished this season will be timely at this juncture. The article will be of additional interest if reference be made to previous numbers of this journal in which the earlier stages of the work were described.

In the third article of this series, published May 4th,



3A—Constructional Details of Storage Bins



4—End and Division Walls of Filters, Foundation for Entrance Building and Raw Water Inlet to Filters

details were given of the winter work and of the preparations made by the contractors with a view to facilitating construction during the summer and fall. At the opening of the season everything was in excellent shape for the expeditious handling of the contract. The contractors had planned the layout of their extensive plant and had erected a large screening plant on the lake shore. Also a system of tramway lines had been installed for the transportation of materials to the screens and storage bins, and from these to the concrete mixers. A comparison of the present views with those published on May 4th will give some idea of what has been accomplished in something less than five months.

Since that date the excavation for the west half of the filters, the pure water reservoir and a portion of the east half of the filters has been carried out, also the remainder of the various pipe lines. The pumping station and the two regulator houses have been completed. The construction of the four large sand bins, which are to be used for the storage of washed sand for the filters, has been carried out. In addition to the above, and to a multitude of minor detail in the construction of man-holes, catch basins and other items incidental to the work, there have been completed practically all the floors for the west half of the filters, the concrete piers and walls for three complete filters, the groined arch roof for two filters, the concrete floor and the greater portion of the walls for the pure water reservoir.

As may be gathered from a preceding paragraph, the contractors, at the beginning of the season, installed a



5—30-inch Main Drain and 72-inch Raw Water Pipe at Site of Venturi Meter



6—Concrete Floor of Pure Water Reservoir, Area 2½ Acres

plant which, in their opinion at that time, would be sufficient for the requirements of the contract during the present year, but the scarcity of labor which has been experienced all over Canada in every department of constructional enterprise greatly hampered their operations with the result that a portion of the plant has been idle for practically the whole season. A force of upwards of 300 men has been constantly employed during the present season. The accompanying illustrations indicate in a measure what has been accomplished.

The first picture is a general view of the floors of filters, showing the detail of the main collecting drain for the filtered water. This main drain is built of concrete and is about six feet in width. Ten-inch split tile are built into the sides of this drain at intervals of 13 feet. This tile will be extended in parallel rows from the main drain to the division walls and will collect the filtered water, which will be gathered into the main drain and be carried through a 24-inch cast iron pipe to one of the regulator houses. From there it will pass into the pure water reservoir, and thence to the city pumping station. The main drain extends the whole length of each filter and is 312 feet long, the size of each filter being 312 by 117 feet. The forms shown on the concrete floor are for the piers which support the concrete roof.

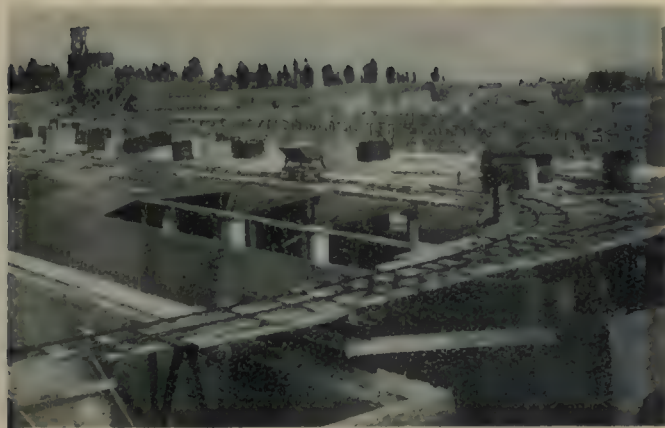
In the second illustration, which shows the construction at a later date, the main drain is covered with reinforced concrete slabs. The only entrance into this drain is through the 10-inch split tile drains which collect the filtered water. As will be seen, the piers have been erected and the forms stripped off. The contractors are to be congratulated upon the accuracy of the alignment of these piers and the neat appearance of the work.

For the operation of the filters it will be necessary to have a supply of washed sand in stock for the renewal of the surface material for the filters. For this purpose four circular storage bins have been constructed (see illustration No. 3). Each of these bins has a capacity of 612 cubic yards, the inside diameter of each being 34 feet and the depth about 21 feet. The thickness of the concrete floor and walls, and the arrangement of the steel bar reinforcing, also details of the piping system are shown in 3a. These bins are of the best type of reinforced concrete construction and present a very uniform appearance. The tracks and endless cable seen in this picture show the contractors' method of handling the various concrete materials from the screening plant on the lake shore to the mixer plants on the work.

The fourth view shows the outside wall of the filters and the division wall between the two adjacent filters.



7—The First Forms Erected for Groined Arch Concrete Roof Over Filters



8—Outside Walls of Pure Water Reservoir and Filters, and Starting of Concrete Roof

At the junction of these walls there has been erected a small building known as an entrance house, through the foundations of which the raw water pipe, shown clearly in the photo, brings the unfiltered water to the filters. The supply is regulated by large gate valves through which the water is supplied. There will be six of these entrance buildings, three on each side of the central court. Each will provide for the supply of raw water to two filters.

In the fifth picture will be seen the concrete pipe lines where they cross the drainage canal near the pumping station. The upper one is the 72-inch raw water pipe, through which the unfiltered water is carried from the pumping station to the filters. The end shown and a section near the pumping station have since been connected by a large Venturi meter, 50 feet in length. The peculiar construction of this meter consists in the sudden narrowing down of the diameter of the pipe from 72 inches to 36 inches and the gradual enlarging in a long funnel to the larger diameter. Cast iron rings with small pipes attached have been set into this pipe at such points as to permit the accurate measuring of the flow of water through the meter by means of a system of gauge tubes. Variations of pressure in these indicate changes in the quantity of water flowing through the pipe. Thus an accurate computation of the amount of water being filtered can be made daily.

The lower pipe, seen in No. 5, is the 36-inch main drain which extends clear round to the extreme end of the plant. Into this drain are connected the smaller drains from the pure water reservoir, filters, regulator houses and various catch basins, thus enabling the drainage of any desired portion of the filtration plant. This

main drain empties into a sump in the pumping station. At this point will be placed a pump to elevate the drainage so that it can be forced out into a lagoon to the west of the pumping station.

The concrete floor of the pure water reservoir is shown in the sixth photo. Here a quantity of filtered water will be stored before passing into the steel pipe line and the tunnel leading to the city pumping station. This reservoir is 312 feet square, covering an area of $2\frac{1}{4}$ acres. It is surrounded with heavy concrete walls and will be roofed over after the same manner as the filters. The amount of concrete in this floor is a little over 2,500 cubic yards. The roof will be supported by 529 concrete piers.

In the seventh view there is illustrated the type of form used in the construction of the groined arch roof. This roof is put up in sections 13 feet square. The thickness of the concrete over the supporting pier is 16 inches, gradually tapering down by parallel elliptical surfaces to 6 inches in thickness at the flat top. Each section is drained by 2-inch agricultural tile pipe, set slanting over each pier. An immense number of forms are required in the construction of this roof work. About one-third of the number are shown in the picture. The



10—Interior of Filters, Showing Piers and Groined Arch Roof

photo also shows the tracks used by the contractors for the economical handling of the concrete from the mixer plant in filling the walls surrounding the filters and also the roof forms.

The eighth illustration, taken at a later date than the preceding picture, shows sections of the concrete roof completed and the concrete manholes which are spaced at regular intervals over the surface of the filters for the purpose of ventilation and the convenient handling of material in and out of the filters. Over two feet of earth will be spread on the top of this concrete roof. This in time will be sodded to form a large park. The only evidence of the existence of a plant, outside of the buildings and operating devices, will be the manhole tops in regular rows. This photo shows also the type of form used in connecting the concrete squares over the top of each pier with the side walls. It also shows the method of supporting the forms from underneath. It will be noticed that the track for handling the concrete has been thrown over onto the finished roof. This method has been followed up generally as the work has advanced and has facilitated the economical handling of the material. The four large sand bins described pre-



9—Later View Concrete Roof of Filters, Showing Manholes and Steel Forms for Same

viously will be seen over the top of the end walls in the distant part of the picture, also the form work for the two regulator houses.

A later view of the roof of the filters, No. 9, shows clearly the connection of the walls with the roof. On the right hand in the background will be seen the completed concrete wall of one of the regulator houses.

An excellent interior view of the filter, after the placing of the concrete roof and the removal of forms, is shown in the last picture. The design of the roof is well illustrated by the graceful elliptical curves of the groined arch. The perspective view is particularly pleasing. Here again is a further evidence of the excellent workmanship that has been characteristic so far of the whole contract. The results shown in illustration No. 10 are a proof of the accurate placing of the piers and the uniformity of the form work for the roof. The clean even surface of the concrete and the general appearance

of the work are an object lesson in this class of construction.

Approximately one-half of the value of the contract has been completed up to the present date. It is hoped to prosecute operations during the winter months with a view to completing the whole work about the middle of next season. Practically all of the detail and smaller work have been finished and from now on the developments will be of the kind that will appeal to the non-technical critic of municipal construction. In the remaining portions of the contract much better results may be expected. The work will consist in the completion of a considerable amount of concrete construction, the preparation of the filter gravel and sand required in the operation of the plant, and the refilling about the filters and pure water reservoir, necessary for the protection of the plant from extremes of weather and to give the work a finished appearance.

Power Development in Northern Ontario

Interesting Constructional Features of Installations at and around Cobalt—Cobalt Hydraulic Company's Novel Application of Hydraulic Compressed Air System

Cobalt is strikingly abreast of the times in the possession and general use of electric light and power. The four examples which stand out prominently in the Cobalt region are: (1) an up-to-date interurban electric railway, the Nipissing Central; (2) the hydro-electric development of the Beach Brothers, some six miles from Cobalt town at Hound Chutes on the Montreal river, operating under the name of the Cobalt Power Company (described in last issue of the "Contract Record"); (3) a hydraulic

inch. The capacity of the plant at the air intake is 40,000 cubic feet of air per minute designed to deliver 5,000 cubic feet per minute under 100 pounds pressure at the mines.

The diagram shown in fig. 2 will give an idea of the plan under which the plant operates. While the underlying principle is as old as the world itself, its application to this form of industrial enterprise is entirely new, and too much praise cannot be given the clever inventor, Mr. C. H. Taylor, who is also the superintendent at present in charge of the system.

The huge shafts and tunnel are all sunk in the solid rock. The upper end of the intake vertical shaft, shown on the left side of fig. 2, is closed except for some dozen large circular perforations, and resembles more than anything else, the outlet of an ordinary water sink. This perforated end is kept at such a distance below the surface of the water as is best suited to the proper mixture, by suction, of the air and water; this distance is about 14 inches. The mixture is now carried down the 350-foot vertical shaft in the same way as in a filter pump, but as soon as the bottom is reached and the mixture begins its course along the horizontal 1,000-foot tunnel, the water settles to the bottom and the air escapes upward to the reservoir, where it is held under pressure and from which it can only escape through the pipe line

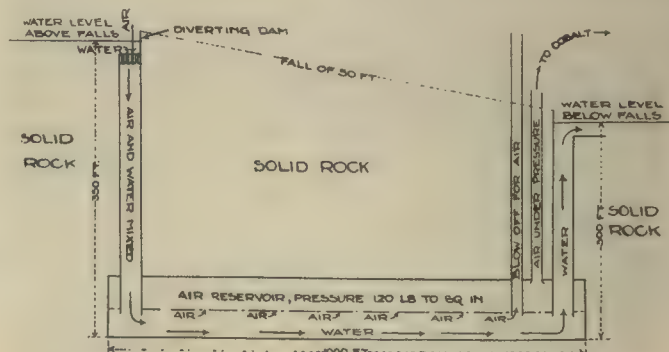


1—Metal Tube Conducting Compressed Air Eleven Miles under 120 Pounds Pressure

compressed air system, operated by the Cobalt Hydraulic Company and situated on the Montreal river, a little lower down, at Ragged Chutes; and (4) the hydro-electric development near the mouth of the Montreal river, but situated on the Matabitchouan, a smaller river, emptying into Lake Temiskaming at practically the same point on the Montreal river. This latter is known as the Mines' Power Company.

The Cobalt Hydraulic Company

The Cobalt Hydraulic Company's plant transmits compressed air from Ragged Chutes to Cobalt town and district, a distance of about eleven miles. The air is carried in a metal tube, a view of which is shown in fig. 1. This tube is 18 inches inside diameter. The pressure at the chutes is 120 pounds, which, delivered at the mines, gives something over 100 pounds to the square



2—Diagrammatic Sketch of Hydraulic Air Compressing Plant—Cobalt Hydraulic Company



3—Diverting Dam—Mines Power Company.

or the exhaust (when the demand is less than the supply).

The Mines' Power Installation

Mr. A. E. Walberg, of Montreal, is largely interested in this plant, which has been constructed by the engineering firm of Smith, Kerry & Chace. The generating station is situated some 26 miles south of Cobalt on the Matabitchouan river. From there the electric power is transmitted to substations in Cobalt, Brady Lake and South Lorraine. The site of the power house is two and one-half miles from the point where the Matabitchouan river enters Lake Temiskaming. The location was most favorable for getting full benefit of the total fall of water at minimum cost. At one point the Matabitchouan takes a sudden curve and doubles back on itself in the short distance of a mile or less. All around this sharp curve was formerly falls and rapids, giving a total head of over 300 feet. The plan of utilization of this fall consisted simply in the construction of a diverting dam at the head of the rapids, and the leading of the diverted water over the steep hill side by the shortest route to the river bed below.

The work was commenced in June, 1909, and in March, 1910, the plant was in operation and supplying power to the mines. The material for building was brought to the grounds by way of Temiskaming, and from there by scows up Lake Temiskaming and the Matabitchouan river to within 500 yards of the power house. All of the machines to be installed and most of the material was placed on the grounds before naviga-

tion closed and the remainder was hauled by teams over the chain of lakes from Temagami.

The Storage System

The storage system is an extensive one, developed to a degree quite in excess of what has previously been considered necessary in Canadian plants. The Matabitchouan river in its natural flow varied greatly with the seasons. Possibly at lowest water not more than 2,000 horse power would have been assured. By the judicious damming of a chain or group of small lakes, which are dotted over the drainage area, all the water of the spring freshets can be stored in the various reservoirs. These dams will be opened one by one as demand requires them and a constant supply of approximately 8,000 horse power delivered to the turbines. The drainage area now controlled by this series of dams is about 350 square miles.

The water in First, Second and Third Bass lakes has been raised 40 feet by the main dam. Three dams have been built to hold the water in Rabbit lake, which can



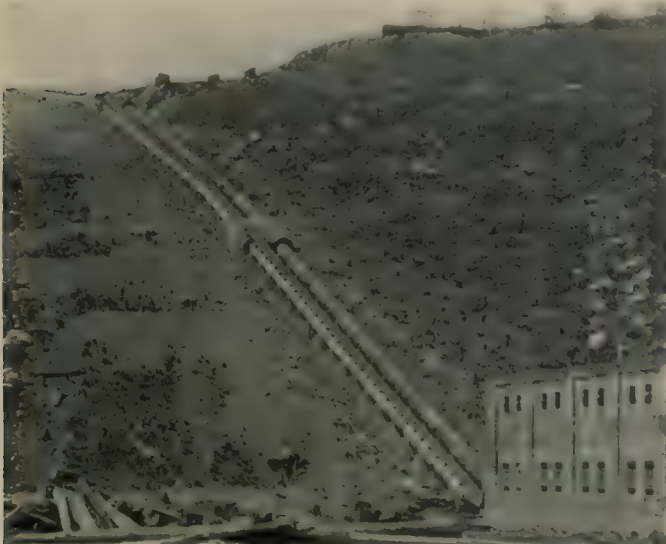
5—Reinforced Concrete Power House—Mines Power Company

be raised 18 feet and has an area of about 7 square miles. Above this lake is White Bear, in which the water can be raised 10 feet. In addition to these there are dams at Ross and Bear lakes, but both of these belong to lumber companies.

The main diverting dam near the power house, fig. 3, is approximately 675 feet long and built of concrete. It has three waste sluices, each 14 feet long, and one log sluice 20 feet long, and a spillway of 30 feet.

There are two pipe lines each 1,054 feet long and 5 feet in diameter, installed by the Jenckes Machine Company, of St. Catharines. The pipes (fig. 4) are supported by three concrete anchor blocks, and have concrete saddles at intervals of 12 feet. Each pipe has four expansion joints. A bursting plate and manhole are also installed at the foot of each. There is a net head of 312 feet, which gives a pressure of 126 pounds in the wheel case.

The power house, fig. 5, which is entirely of reinforced concrete construction, contains four turbines with a maximum of 2,750 horse power each, and a normal rating of 2,150 horse power.



4—Two Pipe Lines—312 Foot Fall

The commission appointed by the Manitoba Good Roads Association to award prizes to municipalities in that province for the best kept roads, report considerable improvement in conditions since last year. Four prizes of \$50 each are to be awarded.

Cost: the Fundamental of all Construction

Notes on Cost Data and Cost Analysis—Methods of Determining Cost—Examples of how Specifications Affect Cost

BY DANIEL J. HAUER

It has been said that cost data is of value as long as methods of work remain the same and the price of labor is known. To a great extent this is true, yet many take exception to such a statement and with reason. Much cost data is of little value except to the man who keeps it, owing to the fact that it is incomplete. Then too many costs that are recorded and published are in scrap book form, there being little or no connection between them.

On the other hand, costs should be and are the basis of all commercial engineering and of all contract work. One of the greatest of all American engineers once defined engineering "as the art of doing work for one dollar that any bungler could do after a fashion for two." This is a true definition, and the American engineer and contractor excel in this art. This alone shows the necessity of the engineer and contractor knowing costs.

During recent years there has been much hysteria regarding cost data. Some have advocated costs and cost keeping to the exclusion of everything else. Cost data has been cried from the housetops as the panacea for all evils. On the other hand others have attempted in their ignorance to cry down this important feature of modern engineering. The writer remembers a prominent eastern engineer testifying in a controversy on the cost of doing certain work that the idea "was all wrong, that I do not believe in it, and we are only wasting time by going into this matter from that standpoint." This was in spite of the fact that under his direction, extensive studies had been made by his principal assistants on the cost of the work in question, and his department had collected from engineering journals and books a vast amount of cost data.

Many engineers and contractors are capable and competent to originate and develop a scheme or method of cost keeping. Others can adapt methods already devised to their own needs, and anyone can keep costs under verbal or written instructions, but the application of costs to other jobs and for the purpose of systematizing work is another matter.

"How do you mix your paints, Mr. Opie?" asked a student. "With brains," was the reply of the great artist. Discretion, experience and ability are needed just as much in using costs as in using paints. The novice can do more harm than good in handling cost data, yet this should not deter anyone from keeping costs or making a study of them. A man who has done comparatively little work can become proficient by careful analyzation and study of costs, just as he can become a competent designer by study and practice. The essential thing is to master a subject so that one can apply one's knowledge.

Cost Keeping and Cost Analysis

Cost keeping and cost analysis are often confused. The writer has heard many engineers and contractors speak of a cost analysis they had kept, when they only had a cost record that had never been analyzed. Keeping costs is simply amassing records, which when completed are known as cost data. Cost analysis is the reduction of this data to unit costs, and the analysis of them so as to obtain man, machine or animal units. Thus, segregating and listing costs so that they can be readily applied in estimating the cost of new work, in reducing the cost of work that is being done, and in developing methods and systems of carrying on different kinds of work.

This is the all-important feature of costs, and unless

costs are analyzed, their true value is never known. It is for this handling of costs that one must make preparation, and one must be familiar with methods of doing work, have knowledge of the various kinds of machines and their outputs, as well as know the units of work that a man can do in a day. One may study costs without this knowledge, but one can not apply them without it.

One reason that much cost data is of little value except to the man who kept it, is because such data is incomplete. Many details are not recorded for future use. Among the things frequently omitted are wages, the number of hours worked per day, the many local conditions, the time of the year the work is done, the condition of the labor market, the ability and efficiency of the management, the plans and specifications governing the work, and many other details.

The necessity of knowing the specifications has never to the writer's knowledge been alluded to in a discussion of this subject, yet on some classes of work they must be known in order to give the cost data any great value. This information is necessary whenever several classes of work, for unit prices are paid, are done together, and it is not possible to keep the costs on each class. Then the specifications must be known so as to understand how the various classes of work are to be divided; and in order to reduce the costs to unit costs, the contract price for each class of work must be known. This is especially true of classified excavation, such as is done in railroad construction.

On such work there is generally a classification of earth or common excavation, loose rock and solid rock, and on some occasions hardpan. On different railroads the specifications for excavation vary exceedingly. Some materials that are classed under the head of loose rock, as shale, fire clay, shale and chert, are on the other roads considered earth, although they cannot be moved except by blasting. Likewise, there is a vast difference in the classification of loose and solid rock. Many roads make all stones or boulders less than a cubic foot come under the earth class, others use one-half a cubic foot. The majority class everything less than a cubic yard as loose rock, and solid ledges and boulders as solid rock. One road in the south goes to an extreme in this, inasmuch as it throws into loose rock all ledges of solid rock of six inches or less in thickness, separated by strata of clay. If only a single stratum of partly decomposed rock is found in a cut, such a specification would not be so bad, but it is readily seen that alternate thin strata of rock and clay can make the job of excavation a very expensive one.

Cost of Rock Excavation

Naturally, the cost of rock excavation will vary considerably, owing to the conditions surrounding the work and the methods used. The character of the rock will materially affect the price, as well as the angle of the rock to the plane of excavation. The nature of the excavation to be made will enter into the cost, as, in railroad construction, a side hill cut can be made much cheaper than a through cut. Then an important item is whether or not the material to be moved is entirely rock or a mixture of rock, boulders and earth.

In keeping cost data for rock excavation it is a simple matter to arrive at the unit cost of removing solid rock and earth if all the material to be moved in a cut is either one or the other, or if first one class of material is excavated, and then the other when two are found together. But it frequently happens that a single cut will have solid ledges, dis-

integrated rock, large and small boulders and earthy materials, and the material will be in such shape, or the excavation will be so situated that the various materials must all be excavated together and it is thus impossible to keep the cost of each class of material separate.

With the entire cost of the work kept, and the yardage known, an average price for excavating a cubic yard is easily derived, but this is only useful when the excavation is not classified. For classified work, it is not possible to obtain an accurate unit cost for each class of material, but a comparative cost to the contract price paid can be obtained. With such work, the specifications must be known, to give the greatest value to the data, and the unit costs cannot be calculated without knowing the prices paid for the work.

Method of Arriving at Cost

The method of determining the cost is readily illustrated by an example. A contract has been made for some classified excavation at 60 cents per cubic yard for solid rock, 35 cents for loose rock and 20 cents for earth. The actual cost of moving a small cut of 1,000 cubic yards was \$350. Under the specifications the engineer classified the cut as follows: Six hundred cubic yards of solid rock, 300 cubic yards of loose rock and 100 cubic yards of earth. This classification at the contract prices would give the contractor \$485, netting a profit of \$135.

Now it is found that the cost of doing the work is 72 per cent. of the amount earned, so that the cost of each unit is 72 per cent. of the price of each unit, making a cost for solid rock of 43.2 cents per cubic yard, loose rock 25.2 cents and earth 14.4 cents per cubic yard. If a money loss had been sustained on the 1,000 cubic yards, saying the cost had been \$543, then the percentage would have been 112, and the rock excavation would have cost 67.2 cents, the loose rock 39.2 cents and the earth 22.4 cents.

It can be seen that these are not true costs, but as previously stated, comparative or proportional costs, as, in a case where money was lost, the earth may have been moved at a profit, and likewise the loose rock, while all the loss was sustained in blasting and handling the solid rock. Yet a proportional loss would show on both the earth and loose rock. If greater details of costs have been kept, such as explosives, separate from labor and teams, then further to subdivide these costs, the proportion of each detail to the whole is calculated. For example, if the \$543 is divided, \$70 for explosives, \$353 for labor, and \$120 for teams, then the detail cost of the solid rock would be 8.74 cents for explosives, 43.68 cents for labor and 8.74 cents for teams, or a total of 67.2 cents.

Specifications Affect Cost

To illustrate how the specifications will affect the cost of such work, another example will be taken. Some years ago the writer excavated a cut on one of the southern railroads, the yardage in it being 7,867. Under the specifications governing the work, chert was classed as earth and slate as loose rock. The engineer in charge classified the work as follows: 2,619 cubic yards of earth, 2,831 cubic yards of loose rock, and 2,435 cubic yards of solid rock. Even following the specifications this was a low classification. Of the earth about 600 cubic yards was chert, and about 1,100 cubic yards of the loose rock was a hard slate. The total cost of excavating the cut was as follows:

Explosives	\$ 265.55
Foreman and laborers	1,619.35
Teams	273.25
Total	\$2,158.15

The average haul of the material was 350 feet. One and one-half yard rotary dump cars were used, one mule and a driver operating two cars. The costs of explosives used were: Black powder, \$1.22 per keg; 40 per cent. nitro-glycerin,

11 $\frac{3}{4}$ cents per pound; Judson powder, 7 $\frac{3}{4}$ cents per pound. The average wage paid to men was 13.4 cents per hour, and to foremen 28.6 cents. Two cars, one mule and a driver were charged at \$2 per day. The cost per cubic yard for the work was: Solid rock, 46.8 cents; loose rock, 24.6 cents, and earth 12.3 cents.

Now had this work been done for a competing railroad which had attempted to locate a line through the same mountain pass, a different classification would have been put on the work, since under this road's classifications, chert is classified as loose rock, and slate as solid rock. Thus the 7,867 cubic yards would have been classified as follows: 2,019 cubic yards of earth, 2,331 cubic yards of loose rock and 3,535 cubic yards of solid rock. The total cost of doing the work remaining the same, and the contract prices unchanged, the unit cost for doing the work would then have become as follows: 40.9 cents per cubic yard for solid rock, 21.4 cents for loose rock and 10.7 cents per cubic yard for earth. For easy comparison we place them thus:

	Solid rock.	Loose rock.	Earth
1st classification, per. cu. yd.	46.8c.	24.6c.	12.3c.
2nd classification, per. cu. yd.	40.9c.	21.4c.	10.7c.

Another example taken from the writer's own experience shows how classification can affect the unit costs of doing such work. A description will assist in illustrating.

The cut was on the same road mentioned above. A little more than one half of the cut was solid gray sandstone, while in the other end slate occurred in the bottom, but little of it had to be excavated. On top of the slate there was a stratum of fire-clay shale, upon which was disintegrated shale, and then a stratum of fire clay. Upon this clay were large sandstone boulders lying very close together. During the winter months the shale slid on the fire-clay shale and brought several thousand yards of rock into the cut. A thousand yards of the material was hauled out of one end of the cut with an average haul of 250 feet. About 6,000 cubic yards were hauled across a temporary trestle, the average haul being 755 feet. The rest of the yardage had an average haul of 500 feet. The total yardage excavated was 13,661 and the following classification was placed upon it: 868 cubic yards of earth, 1,117 cubic yards of loose rock, and 11,676 cubic yards of solid rock. The cut was worked from both ends, and in addition, an entry was made on the side and a track built around a small hill to hasten the completion. This entrance cost \$85.45, which expense was borne by the contractor. This also added 65 feet to the haul, 4,500 cubic yards being hauled over the extra distance. Small rotary dump cars were used. A year was consumed in making the cut, as it was commenced in August and some work was done each month until the cut was completed the following August. The cost, including extra haul and side entrance, was:

Explosives	\$1,090 12
Labor	4,978 02
Teams	777 00
Total	\$6,845 14

The cost per cubic yard was: For earth, 14.4 cents; loose rock, 28.8 cents, and 54.8 cents for solid rock. Previous to taking up the final estimate, the division and resident engineer had placed the following classification on the material: 450 cubic yards of earth, 217 cubic yards of loose rock and 12,994 cubic yards of solid rock. This had given unit costs for doing the work of 13.6 cents for earth, 27.2 cents for loose rock and 51.7 cents for solid rock. The chief engineer re-classified the cut, making the shale and fire-clay shale loose rock and the clay that caused so much trouble in the cut, earth. During the four months, January to April, owing to the presence of the shale and clay, the men worked in this cut standing in mud and water that was ankle deep. The material shovelled would often run out of the cars on the way to the dump. All the drainage possible was given the

cut, but the entire flow from one side of the mountain seeped into it. It was owing to these conditions that the better classification was made, but the unit costs were raised by the chief engineer, thus knocking some profit out of the work.

From the cases cited, it is seen that in considering such costs the specifications must be known, and not only kept in mind, but notes must be made as to the manner in which they were interpreted.

Applicable to Concrete and Other Work

What is true regarding this class of excavation is also applicable to concrete work, when several grades or proportions of concrete are used in a structure, and in such a manner that it is difficult to keep the cost of each separate, the various grades being paid for at a common price. Any costs must be proportional ones, based on the amount of cement used.

The same principle also applies to other classes of work,

and shows the necessity of carefully studying and analyzing costs before applying them to other work.

The application can be made, however. We believe that the only correct way of estimating bidding prices is to break up work into its various component parts, and by using costs obtained from similar work, and based on conditions that surround the new work, thus obtain new prices. The only other method is to guess, and to guess in lumps is certainly far worse than to guess in small units, for some of the units can be definitely obtained, possibly leaving but a few small items to be set down from a guess.

However, the great use for cost keeping and cost data is not to make estimates upon other work, except in the case of engineers, but is for keeping a check on the amount of work done by men and machines, and for systematizing work and deciding upon the proper methods to be used.—"The Contractor," Chicago.

Uses and Advantages of Hydrated Lime

An Excellent Waterproofing Compound to Add to Cement—Its Successful Application at Kingston, Ont.—Standard Formulae for Use

The use of hydrated lime is a growing one with contractors and builders, but many do not appreciate how useful an article it really is, and what numerous advantages it possesses over lump lime. R. K. Meade, in an article in "Municipal Engineering," outlines some of its advantages. A portion of the article is as follows:

Hydrated lime can be used for every purpose for which quick lime is used, and also for all purposes for which lime putty is used. It has also some uses which neither have. It, however, does not trowel quite so easily as lime putty, and this has been the greatest objection on the part of the mason to its use. By employing a good deal of water in the mortar, however, this objection can be to a great extent removed. The greater convenience with which it can be handled and used, however, and the thoroughness with which it has been slaked, to a large extent make up for this trouble. No mortar box is required and the hydrated lime and sand may be mixed upon a board, just as are cement and sand. It is, therefore, especially convenient for doing small jobs, such as repairs to plaster, etc.

It is estimated that it costs 25 cents per barrel to slake lime in a mortar box. This expense is saved by the use of hydrated lime. Furthermore, the mixing can be done indoors and in cities the streets are not blocked.

In using hydrated lime the mason should remember that not quite as much water would be required as is the case with lump lime, because in the case of quick lime some water is needed to combine with the lime, and in case of hydrated lime this water has already been supplied by the manufacturer. Where a mortar box is used, it is usually considered best to first place the water in the box and then the lime. More water and then lime can be added as necessary, the idea being to get a thorough mix of water and lime. It is usually considered better to allow the mixture to remain over night. Such a mortar can be used just as lime putty, and if plenty of water has been employed, will trowel very similarly.

Used With Portland Cement

One place where hydrated lime can be used, where ordinary lime putty can not be employed, is with Portland cement. The addition of lime to Portland cement is not an adulteration, but confers a great many good properties to the latter. It has long been known that slaked lime would waterproof concrete. This is due to the fact that it exists in the form

of an extremely fine powder, many times finer than the finest ground cement. This fine powder fills in the pores of the concrete and stops them up, thus excluding the water. Owing to the difficulty of mixing the wet lime putty with the dry cement and sand, however, it has only been since the introduction of dry hydrated lime that slaked lime could be used for waterproofing. It is generally considered that hydrated lime is the best waterproofing compound which can be added to cement, and that it is superior in lasting qualities to any of the waterproofing compounds at the present time advertised for this purpose. The writer has tested some eight or ten of these compounds. In every instance, without exception, they decreased slightly the strength of the cement mortar made therefrom, and he does not think that any of the manufacturers claim that they add to the strength of concrete. Hydrated lime, on the other hand, not only waterproofs the concrete, but numerous tests made in different laboratories by disinterested parties show that additions of hydrated lime up to 15 or 20 per cent. increase the strength of cement mortar.

As an actual waterproofer, hydrated lime is not surpassed by any of the waxes and paraffin compounds at the present time used for this purpose. Many of these compounds are organic, and in time will volatilize, leaving the concrete porous. Hydrated lime, on the other hand, is inorganic or mineral, and will remain where it is put.

As an example of the waterproofing properties of hydrated lime, this was employed upon a large gas holder at Kingston, Ont., which had been practically a failure, owing to the leakage of the concrete wall of the gas holder. A number of waterproofing methods were tried, all of which failed, and it was not until this wall was chipped back from three to six inches by means of pneumatic chisels and a new wall composed of concrete, containing about 18 per cent. of the weight of the cement of hydrated lime had been added, that the tank was waterproof.

The addition of hydrated lime to cement makes the latter more plastic and easily trowelled. It also improves the adhesive properties. A mixture of equal parts of hydrated lime and Portland cement makes an ideal mortar for laying brick. The addition of hydrated lime to concrete blocks makes the latter whiter, tougher, and waterproof.

Hydrated lime is not only the best but also the cheapest waterproofing compound known, since it replaces so much

cement and the only additional cost is the difference between the price of cement and hydrated lime, which is slight, even at the present low price of cement.

Standard Formulæ for Use of Hydrated Lime

First cover bottom of mortar box with water and add the hydrated lime and more water as is necessary. Some mechanics prefer to soak the hydrated lime at least twelve hours before using, claiming more plasticity in its manner of working.

For Plaster Mortar—First or Scratch Coat: 350 pounds hydrated lime, 1-4 yards screen sand, 2 bushels hair. Should cover about 100 square yards.

Second Coat: 200 pounds hydrated lime, $\frac{1}{2}$ yard screen sand. Should cover about 100 square yards.

Putty or White Coat: Use about one-half as much plaster to gauge with as is commonly used with putty made from lump lime. If wall is dry sprinkle or dampen with brush before putting on white coat, as labor will be lessened.

Float Finish: 300 pounds hydrated lime, $\frac{1}{4}$ yard screen sand. Should cover about 100 square yards.

For Stone Mortar: 200 pounds hydrated lime, $\frac{1}{2}$ yard screen sand and add water.

For Brick Mortar: 250 pounds hydrated lime, $\frac{1}{2}$ yard screen sand.

Hydrated Lime and Portland Cement Mixture for Laying Brick and Stone—For hard mortar for these purposes use equal parts by weight of hydrated lime and Portland cement. Add required amount of sand to properly gauge up mortar.

For Waterproofing Concrete and Concrete Blocks—Replace 15 to 20 per cent. of the weight of the cement used in the mortar by hydrated lime.

To sum up the Advantages to the Dealer—It is first of all a fixed product which does not deteriorate or change with age, nor swell and burst its packages, consequently it is always worth the market price of lime. Second, it can be handled without risk of fire, and, third, it can not only be used for all purposes for which lime is used, but also has many new uses, and is more convenient of application.

It has been aptly said that hydrated lime is the twentieth century way of handling the lime trade.

Proposed C.P.R. Tunnel Through Ottawa

The proposed C.P.R. tunnel through Ottawa would be 4,825 feet long. The portals would be near the east end of Wellington street, on the east, and the city waterworks on the west. It is planned to be 26 feet wide and 20 feet high. This 20 feet includes 2 feet below the grade to allow a roadbed of broken stone. The rock formation is stratified limestone, lying almost flat. The layers run from 6 inches to 2 and 3 feet thick. There are good facilities for carrying on the work from both ends simultaneously. This limestone formation is such that it is not anticipated there will be any need for lining the tunnel except at the portals. Throughout the entire location there will be from 25 to 50 feet of roof over the tunnel. The average thickness will be 35 feet. Owing to the building and traffic along the street, and the depth of the tunnel, it must be bored from the ends. It could not be made cut and cover as there is no clay, the limestone being stratified, the thick broken stone roadbed, and being a .4 grade, it is believed that there would be no vibration noticeable on the surface and in the buildings along the route. The contractor would have to supply the compressed air, none being sold in Ottawa. The work is estimated to cost a million dollars, and to take about two years to bore the hole. Cauchon & Haycock, Ottawa, are the engineers in connection with this work.

Application has been made for the incorporation of the International Portland Cement Company, Limited, of Spokane, Wash. The president of the concern will probably be

Mr. J. S. Irvin, the founder and managing director of the big international plant in Ottawa. Mr. Irvin was also largely instrumental in organizing the \$30,000,000 merger of Canadian cement plants, being now an active member of its board of directors. The permanent board of directors of the new concern will include: Rodolphe Forget, M.P., C. A. Barnard, K.C., and W. Grant Morden, all of Montreal; Hon. J. P. Hartman, Seattle, Wash.; C. A. Irvin, secretary of the International Portland Cement Company, Ottawa; D. P. McKinnon, Calgary, director of the International Portland Cement Company, Ottawa; S. G. Near, Toronto, and H. D. McKinnon, Spokane.

Ottawa as an Ocean Port

An interesting address was given by Mr. N. Cauchon, consulting engineer, of Ottawa, before a recent meeting of the Ottawa branch of the Canadian Society of Civil Engineers. The topic of Mr. Cauchon's discussion was the proposed C.P.R. tunnel through Ottawa, of which a brief description is given elsewhere. Mr. Cauchon spoke in part as follows:

"To those who are interested in the water port of Ottawa, I might draw your attention to the fact that we have practically no available water frontage for business purposes, outside of such limited areas as Mr. Booth's wharves, the Queen's wharf and W. C. Edwards'. The Ottawa water frontage is miles of park. By putting locks in the old timber slide, the basin above the falls could be made a large and very commodious shipping port. If these locks were 10-foot draft they would accommodate any loads now passing through the Carillon-Grenville canal, and later on when the Georgian Bay canal exists a lift of one lock, Georgian Bay standard, would put you from the basin up into the large lake above the proposed Georgian Bay dam. If these were carried out Ottawa would become an ocean port on the Georgian Bay canal. Without it Ottawa may have to be content with looking at the boats going through Hull.

"Ottawa is no doubt on the verge of great industrial developments and it seems to me an opportune time for the city to meet half way those who are proposing to spend large sums towards development, and it will be of great value to Ottawa to anchor for all time the main line of the Canadian Pacific Railway. The tunnel will always be worth what it cost, and it will always be a hole in the ground. The advantage which the city will reap will be of an accumulative kind, and go on increasing in value in such ways as the greater facilities for communication between the different parts of the city; the elimination of the canal as a retarding barrier, which in three miles has only two openings; the vast increase in property value to the individual and in assessments to the city.

The question is one of opportunity both for the C.P.R. and the city, in which, if you both contribute, you will both derive great benefit."

The new by-law framed recently by the City Architect of Toronto is a source of objection to the Builders' Exchange, which is taking steps with a view to having the provisions of the proposed measure altered. The new by-law provides that: "As soon as either the walls or structural steel of any building in process of construction have reached the level of the first floor the joists for such floor shall be placed in position and permanently secured, and the joists covered temporarily to secure reasonable safety for the workmen engaged, to the satisfaction of the building inspector. As the building progresses from floor to floor, the joists of each floor shall be put in and similarly covered." The Builders' Exchange points out that the by-law is not practicable and that in putting up steel structures it is essential that no permanent joists be placed in position until the frame work is completed.

Canadian Railroad Developments

Representing the constituency of Milestone, A. E. Whitmore, J.P., of Regina, Sask., is now in Winnipeg for the purpose of urging the Canadian Pacific to complete the 25 miles of new line from Weyburn to Forward, Sask.

Johnson & Carey Company have work under way constructing a fill across Rainy Lake for the Canadian Northern Railway, to replace the trestle at Fort Francis, Ont. The work will involve the excavation of nearly 2,000,000 yards of bastard granite.

The railway commission recently held a meeting in Ottawa, Ont., for the purpose of dealing with the application of the Transcontinental Railway for running rights over the Canadian Northern in Winnipeg, Man., so as to establish a through line from Edmonton, Alta., to Fort William.

It is said that the Canadian Pacific is planning to shorten the running time from Halifax to Montreal several hours by constructing a cut-off from McAdam or Fredericton Junction in a straight line across the country to New Brunswick and Nova Scotia to the proposed winter port at Halifax.

Instead of the double tracking of the Canadian Pacific Railway line from Smith Falls, Ont., to Peterboro, as recently rumored, it is reported that engineers have been placed in the field to make surveys for an entirely new road west from Smith Falls to Toronto, traversing a country heretofore not served by any line. The present line west of Belleville is very hard to operate on account of the grades, and survey has already been run for the new improvement between those two places, passing north of the Rideau lakes.

In Cobourg, Ont., it is now expected that the Canadian Northern Railway will rush the completion of their line eastward from Trenton to Deseronto. It is stated that contracts for 30 miles of construction have been let, and work will begin at once. This section is comparatively level, and construction work no doubt will progress speedily. Mr. Duff, who has been on Mr. George Armour's engineering staff at Colborne, will be, it is stated, resident engineer on the new C.N.R. construction east of the Trent river. Messrs. Dilon and Orlando Bros. are finishing up their work on the section between here and Brighton, and may go shortly to Montreal to begin work on the Ottawa-Montreal section of the C.N.R.

Plans have been approved by Premier Sifton, according to advices from Edmonton, Alta., for the Pincher Creek, Cardston & Montana Railway, a line which will traverse the whole province of Alberta from the international boundary to Peace River Crossing, a distance of 700 miles. As proposed the first section will run from the boundary northwest through Cardston and Pincher Creek to the west side of section 34, township six, range two, west fifth meridian, along the south fork of Old Man river. Connection will be made with the C.P.R. at Pincher Creek, and the system will connect with the Hill lines in Montana. The promoters are New York capitalists, railway builders and coal men. At the next session of the Legislature the company will apply for an extension of the charter permitting them to construct the main line through Alberta by way of Calgary and Edmonton in the Peace River country. There will also be a branch line in the south into the Kootenay coal fields, where, it is understood, coal lands have already been secured. The company has had engineers in the field all summer, and is starting construction at the boundary.

At a recent meeting of the Railway Commission, at Vancouver, B.C., the matter of granting the Canadian Northern Railway the right to construct a line on the right of way of the Canadian Pacific through the Fraser Canyon near Lytton and to a point 7 miles above the canyon, was taken up. The Canadian Pacific did not object to the use of their right of way through the canyon, but held that it was unnecessary

for the Canadian Northern Railway to use the additional 7 miles. The commissioners decided that the Canadian Northern would be infinitely more economical to build on the C.P.R. right of way, and for this purpose to nominate an independent engineer to estimate the alternative costs of construction. Both railways agreed upon C. E. Cartwright, who stated it would take him two months to go over the ground.

Location surveys and map of the proposed route of the Canadian Northern Railway from St. Albert to Yellow Head Pass, according to advices from Winnipeg, Man., have been filed with and approved by the Minister of Railways. According to plans the line for some distance east of Yellow Head runs close to the Grand Trunk Pacific. It is proposed to have 50 miles completed this year.

Personal News and Notes

Mr. H. S. Wormack has been appointed city clerk of Fernie, B.C., to succeed Mr. G. H. Bolton, who is resigning.

Howard Douglas, Commissioner of Dominion Parks, will establish headquarters at Edmonton and take up his residence there.

The Board of Control of Toronto have recommended that a by-law be submitted to raise \$100,000 for improved highways in the county of York.

At Fort William, Ont., the building permits for August, 1910, showed an increase of 21 per cent. over August, 1909. The respective totals were \$204,585 and \$168,935.

The contractors for the substructure of the Quebec bridge recovered last week from the debris the body of another victim, that of Frank Karley, a Caughnawaga Indian.

The city council and the Board of Trade of Windsor, Ont., are making a joint petition to the Dominion Government for the erection of a new federal building and dock next season.

Messrs. Shattuck & Hussey, architects, of Chicago, have been appointed to consult with Messrs. Burke, Horwood & White, the Toronto firm, in regard to the design for the new Y.M.C.A. buildings at Toronto.

The Ontario Iron & Steel Company last week turned out a wheel weighing 12 tons, the largest casting ever made in Canada. It was manufactured for the Allis, Chalmers, Bullock Company, Limited, Montreal.

Mr. David Murphy, who superintended the construction of the lift locks on the Trent canal for the Dominion Bridge Company, was run down by an automobile at Montreal recently and died shortly afterwards.

The city of Quebec has instituted proceedings to recover \$200,000 from the Canadian Northern Railway Company on account of the company's failure to erect a workshop in accordance of the company's failure to erect workshops in accordance of the road and the city.

The Vulcan Iron Works, Winnipeg, which claimed \$50,000 damages from the city for injury to business and depreciation in value of property through the building of the C.P.R. subway and the consequent closing of the city streets crossing the tracks, have been awarded \$25,000 by the arbitrators. This is the last of the subway claims against Winnipeg.

The death occurred last week at Toronto of Mr. Robert Grant, president of the Grant Contracting Company. The late Mr. Grant, who was nearly 70 years old, came to Toronto many years ago from Morrisburg. Mr. Grant was responsible for a considerable amount of important construction in the city, among which may be mentioned the Parkdale subway.

Among those who have declared themselves in favor of a permanent and visible supply of water for the city of Winnipeg is the Hon. Robert Rogers, Minister of Public Works

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for the province. Mr. Rogers says that nothing but a visible supply is commensurate with the increasing needs and importance of the city. He suggests Shoal lake as the best source.

A number of leading citizens of Victoria, B.C., are discussing the formation of a good roads association in that city, with the object of raising \$100,000 for expenditure upon the general improvement of roads in Vancouver Island. The Provincial Government is promising financial assistance.

Hamilton, Ont., is to be congratulated upon having secured the Canada Steel Company, Limited, who will erect a \$400,000 plant. The first structure will be a steel mill, 250 x 70 feet, and machine shops, tube mill, office, etc., will follow after. The company will roll entirely from old scrap rails, the first plant of its kind in Canada. The directors of the new company are F. W. Baillie, Toronto, president; R. M. Bertram, Toronto, vice-president; W. M. Currie, Hamilton, managing director; A. L. Malone and G. A. Morrow, Toronto. Hamilton's advantages in shipping facilities induced the company to locate there.

Canadian City Engineers

Mr. A. H. Van Cleve, London, Ont.

Mr. A. H. VanCleve, who has been appointed city engineer of London, Ont., enrolled as a student at Lehigh University, South Bethlehem, Pa., in 1886 and graduated with the degree of civil engineer in 1890.

During the summer of 1889 he engaged with the Lehigh Valley Railroad Company as bridge inspector and computer. From May, 1890, to April, 1892, he was employed by the Brooklyn Elevated Railroad Company, Brooklyn, N.Y., in the capacity of draughtsman, designer and instrument man. During this period the terminals in East New York were being designed and surveys made for the 5th and Fulton avenue extension. His work consisted largely in calculations and designs for steel work and the preparation of maps for the legal department.

From April, 1892, to January 1, 1899, he was engaged by the Niagara Falls Power Company, Canadian Niagara Power Company and allied concerns. From the last named date he executed various commissions until October, 1900, when he was made principal assistant engineer in charge of all design and construction for the Niagara Falls Power Company, by whom in March, 1904, he was appointed resident engineer in full charge of construction, excepting electrical work. On December 1, 1904, he was appointed to the same position in respect to the Canadian Niagara Power Company's work. Later, he was made engineer of both companies, a position he retained until January 1, 1908, when, upon the completion of constructional work, he was appointed consulting engineer. Since January, 1909, Mr. VanCleve has been engaged in general consulting work, devoting special attention to hydro-electric development. For some months he was at Cobalt in charge of the Cobalt Hydraulic Company's work there.

The companies associated with the Niagara Falls Power Company and Canadian Niagara Power Company were the Niagara Junction Railway Company, Niagara Falls Water Works Company and the Niagara Development Company. The first named company built and operated, subsequent to 1892, a terminal railroad connecting the several tenants of the Niagara Falls Power Company with the trunk lines entering Niagara Falls. While this railroad is of small extent, it involved the usual railroad problems, aside from heavy grading. The Niagara Falls Water Works Company was a private company for some years closely associated with the Niagara Falls Power Company. This company, during the time of

Mr. VanCleave's connection therewith, installed a steam pumping plant, a system of mains covering about one-half of the city, a stand pipe, a mechanical filtration plant and Riedler pumping engines driven by Pelton wheels. The Niagara Development Company built a village in the vicinity of the lands of the Niagara Power Company for the purpose of furnishing a place of residence for the employees in the several factories. This work involved the building of a system of sewers and drains, and sewage disposal works, the grading and paving of streets, laying of water pipes, conduits, etc., as well as the designing and erection of the dwellings.

The work of the Canadian-Niagara Power Company and the Niagara Falls Power Company during the period of Mr. VanCleave's connection with them is perhaps so well known as to require no description. It will suffice to say that the companies own about 1,500 acres of land, over which it was necessary to build streets, lay a large system of conduits, sewers and water pipes for supplying the various tenants. The hydro-electrical installation of the Niagara Falls Power Company consists of 110,000 h.p. in 21 units, all of this installation being made subsequent to 1892. Mr. VanCleave had charge, either as principal or assistant, of all the designs for the Canadian-Niagara Power Company other than electrical, and, as stated above, was in charge of all the construction of the plant and transmission lines subsequent to December 1st, 1904. The installations of that company consist of a forebay, wheel pit and tunnel with a capacity of approximately 110,000 h.p., while the machinery installed during Mr. VanCleave's connection with the company aggregates over 50,000 h.p., together with the necessary power house, transmission station, conduits, etc. As consulting engineer Mr. VanCleave has made reports on hydro-electric developments proposed in various places.

The Forest City is to be congratulated upon having secured the services of an engineer whose experience qualifies him so eminently for municipal work.

English Firm's Enterprise

One of the most interesting exhibits at the Canadian National Exhibition, held recently at Toronto, was that of G. Woolliscroft & Son, Limited, Hanley, Staffs., Eng., represented by H. M. Robinson & Company, Toronto. The sample tiles shown represented the highest class of workmanship and called forth many expressions of commendation from visiting architects.

These tiles are used for the interior of large office buildings, public buildings and for various uses in private residences, such as for porches, bathrooms and kitchens. The samples displayed included glazed and enamelled tile in various designs, embossed in three, four and five colors. The tiles were designed by leading British artists. Attractive designs in terra cotta, both plain and glazed, were also shown. The glazed terra cotta is known as Penttilicon and is especially adapted for Canadian requirements in large office buildings.

The tile paving comprising the floor of the exhibit room was executed in some of the leading Woolliscroft lines. The left hand side was paved in ceramic mosaic, the middle portion with Rust's vitreous mosaic paving, and the right hand side with 6-inch quarries and red floor tile. In front was a cleverly executed facsimile of the agents' signature. Before this were displayed sample road paviers. The checkered brick shown in this exhibit are used for stable paving and garage floors. They are guaranteed absolutely impervious to absorption.

Messrs. Woolliscroft & Son, Limited, are meeting with gratifying success in the Canadian field. Recently, we learn, they have been awarded an important contract for terra cotta at Montreal, besides a number of various contracts for the supply of floor and wall tiles.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Belleville, Ont.

The Board of Works have decided to lay a permanent pavement on Front street between Victoria avenue and Bridge street.

Burnaby, B.C.

The Ratepayers' Association have appointed a committee composed of three councilors and three members to enquire as to the best kind and quality of water pipe required for the new water system to be installed.

Cornwall, Ont.

Tenders addressed to H. E. Hodgins, tp. clerk, Osnabruck Centre, will be received until October 10th for completion of the Palen creek drainage work. Plans, etc., at office of W. H. Magwood, engineer in charge, this place.

Fernie, B.C.

City Engineer Potter reported that Dr. Fagin, Provincial Health Officer, had advised the installation of a filter bed at the septic tanks. The city engineer will prepare an estimate of the cost.

Montreal, Que.

City Engineer Howard has been instructed to make a report showing the cost of building a huge sewer from a point at the foot of the mountain to Sault aux Recollets, where the city's sewage farm is located.

Another report on widening a large section of the Cote des Neiges road was passed by the council. The cost will be \$125,000.

Mr. John Duff and ex-Ald. Sauvegeau were elected by the residents of St. Antoine street to visit the chief American cities to view the paving operations of the Canadian Hassam Paving Company. If report is favorable the Hassam block will be recommended as a suitable paving block for St. Antoine street.

Niagara, Ont.

On October 10th a by-law will be voted on to issue \$6,000 5 per cent., 20 instalment waterworks debentures.

Nanaimo, B.C.

Tenders are invited for pipe laying for making drainage connections into sewers. Allan Waters, City Engineer.

Ottawa, Ont.

In order to have an irregularity in Bank street between Billings' bridge and Riverdale road straightened out, City Engineer Ker recommends that a narrow strip of land containing 1,600 square feet be purchased. It is proposed to make the whole thoroughfare uniform in width.

Swift Current, Sask.

Tenders will be received until October 11th for \$33,330, 40 year, 5 per cent. sewerage disposal works and \$71,500 40 year 5 per cent. waterworks debentures. G. W. Bilbrough, secretary-treasurer.

Toronto, Ont.

The College street asphalt block pavement will not be put down this year, as

the residents who are opposed to the work have given notice of their intention to appeal against the recent decision of Mr. Justice Clute.

Vancouver, B.C.

The engineer has been instructed to prepare an estimate of the cost of installing lateral sewers to connect with the trunk sewer on Columbia street, Mount Pleasant. These laterals will run both east and west on Tenth avenue; also to estimate the cost of boulevarding the streets between Victoria and Salisbury drives.

Tenders will be called for the resurfacing of Abbott street from Pender street north to the C. P. R. right-of-way. The tender will include the removing of the present asphalt.

Victoria, B. C.

On City Engineer Smith's recommendations work on the repair of the reservoir will start. It will take about two months. Estimated cost, \$7,000.

The list of tenders with prices for grading Asquith, Victor, Forbes and Cecil streets and constructing permanent walks were as follows: Cecil street — City Engineer, \$7,834.50; Pacific Coast Construction Company, 38.25 and 18 cents, \$6,421.15; Hugh McDonald, \$8,665.00. Asquith street — City Engineer, 70 and 20 cents, \$9,606.80; Pacific Coast Construction Company, 69.93 and 18 cents, \$9,286.80; Hugh McDonald, \$10,455.00. Forbes street — City Engineer, 50 and 20 cents, \$7,850.00; Pacific Coast Construction Company, 38.23 and 18 cents, \$6,433.00; Hugh McDonald, \$8,655.00. Victor street — City Engineer, 55 and 20 cents, \$8,040.50; Pacific Coast Construction Company, 57.80 and 18 cents, \$7,780.90; Hugh McDonald, \$8,205.00.

Wynyard, Sask.

The council are inviting tenders for sidewalks and their construction will complete the walks in the business portion of the town.

Winnipeg, Man.

Tenders were called for work in local improvements amounting to over \$22,000, and the city clerk received instructions to advertise the city's intention to do further works involving an expenditure of over \$84,000.

AWARDED.

Blairmore, Alta.

The council has let the contract for the installation of a waterworks system to W. J. Budd, of Blairmore. The water will be taken from Wolf Creek at a point about two miles distant and will be brought to the village in 12-inch wire wound wooden pipes.

Hamilton, Ont.

E. Caroll, this city, was given the contract for sewer construction on Ravenscliffe avenue at 90 cents per foot and 54 cents per foot on Grey street. J. T. Armstrong, this city, has the contract for Glen-side avenue at 90 cents, and Platt avenue at 97 cents.

Montreal, Que.

The contract for construction of new intake at Point St. Charles, has been awarded

to Lemoine & Desy by the council, \$155,000.

Port Arthur, Ont.

Contract for excavating and refilling of trench for sewer and water mains was let to K. Justin at 58 cents per cubic yard for earth, and \$3.50 per cubic yard for rock. Other prices, 80 cents per cubic yard for earth and \$4.50 for rock.

Prince Albert, Sask.

The tenders for the filtration plant were as follows: One at \$14,000, another at \$11,000, and Wm. Knox's tender at \$6,985 (accepted).

Winnipeg, Man.

The tender of the Canada Iron Corporation for the supply of 10,000 feet of six-inch water main was accepted by the board of control. The price is \$57.50 per ton, which is much lower than that quoted in the next lowest tender.

Railroads, Bridges and Wharves

Bonaventure River, Que.

Tenders are being called until October 26th by Public Works Department, Ottawa, for construction of extension to training pier here. R. C. Desrochers, secretary.

Calgary, Alta.

Tenders will be received by W. D. Spence, city clerk, up to November 7th, for the erection of steel bridges, one across the Elbow river at 12th avenue and the other across the Elbow river at Second street east. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Tenders will be received by W. D. Spence, city clerk, up to November 7th for the supplying to the city, rails, cars, equipment and overhead material for extensions to the municipal street railways. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Lake Superior Junction, Ont.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, Ottawa, will be received until October 18th for the machinery required for the equipment of roundhouse here. Plans, etc., at office of Mr. G. Grant, chief engineer, Ottawa, and of Mr. S. R. Poulin, district engineer, St. Boniface, Man.

Ottawa, Ont.

The residents of Ottawa South will petition the Government for a high level bridge on Bank street over the canal. Hon. G. P. Graham, Minister of Railways & Canals.

The following firms submitted tenders on the Quebec bridge: The Dominion Bridge Company of Montreal, the Canadian Bridge Company of Walkerville, the British Empire Bridge Company (representing the amalgamated interests of two large British companies, with works at Darlington and Birmingham), and the Phoenix Bridge Company of Phoenixville, Pa., which had the original contract for the bridge.

Roberval, Que.

Mr. Dubuc, of Chicoutimi; Col. B. A. Scott, and others, intend to apply for a charter to build a line of railway from Roberval to the Peribonca, and thence by the north shore of Lake St. John to a deep water port on the Saguenay. The large projected pulp industries give rise, it is said, to the demand for railway communication in the district in question.

St. Joseph De Sorel, Que.

Tenders will be received until October 17th for the construction of a landing pier. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

St. Andrews, Que.

Tenders are being called by Public Works Department, Ottawa, for construction of wharf here. R. C. Desrochers, secretary.

Trail, B.C.

It is expected that concrete foundations for the piers for the bridge across the Columbia here will be put in this winter. J. E. Griffiths, provincial government engineer, has been here in regard to the work being rushed ahead.

Toronto, Ont.

The city council will consider the connecting of Parliament street with the proposed Bloor street viaduct. On motion of Ald. O'Neill, the City Engineer was asked to report an estimate as to the cost, and the Assessment Commissioner to estimate the land damages.

Union Bay, B.C.

Tenders addressed to H. E. Beasley, superintendent, will be received until November 1st for clearing of right-of-way on the Comox extension, E. & N. R., between Parkerville and Union Bay. Specifications at office of division engineer, Victoria.

Winnipeg, Man.

The wharf at the foot of Blanchard St. on the Assiniboine river has been condemned.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, Ottawa, will be received until October 18 for the centrifugal pumps and motors required for the sewage pumphouse at the shops here. Plans, etc., at office of Mr. G. Grant, chief engineer, Ottawa, and of Mr. S. R. Poulin, district engineer, St. Boniface, Man.

Tenders will be received by P. E. Ryan, secretary, Commissioners, Transcontinental Railway, up to the 18th day of October, for the machinery required for the equipment of a round house at Lake Superior Junction, Ont., and for centrifugal pumps and motors required for the sewage pump house at the Winnipeg shops, Winnipeg, Man., For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

AWARDED.**Edmonton, Alta.**

The contract for the steel bridge over the Groat ravine was let to the Dominion Bridge Company, \$52,000.

Victoria, B.C.

Contract for the extension of E. & N. Railroad from Duncan to Cowichan has been awarded to the firm of Janse, Macdonnell & Timothy.

Public Buildings, Churches, Schools, etc.

Babcock, Man.

Tenders addressed to A. W. Gordon, secretary-treasurer, were received until Oct.

3rd for erection of school building for Leary's S. D. No. 1540.

Brantford, Ont.

The committee in charge of securing a site for the new Thomson memorial home will decide on the location of the new home. Several fine sites are under consideration.

Castor, Alta.

The board of trustees, S.D. No. 2194, have been authorized to borrow \$20,000 to purchase land and erect a school. R. C. Murphy, Sec., Castor, Alta.

Campbellton, N.B.

The Department of Public Works, Ottawa, is calling for tenders until Oct. 18th for construction of public building here. R. C. Desrochers, secretary.

Edmonton, Alta.

Official word has been received by Col. E. B. Edwards that the armory there will be constructed at a cost of not less than \$100,000 when the suitable site has been procured.

The final steps in the purchase of the site for the new residence for Lieut.-Governor in Glenora have been taken.

Erieau, Ont.

Tenders are wanted for the new English church here. Plans at E. H. Spackman's, Blenheim.

Goderich, Ont.

Tenders are being called by Public Works Department, Ottawa, until October 24th for erection of public building here. Plans at public building here and at office of H. J. Lamb, district engineer, London. R. C. Desrochers, secretary.

Hartland, N.B.

Tenders are being called until October 19th for the erection of public building here by the Department of Public Works, Ottawa. R. C. Desrochers, secretary.

Harris, Sask.

The board of trustees, S.D. No. 2498 has been authorized to borrow \$10,000 to erect a school house.

London, Ont.

Tenders will be received until October 10th by T. A. Robinson, The Grove, for the painting and kalsomining of The Grove Church. For further particulars apply to S. G. Tackabury, or G. Smith.

Moose Jaw, Sask.

Tenders were called until October 3rd for erection of curling rink here. Plans at office of Jas. Thompson, this city; Storey & Van Egmond, architects, Regina.

Tenders are being called until Oct. 10th for erection of Saskatchewan College Buildings. Plans, etc., at office of R. G. Bunyard, architect, this city, or with J. D. Atchison, architect, Winnipeg, Man.

Moncton, N.B.

The Department of Public Works, Ottawa, is calling for tenders until October 17th for additions and alterations to the public building here. R. C. Desrochers, secretary.

Mimico, Ont.

At a meeting of the Board of Management of the Mimico Industrial School, the enlargement of the school was discussed.

Montreal, Que.

Messrs. Marchand & Haskell, architects, 164 St. James street, are preparing plans and specifications for the remodelling of the Emergency Hospital, same to include new drainage, plumbing and heating, for the city.

A committee has been appointed by the Engineers' Club to confer with the architects regarding the preparation of plans for an extension of the club's present building in Beaver Hall Square.

Tenders were called until Oct. 3rd for the furniture in connection with the Montreal Technical School. Plans, etc., at office of the architect, J. S. Archibald, 59 Beaver Hall Hill. A. Ayer, chairman of the committee.

The request of Mr. C. A. Beggar, of the Department of the Interior, for permission to construct a tower 40 x 16 on Mount Royal to be used by the Geodetic Service of Canada has been referred to the Legal Department.

Until October 17th tenders are being asked for \$350,000 4 p.c. 30 year school debentures. C. J. Binmore, Treas., 197 Peel St., Montreal.

Nelson, B.C.

Active steps are being taken by this municipality towards the erection of a suitable memorial to the late John Houston, its founder.

Ottawa, Ont.

The Board of Control has recommended to the city council the acceptance of the tender of Laurie & Lamb for the Heenan-Froude incinerator at a cost of \$34,650.

An incinerator of Heenan-Froude construction will be recommended by the committee, which is composed of Mayor Hopewell, Controller Davidson and City Engineer Ker. The offer to install the Heenan-Froude plant was found to be the lowest. It is understood the cost will be about \$34,000. The plant is similar to the one in Westmount, Que., and to the destructor in Seattle, and is to be erected this fall on the site of 16 acres which has been acquired near Hurdman's bridge.

The plans for Bethany Presbyterian Church, prepared by J. A. Ewart, have been adopted, and tenders will be called for the excavation and foundation.

The plans for the Rivermead Golf Club house have been prepared by Weeks & Keefer. The present farmhouse on the site will be used in the new building. Estimated cost, \$7,000.

Horwood, Taylor & Horwood, architects, are calling for tenders for constructing a tennis court and basket ball court at Carleton school.

Regina, Sask.

No plan has been chosen from the competitive plans submitted for the library building here. T. R. Honeyman, secretary.

Sudbury, Ont.

The Palace roller rink was destroyed by fire on the 27th ult. Estimated loss, \$15,000.

Strathcona, Alta.

Tenders are being called by Public Works Department, Ottawa, until October 24th for construction of public building here. Plans, etc., at office of Mr. J. Greenfield, resident architect, Winnipeg, Man.; W. T. Mollard, clerk of works, Regina, at local post office and at above department. D. C. Desrochers, secretary.

Sherbrooke, Que.

The Redemptorist Fathers, of Ste. Anne, Que., have purchased land on Ontario St. for the purpose of erecting a large church and monastery.

St. John, N.B.

Tenders are being called by Public Works Department, Ottawa, until October 24th, for construction of warehouse No. 7

and extension of warehouse No. 6 on St. John Harbor. R. C. Desrochers, secretary.

Three Rivers, Que.

The city hall was partly destroyed by fire on the 2nd inst.

Toronto, Ont.

The governors of Trinity College have authorized the erection of new rink and preparation of plans. Estimated cost, \$8,000.

The Ontario Club have secured option for 30 days on the stone structure, corner Wellington and Jordan streets as a probable future home for their club when they have to leave their present quarters on Bay street.

The Macedonians of this city have organized and a committee has been appointed to select a site for new church. Mr. Kosma Demalkoff, chairman, and M. G. Arsoff, 652 Landsdowne avenue, secretary. Estimated expenditure, \$5,000.

Tenders for the power house, the private patients' wing, the nurses' residence, and the obstetric building for the General Hospital are to be asked for later.

Tenders are called until October 5th on behalf of the Y.M.C.A. for removal and woodwork, plumbing, and heating apparatus of the house corner of College and Dovercourt Road. Burke, Horwood & White, architects, 28 Toronto street.

Tenders will be received by Symons & Rao, architects, up to October 8th, for the various works required in the erection of a Sunday school building for the Chester Presbyterian Church. For further particulars see advertisement in "Tenders and For Sale Department" in this issue.

Victoria, B.C.

A permit was issued to the Grace Lutheran Church board for a one-storey frame church at Queen's avenue and Blanchard street, \$6,000.

Another proposition for a new theatre is before the city in the shape of a letter signed by Charles Frohman and Klaw & Erlanger per Marc Klaw offering to subscribe \$10,000 to a \$125,000 fund raised by the city, and to take a ten years' lease of the theatre, etc. Mr. Simon Leiser has asked the city council to assist.

Vancouver, B.C.

The University Commissioners have selected the vicinity of Vancouver as the locality for the Provincial University.

Vancouver is to have a Buddhist temple. Five thousand Japanese have planned a \$25,000 structure. The building inspector has approved the plans. Plans prepared by Architect Archer.

Donnellan Brothers are the architects for the proposed building to be erected by the Fraternal Order of Eagles, on the west side of Homer street between Pender and Dunsmuir.

The congregation of St. Paul's Anglican Church have decided to build the parish hall and rectory. Provisional cost, \$13,000. Rector, F. A. P. Chadwick; F. W. Sterling, H. Newmarch and others, building committee.

Tenders are being called by Department of Public Works, Ottawa, until Oct. 26th for construction of examining warehouse here. Mr. J. Greenfield, resident architect, Winnipeg, Man.; W. Henderson, resident architect, Victoria. R. C. Desrochers, secretary.

The plans for the new isolated hospital on the Admiralty reserve, on the North Arm of the inlet, as prepared by Dalton & Eveleigh, have been approved by the health committee. Dr. Underhill, medical

health officer, has received instructions to call for tenders as soon as the specifications have been made out. The estimated cost of the three structures comprising the hospitals is \$45,000 for frame structures and \$60,000 for brick buildings.

Mr. Marc Klaw, of the theatrical firm of Klaw & Erlanger, is expected here to look over the theatrical field with a view, it is said, of establishing a theatre in Vancouver.

Warton, Ont.

Tenders are being called by the Department of Indian Affairs, Ottawa, until Oct. 10th for erection of stone school on the Cape Croker Indian Reserve. J. D. McLean, secretary.

Winnipeg, Man.

Tenders were called until Oct. 2nd for excavation, masonry, brick work and drains required in the foundations for Country Club building at St. Charles. J. E. Botterell, secretary.

AWARDED.

Brandon, Man.

The contract for the electric fixtures for the new convent, and St. Michael's Academy, has been let to H. T. Broughall Electric Company, of this city.

Carleton Place, Ont.

Plans have been prepared by Mr. C. J. Burritt, architect, Ottawa, for the 2 storey Masonic Temple here. Plans call for brick with stone trimmings, 51 x 74 feet. Contractors for foundation are P. McGregor and A. Coles. Contract for the superstructure has not yet been signed.

Erickson, B.C.

Messrs. Hendren & Payne have been awarded the contract for the erection of the public school at Erickson.

Montreal, Que.

General contract for the erection of a one storey addition to the Children's Memorial Hospital, Cedar avenue, has been awarded to the Atlas Construction Company, Guy Block. Architects, Brown & Vallance, Canada Life Building. Price \$11,000.

Contract for the ornamental iron work in connection with the erection of the new William Dawson school for the Protestant School Commissioners, has been awarded to Messrs. John Watson & Son, Limited, 167 Wellington Street. General contractors, Gray & Wighton. Architect, A. F. Dunlop, Lindsay Building.

The St. Denis Catholic School Commissioners are making alterations to school building at 210 Laurier avenue. Price, \$2,000. General contractor, E. Dore, 1245 Berri street. Architect, E. J. P. Courval, 714 Laval avenue.

Niagara Falls, Ont.

The contract for the new armory in this city has been awarded to Alonzo B. Robertson of this city at \$44,050, the lowest. The next lowest was \$46,000, and the highest \$81,000. There were 52 bidders, and the armory will be completed July 1st, 1911.

Toronto, Ont.

R. Robertson & Sons have the contract for the pathological building, corner of University and Christopher streets, in connection with the General Hospital. J. & T. Thompson are the contractors for the surgical building.

Accepted tenders for Annette Street school are as follows: Masonry, J. C. Baylis & Son, \$28,700; carpentry, Crocker & Le Drew, \$8,700; plasterers, George White, \$2,580; painting, J. Faircloth & Company, \$785; steam heating, Fred.

Armstrong & Co., \$8,200; heat regulators, Johnston Temperature Regulating Co., \$400; structural steel, W. H. Salter, \$2,540; roofing and sheet metal work, Beggin & Spence, \$914; terra cotta flooring, R. Burnett, \$3,240; plumbing, Fred. Armstrong & Co., \$1,534; electric wiring, Geo. A. Beattie, \$80; total, \$57,693.

The McMurich School accepted tenders are as follows: Masonry, J. C. Baylis & Son, \$23,200; carpentry, Crocker & Le Drew, \$11,300; plasterers, Blackburn & Son, \$2,550; painting, J. Faircloth & Co., \$1,245; heating and ventilation, Keith & Fitzsimons, \$4,913; plumbing, Fred Armstrong & Co., \$1,318; heating regulators, Johnston Temperature Regulating Co., \$670; structural steel, Reid & Brown, \$3,109; roofing and tin-smithing, J. G. Flow-ers, \$898; terra cotta flooring, James A. Wickett, \$2,657; electric wiring, George A. Beattie, \$60; total, \$51,900. The erection of a two-room portable school in the south playground at Hillcrest school was recommended.

Westmount, Que.

Messrs. Ross & McFarlane, architects, 1 Belmont street, have awarded the contracts for the excavations, masonry and brickwork in connection with the erection of the two branch buildings for the Young Men's Christian Association on Fairmount avenue, Outremont, and Arlington and Sherbrooke streets, Westmount, to Messrs. John Stewart & Company, general contractors, 1 Bethune avenue, Westmount.

Residences

Edmonton, Alta.

Building permits were issued to J. L. Conover for a dwelling on Jasper avenue west, \$3,000; to J. Goldsbury, for a dwelling on Kirkness street, \$2,000.

Hull, Que.

Mr. W. A. Cole has purchased 141 lots on the Walker property, Wrightville, in the city of Hull, and will build 100 cottages on this property.

Montreal, Que.

An application has been made by Mr. A. J. H. Denis, to the Westmount City Council for permission to erect an apartment house.

Ottawa, Ont.

Among the recent building permits were: Nimmo & Soper, dwelling, First avenue, \$2,950; A. & K. McArthur, Woodlawn avenue, dwelling, \$3,000; W. R. Smith, Sunnyside avenue, \$3,600; Nimmo & Soper, dwelling, Carling avenue, \$4,200; J. M. Taylor, dwelling, Third avenue, \$4,000.

Sydney, N.S.

A permit has been issued to Contractor S. H. Stevenson for the erection of a dwelling for the congregation of Jubilee Methodist Church, on Dorchester street. Cost, \$6,000.

Victoria, B.C.

A permit was issued to A. E. Robertson for dwelling on Elford street, \$4,500.

Winnipeg, Man.

M. Krolak, of the Burrigge-Cooper Co., of Winnipeg, has purchased property in Tuxedo Park. On one of these lots on Piper Boulevard he will erect next year a hand some residence, to cost about \$12,000.

The following building permits have been recently issued: G. W. Ferguson, house, south side of Maplewood, \$4,200; F. D. Burns, two houses, north side of Morley, \$4,000; J. Granburger, two houses, south side of Lansdowne, \$4,000; Beaver Soap Works, addition to factory on Winnipeg avenue, \$2,500; Mrs. W. J. Boldry, house,

west side of Horne, \$3,800; P. MacDiarmid, two houses, west side of Walnut, \$7,000; A. C. Galbraith, house, west side of Basswood Place, \$2,000; A. Simpson, house, northeast corner of Home and Buell, \$4,000.

AWARDED.

Montreal, Que.

T. R. Wilson is erecting thirteen houses on Cowan street to cost \$32,000. General contractors, H. Plante & Company, 924 Huntley street.

Messrs. Hogle & Davis, architects, 80 St. Francois Xaxier street, have awarded the general contract for the erection of an apartment house on Summerhill avenue for Mrs. M. Davis, to Messrs. John Stewart & Company, general contractors, 1 Bethune avenue, Westmount. Price, \$24,000.

The Masson Estate are making alterations to property at 342 St. Catherine St. west. Price, \$1,500. General contractor, D. M. Long, 39 Windsor street. Architects, Finley & Spence, 46 Beaver Hall Hill.

Mr. J. B. Drapeau is erecting a two storey house on St. Hubert street. Price \$5,500. General contractor, D. Dupras, 407 Maisonneuve street. Architect, Jos. Art. Godin, 299 St. Denis street.

Mr. E. Payette, architect, 15 St. James street, has awarded the contract for alterations to property on Dorion street for the Masson Estate to Picard, Valin & Co., contractors, Bordeaux. Price, \$4,000.

Ottawa, Ont.

The contracts for the construction of a residence for Hon. Sidney Fisher have been awarded as follows: Felix McCullough, masonry; W. G. Adamson, carpenter work; J. Sutherland, plastering; J. Storr, painting. C. P. Meredith, architect.

Victoria, B.C.

Hayward & Dods, Fort street, have been awarded the contract for the plumbing and heating installation in the Mount Edward Apartments, corner Vancouver and Coutts streets. The contract calls for its completion by January.

Business Buildings and Industrial Plants

Amherst, N.S.

The business block occupied by D. M. Ferguson and A. J. Crease, druggist, was badly gutted by fire on the 2nd inst. Estimated total damage, about \$20,000.

Berlin, Ont.

Negotiations are in progress by Mr. W. McDougall for a site for a two-storey cement block to be used as a planing mill.

Canford, B.C.

A new sawmill with a daily capacity of 40,000 feet and modern machinery is to be erected here. Estimated cost, \$25,000.

Digby, N.S.

It is understood that the C. P. R. is contemplating the erection of a hotel here on Battery Point.

Edmonton, Alta.

The C. P. R. are planning to erect next spring a large terminal station here.

Grand Valley, Ont.

J. McIntyre & Sons, in the recent fire here, which destroyed their business block, estimate their loss at about \$4,000; Wm. McIntyre at \$3,500; G. A. Davey, \$4,000.

Goderich, Ont.

The building, plant and stock of the Goderich Organ Company was destroyed by fire on the 2nd inst. Estimated loss, \$100,000. Local manager, A. Saunders. It is stated the mill will be rebuilt at once.

High Falls, Ont.

J. B. McRae has been chosen engineer for the timber sheds at High Falls, to be built for the Jas. MacLaren Lumber Co.

Hamilton, Ont.

Permits were given to the Oliver Chilled Plough Works, \$30,000; to A. W. Peene, for warehouse, \$14,000.

The Canada Steel Company, Limited, will erect, at once, their mill on the west side of Sherman avenue, between the main line of the G. T. R. and the spur line of the T. H. & B. R. The plans, originally prepared by a Pittsburgh firm of engineers, are in the hands of Munro & Meade, architects, of this city. They include the erection of a steel mill, 250 feet by 70 feet; also stock sheds and machine shop. Tenders will be called within the next week and work will start immediately. The mill will be of corrugated iron, structural iron and concrete construction. W. W. Currie, this city, general manager; temporary office, corner of Main and Hughson streets. Commissioner of Industries, W. Mulliss.

Iroquois, Ont.

Two large warehouses belonging to A. J. Ross, of the firm of Ross Bros., were totally destroyed by fire on the 20th ulto. Estimated loss, \$3,000.

Medicine Hat, Alta.

The Bank of Montreal will commence erecting a building in Medicine Hat the middle of next month.

Milton, Ont.

The contractors are working on the erection of power house and wire-drawing building for P. L. Robertson Company. The main building, 300 feet frontage, will be erected next year.

Merrickville, Ont.

The Percival Plow & Stove Co. was damaged to the extent of \$10,000 on the 2nd inst.

Macleod, Alta.

A. E. Hoare, of England, managing director of the Bank of British North America, has conducted negotiations for the purchase of a site on Main street, Macleod. A new bank building will be erected at a cost reported at \$25,000.

Montreal, Que.

St. Lawrence Milling Company, Limited, 1110 Notre Dame street west, has a permit for flour mill, \$77,000.

The Montreal Taxicab Company have purchased the Victoria rink and property on Drummond street, close to the Windsor hotel, and will use the same as a garage. Extensive alterations and improvements will be made to the inside of the building to suit requirements. Messrs. Duncan McDonald, R. Forget Louis Boyer, K.C., L.N., Patenaude and Dr. Simard, control the company.

The old Y. M. C. A. building at the corner of Craig and Victoria Square, the property of the Shelden Forwarding Company, Limited, has been condemned by the city inspector, and the company will have the building replaced by a modern structure.

Newmarket, Ont.

The Office Specialty Manufacturing Company purpose erecting at once a large four-storey factory building adjoining their present plant here. Tenders close October 20th. For further particulars see "Tenders and For Sale Department" of this issue. O. E. Tench, architect.

Nanaimo, B.C.

A new industry will be established here by the Red Cliff Brick & Tile Company,

Limited, for the purpose of exploiting shale beds at East Wellington, near here. It is estimated that material sufficient to turn out about 300,000 bricks each day is available for some time to come.

New Westminster, B.C.

The Maple Grove Lumber Company's sawmill near Clayburn was destroyed by fire recently at a loss of about \$10,000.

New Glasgow, N.S.

St. George's Church, it is understood, will erect a new structure in the spring to cost about \$10,000.

Ottawa, Ont.

A. Cherpentier will erect a seven tene-ment, brick veneer building on Main St. this fall.

K. Cohen and A. Levison will erect a commercial building on Somerset street. It will be brick, have three stores, and be three storeys. The upper storeys will be for apartments. Jas. Mather, architect.

I. Sugarman will entirely remodel three stores he recently purchased on Wellington street.

A construction permit for a solid brick building to be erected at the corner of Rideau and Mosgrove streets has been issued to the Geo. Matthews Company. Alexander, Campbell & Richards, contractors; W. E. Noffke, architect. \$20,000.

Perth, Ont.

The site has been selected for the Winn Shoe factory on the corner of Sherbrooke and Herriott streets. Mr. W. J. Rabb will excavate. Tenders will be called shortly for superstructure.

Peterborough, Ont.

Permit was issued recently to Peterborough Canoe Company for factory, \$7,000.

Princeton, Ont.

The Bank of Hamilton branch is being built by W. H. Wells, this place, and will be one storey, brick, 40 by 30 feet. Chas. Mills, Hamilton, architect.

Quebec, Que.

Messrs. Holt, Renfrew & Company, this city, will have their factory here extended. Mr. W. C. Cooke, manager, Montreal branch.

The Canada Paper & Pulp Company have among their future projects a large plant for the manufacture of paper, pulp and carbide on the Saguenay river, near Lake St. John. Capitalization, \$10,000,000.

Rivers, Man.

Mr. P. Cook, formerly of Portage la Prairie, will erect a hotel here.

Regina, Sask.

In the recent fire the store, warehouse, etc., of Mr. Backmann were destroyed at a total loss of about \$12,000. It is understood that he will rebuild.

F. H. French, representative of the National Wire Fence Company, has been here looking over sites for their distributing warehouse here. Head office, Prescott, Ont. Negotiations are in progress for the establishment of a warehouse of the Pella Stack Company, Pella, Iowa, U.S., of which Mr. Kayper is president. Commissioner of Industries, Mr. Sheffield.

The Board of Trade has been in correspondence with a soap company in view of its location here.

W. H. Cushing, formerly Minister of Public Works in the Alberta Government, has been inspecting his planing mills here with a view to future enlargement.

As a result of the recent visit to the city of Geo. B. Meadows, president of the Toronto Wire & Iron Works Co., Ltd., that

firm has decided to locate a branch house in this city, and is applying for a site upon which to erect a three storey building.

St. Johns, Que.

The Clew Peabody Company, of New York City, will erect a factory building for the manufacture of shirts, collars and cuffs.

Sherbrooke, Que.

The Dougherty Mill, Orford, was destroyed by fire on the 26th ulto. Fletcher Lumber Company are the owners. Estimated loss, about \$10,000.

St. John, N.B.

Mr. Cutler, of Stetson, Cutler & Company, is willing to go on with the Mispec Pulp Mill if the city will give him an option to buy the property at \$30,000. In the event of Mr. Cutler purchasing the property, he would either sell or organize a company to start a paper mill, employing 130 hands. Ald. Russell, Scully and Hayes will confer with Mr. Cutler.

T. McAvity & Sons expect to start construction on their plant in Port Arthur in about 12 months, but state that at present they have no intention of erecting a branch plant in Montreal, as was reported.

Sydney, N.S.

Major Calhoun, and J. Carling Kelly, English engineers, have been here on their way to Labrador, where they will erect a pulp mill. Estimated cost, \$500,000. Lord Northcliffe is interested. Plans have been prepared.

South Vancouver, B.C.

Mr. A. Frederickson will build a two-storey structure, 50 by 75 feet, adjoining his place on the south. Mr. G. A. Horel is the architect.

Mr. Joseph Coldwell will build a similar structure on Main street between Twenty-first and Twenty-second avenue.

Toronto, Ont.

Permits were issued to J. Ross Robertson for 4 storey brick publishing warehouse, 35 Melinda street, \$70,000; Toronto Furniture Company, 3 storey brick factory on Dufferin, \$68,000; Standard Manufacturing Company, 1 storey brick clearing house, Royce and Lansdowne, \$12,500.

The Marin Pump & Machine Works will erect a one-storey brick factory building, 60 by 100 feet, on Davies avenue, near Queen. Work will begin immediately.

The Steel & Radiation Company of Canada, Limited, capitalized at \$5,000,000, will, it is said, have factories at Montreal, Winnipeg and Vancouver, as well as here. The two Toronto plants, viz., those of the King Radiator Company and the Expanded Metal & Fireproofing Company, now employing 250 to 300 men, will be enlarged.

Victoria, B.C.

Building permit was issued to John S. Bowker for one storey brick building containing five stores at a cost of \$14,000. C. E. Watkins is the architect, and Luney Bros., contractors.

Permit was issued to Mr. P. Jeune for business building on Pandora avenue, \$11,600.

H. S. Griffith, architect, 1006 Government street, is the architect in connection with the brick business block to be erected for Messrs. F. Moore and H. Scott on the west side of Douglas street. Excavation will be started in a few weeks.

Authority for building permit was granted to Moore & Whittington for the proposed sash and door factory to be erected in the vicinity of Bridge street.

Vancouver, B.C.

The Canadian Bank of Commerce will later on replace the temporary building on First avenue and Park Drive by a large brick and stone structure.

The projected plans of the C. P. R. for erection of hotels includes, besides the extensive additions to the Hotel Vancouver, Banff, new buildings at St. John, N.B., Toronto, Ont., Nelson, B.C., Ottawa, Ont., and Golden, B.C.

Messrs. Law & Von Dohlen, financial agents, Dominion Trust Company building, will organize a corporation for the purpose of manufacturing and marketing in Canada the Gray instantaneous automatic electric water heater, for which they have the sole Canadian patent. Capitalization, \$150,000. Messrs. Ellis, Brown & Creagh, Davis chambers, are looking after the financial arrangements.

Wallaceburg, Ont.

Tenders were called until October 3rd for erection of concrete and brick hotel for A. Gilhuly. Specifications at office of the architects, Jas. L. Wilson & Son, Chatham.

Woodstock, Ont.

The Linderman Machine Company have under construction the erection of their new building here. It will be 250 feet by 100 feet, main centre aisle to be 22 feet to the trusses and 50 feet between crane posts. On each side of this centre building will be two 25-foot bays running the entire length of the building. They state that they will probably use a small amount of steam power as well as Niagara river power. Capitalization, \$160,000. Head office, Muskegon, Mich.

Welland, Ont.

Deere & Company, Moline, Ill., U.S.A., write that building operations on their branch here have not yet been definitely decided upon.

By-laws to grant concessions to the following were carried: The John Deere Plow Company; an automobile factory; the Chemical Company factory; George W. Mixer, for the Allied Companies' factory. The township of Humberstone passed by-laws favoring the Deere Plow Company, and a macadam road, railway switch, and also the Allied Companies.

Walkerville, Ont.

Plans are being prepared for an addition to the plant of the Penberthy Injector Company to cost \$20,000. The building of the addition, however, is conditional on the granting by the city of a fixed assessment and other concessions.

Winnipeg, Man.

The Doty Engine Works, of Toronto, recently incorporated in Manitoba, is now in communication with the industrial bureau, relative to the building of a modern shipbuilding plant on the banks of the Red river near Water street.

Tenders addressed to M. Peterson, secretary, Board of Control, will be received for excavation of earth and removal of same from the site of the sub-station No. 1 on King street near Notre Dame avenue. Details with the power engineers, Smith, Kerry & Ohae.

Tenders are being called by V. W. Horwood, architect, 177 McDermot avenue, until October 10th, for construction of solid brick warehouse on James and Bertha streets for Ryan Bros.

Yorkton, Sask.

The town of Yorkton is tendering for the sale of \$140,000 worth of debentures,

which will be received until November 15. Particulars from T. F. Acheson, secretary-treasurer.

AWARDED.

Montreal, Que.

Work has recommenced on the large store building for the Jas. A. Ogilvy Company, corner Mountain and St. Catherine streets. The general contract for the work has been let to Messrs. D. G. Loomis & Sons, general contractors, St. Patrick street, Cote St. Paul. Architect, David A. Ogilvy, 127 Stanley street.

Contract for the roofing of the new store for the A. E. Rea Company, Limited, St. Catherine street west, has been awarded to Messrs. Sibley & Hout, 77 Duke street. General contractors, Byers & Anglin, 18 St. Alexis street. Architect, A. F. Dunlop, Lindsay Building.

The Imperial Tobacco Company are erecting a factory building on St. Antoine street. Price, \$10,000. General contractors, Byers & Anglin, 18 St. Alexis street.

Contract for the roofing of the new station and hotel at Place Viger for the C. P. R. has been awarded to Sibley & Hout, 77 Duke street. General contractors, John Stewart & Company, 1 Bethune avenue, Westmount. Architect, Wm. Painter, C. P. R.

Ottawa, Ont.

The contract for the marble work on the Rosenthal Building has been awarded to J. K. Mills & Sons, Ottawa. The ornamental iron work has been awarded to Canada Foundry Company. Weeks & Keefer, architects.

Chamberlin & Co. has been awarded the contract of supplying the metal weather strips for the Chateau Laurier. Geo. A. Fuller Co., general contractors.

The Canadian Ornamental Iron Co. has been awarded the contract for the stairs and office railings in the Hope Building, Sparks street. W. E. Noffke, architect.

Owen Sound, Ont.

George Lethbridge has the contract for the brickwork in connection with the new furniture factory here, and A. Green the woodwork. Mr. Minchner is supervising the work.

Toronto, Ont.

The Bishop Construction Company have been awarded the contract for the new plant for the Glidden Varnish Company, Cleveland, Ohio, works at Toronto, consisting of tank house, power house and melting rooms. Contract price, approximately \$20,000.

Vancouver, B.C.

The contract for the structural steel in connection with the erection of the building for the "Vancouver World," has been awarded to John Coughlan & Sons, of this city. Estimated cost, \$125,000.

Victoria, B.C.

The contract has been let for the erection of a two-storey brick block for Mellor Bros. on the south side of View street, \$12,000. C. E. Watkins is the architect.

The contracts awarded for the Matthews Building, Rideau street, are: Mason, stone, concrete and brick work, Alexander & Campbell; carpenter work, A. Richards & Son; steel work, Dominion Bridge Company; painting and glazing, William Howe; electric wiring and fixtures, McCallum & Company; copper work, McFarlane & Douglas. W. E. Noffke, architect.

Tenders and For Sale Department

Tenders Wanted

Separate or bulk tenders will be received by the undersigned, sealed and marked "Tender for Town Hall," until SATURDAY, 22ND OCTOBER, at 4 o'clock p.m., for the erection of a Town Hall Building in the Town of Hanover.

Plans and specifications may be seen at my office, Hanover, and at the office of Forster & Clark, architects, Owen Sound.

The lowest or any tender not necessarily accepted.

JOHN TAYLOR, Town Clerk,
Municipality of Hanover.

September 12th, 1910.

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The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Street Railway Material," until the SEVENTH DAY OF NOVEMBER, at 12 o'clock noon, for supplying to the City of Calgary Rails, Cars, Equipment and Overhead Material for extensions to Municipal Street Railway.

Full particulars and specifications may be had on application to the Commissioners, City of Calgary; marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910.

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The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Erection of Bridges," until the SEVENTH DAY OF NOVEMBER NEXT, at 12 o'clock noon, for the erection of steel bridges, one across the Elbow River at Twelfth Ave., and the other across the Elbow River at Second Street East.

Full particulars and specifications may be obtained from the Commissioners, City of Calgary, on application.

A marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910.

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To Building Contractors

Tenders are invited for the erection in Newmarket, Ont., for a large four-storey Factory Building for the Office Specialty Mfg. Co.

Tenders in bulk or separately for concrete work, brick work, carpentry, painting, plumbing, galvanized iron work and gravel roofing, will be received by the architect up to THURSDAY EVENING, OCTOBER 20TH.

Lowest or any tender not necessarily accepted.

The plans and specifications are now ready and may be seen at my office, Queen street, Newmarket, also at the office of the Contract Record, 504 Confederation Life Building, Toronto.

O. E. TENCH,
Architect.

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To Contractors

Tenders will be received at the office of the undersigned until noon SATURDAY, OCTOBER 8th, for the various works required in the erection of a Sunday School Building for the Chester Presbyterian Church, Toronto. The lowest or any tender not necessarily accepted.

40 SYMONS & RAE, Architects,
15 Toronto street, Toronto.

TOWN OF OSHAWA

Outfall Sewer Extension

Sealed tenders for providing and constructing a Main Trunk Sanitary Sewer as an extension of the present outfall sewer, will be received by the Town Engineer not later than 12 o'clock noon of FRIDAY, THE 14TH DAY OF OCTOBER, 1910.

The work includes the construction of:
1,800 feet Sewer, 20-inch diameter.
1,860 feet Sewer, 24-inch diameter.
12 Manholes and all appurtenances thereto.

Yardage of excavation is approximately 2,700 cubic yards.

Plans and specifications may be seen and forms of tender, on which application must be made, obtained at the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

W. E. N. SINCLAIR, LL.B.
Mayor.

FRANK CHAPPELL,
Town Engineer.

Oshawa, Ont., Sept. 21, 1910.

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Notice to Contractors

Tenders for Machinery for Roundhouse at Lake Superior Junction and for Pumps and Motors for Sewage Pumphouse at the Winnipeg Shops.

Sealed tenders addressed to the undersigned, and marked on the envelope "Tender for Machinery" and "Tender for Pumps and Motors," as the case may be, will be received at the office of the Commissioners of the Transcontinental Railway at Ottawa until 12 o'clock noon of the 18TH DAY OF OCTOBER, 1910, for the machinery required for the equipment of a round house at Lake Superior Junction, Ont., and for the centrifugal pumps and motors required for the sewage pumphouse at the Winnipeg shops, Winnipeg.

Plans and specifications may be seen and full information obtained at the office of Mr. Gordon Grant, Chief Engineer, Ottawa, Ont., and of Mr. S. R. Poulin, District Engineer, St. Boniface, Man.

Tenders must be signed and sealed by all the parties to the tender, and witnessed, and be accompanied by an accepted cheque on a chartered bank of the Dominion of Canada payable to the order of the Commissioners of the Transcontinental Railway for a sum equal to ten per cent. (10 p.c.) of the amount of the tender.

The right is reserved to reject any or all tenders.

By order,
P. E. RYAN,
Secretary.

The Commissioners of the
Transcontinental Railway.

Dated at Ottawa, September 22nd, 1910.

Newspapers inserting this advertisement without authority from the Commissioners will not be paid for it.

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Miscellaneous

Advertisement under this heading two cents a word per insertion.

INVESTMENT OPPORTUNITIES — Stock for sale in a well paying yard and planing mill business, or would consider silent partnership. If you are looking for a god investment here is your chance. Address Box 141, Contract Record, Toronto, Ont.

40

Power Plants, Electricity and Telephones

Berlin, Ont.

At the meeting called to discuss the question of securing natural gas for towns and cities in northern section of Western Ontario, Mr. G. H. Clarke, secretary of the Berlin Light Commission was appointed permanent secretary of the Union to keep in touch with the conditions of the natural gas fields and keep municipalities informed.

Belleville, Ont.

At the last meeting of council the offer of the Canada Company for a switchboard panel, three meter receptacles and one meter plug to be installed for \$60, was accepted and the tender of the Allis-Chalmers Company for a venturi meter installed complete for \$1,000 was also accepted.

Brockville, Ont.

It is reported here on good authority that in the near future construction work for developing power in the South Sault channel of the St. Lawrence, Long Sault channel and the mainland, which is entirely in American territory, will be commenced by the Long Sault Development Company. It is also reported that the Ontario and St. Lawrence Power Company intend developing power at Waddington; also entirely in American territory.

Galt, Ont.

A. M. Edwards, chairman of Finance Committee, is calling for hydro-electric power debentures, etc., until October 14.

Montreal, Que.

The city council has adopted the report of the Board of Commissioners in regard to the street lighting.

Ald. L. A. Lapointe gave notice of a motion that in thirty days he would move the adoption of a by-law to borrow \$5,000,000 for the construction and administration of a system of underground conduits, which was in accordance with the legislative powers obtained by the city.

Niagara Falls, Ont.

The property owners on McRae street will erect six concrete pillars for electric lighting.

It is stated the Niagara, St. Catharines & Toronto Ry. Co. is planning an extension from Fonthill to Fernwick and the establishment of passenger service to the last-named plant. Definite announcement of plans has not yet been made by the company.

The Niagara, Welland & Lake Erie Ry. Co. has given notice that it will apply to Parliament at its coming session for power to construct an electric railway line from

Niagara Falls to points on Lake Erie between Fort Erie, opposite Buffalo, and Port Dover, via Welland and Port Colborne.

New Westminster, B.C.

The B. C. E. R. Company is calling for tenders for the building of freight sheds and a wharf in this city, the work to commence early in October. It is the intention to build the dock about thirty feet out in the river.

Renfrew, Ont.

Dr. McCormack presented a report from the waterworks committee recommending that a revetment wall at the Renfrew Electric Company's intake pipe be built this fall in order to protect the company's property and enable the council to proceed with the building of the new power house intake at the earliest possible moment next spring, Adopted.

Toronto, Ont.

The Board of Control adopted the report of the City Engineer (Hydro-Electric Department) recommending the acceptance of the following tenders: Storage batteries, Chapman & Walker Co., Ltd., \$2,870; transformers, Canadian General Electric Company, \$15,800; motor generator sets, Lancashire Dynamo & Motor Co., \$2,262.

Victoria, B.C.

Gore & McGregor, land surveyors, have surveyors out on a route for an electric railway from Barkerville down the Willow river to join the G. T. P. at or near Fort George, a distance of about 120 miles. There are several places on the river which will supply ample power for operation of the system.

Vancouver, B.C.

Plans were approved by the board of works for the B. C. Telephone Company's extension of its system in Kitsilano. The trunk lines will be placed in the lanes between Third and Fourth avenues and extend as far west as Bayswater street.

Wynyard, Sask.

The town council has decided to install street lighting, and experiments will begin immediately as to the most suitable light until power for electric lighting is available from the C.P.R. roundhouse.

Winnipeg, Man.

See "Business Buildings."

The Board of Control called for tenders until the 4th inst., for supply of 5,000 lbs. of No. 6 and 3,000 lbs. of No. 8 B. & S. medium drawn solid copper wire, and five miles No. 9 B. W. G. galvanized iron wire. Specifications with City Engineer. M. Peterson, secretary.

Tenders addressed to Chairman, Board of Control, will be received until October 20 for supply of 115 h.p., 60-cycle, induction motor, silent chain drive therefor. Copy of specifications at office of power engineers, Carnegie Library Building.

AWARDED.

Calgary, Alta.

Three tenders for supply of 20 motors for the six new cars on the street railway were received and were as follows: Westinghouse, \$10,950; General Electric, \$10,450; Allis-Chalmers-Bullock, \$11,166. Although the tender of the General Electric Company was lower than that of the Westinghouse by \$25 a motor, the latter was accepted because the cars at present are fitted with Westinghouse motors. The new cars which are to be ordered will not be fitted up for the Westinghouse motor as those that have been purchased have been. Other companies will thus be on the same level with the Westinghouse.

Miscellaneous

Hamilton, Ont.

Permits issued recently are as follows: F. J. Rastrick & Son, brick store and dwelling, James street, corner Picton street, for E. Briggs, to cost \$2,000; Thos. Allen, two brick dwellings, Nightingale street, near Ashley street, to cost \$4,000; G. W. Stephenson, brick dwelling, Holton avenue, between King and Main streets, to cost \$2,500; Hancock Bros., two brick dwellings, Margaret street, between King and Main streets, for C. Fee, to cost \$3,100.

London, Ont.

Tenders addressed to Sec. No. 3 Committee of City Council will be received until Nov. 2nd for a fire engine, 800 to 1,000 gallons; automobile or motor fire engine, 700, 800, 900 or 1,000 gallons. Ald. H. Ashplant, chairman.

Montreal, Que.

The following business permits have been recently issued: A. L. Cooper, an oil warehouse on Durocher street; J. H. W. Ohandes, a cottage on Durocher street, \$4,800; I. Crepeau, 1905 Park avenue, a cottage on Outremont avenue, \$5,000; F. & G. Charland, house containing three dwellings on Querbes avenue, \$4,000; B. Damien, 288 Mount Royal east, house containing two dwellings and store on Mount Royal avenue, \$5,000; Portier & Freres, 259 Mance street, two houses containing six dwellings on Mance street, \$10,000; A. Mongeau, 1242 Bordeaux street, house containing three dwellings on Delorimier avenue, \$3,000; J. B. Vien, 1103 Cartier street, house containing three dwellings on Rachel street, \$3,000; S. Richard, 1063 Delorimier avenue, house containing three dwellings on Rachel street, \$8,000; Z. Lussier, 2 St. Philomene street, house containing three dwellings on St. Emelie street, \$3,000; Dr. T. R. Wilson, 44 Park avenue, 13 houses containing 52 dwellings on Cowan street, \$32,000; A. Prevost, 11 Fairmount avenue, two houses containing six dwellings and three stores, St. Viateur and Waverly, \$12,000; Mde. S. A. Hughes, 869 Maplewood avenue, a two storey house on Cote des Neiges road, \$3,000; R. Laberge, 122 Marguerite street, two houses containing six dwellings on St. Marguerite street, \$4,500; F. Larose, 506 Chambord street, three houses containing six dwellings on Simard street, \$5,000; E. Cote, 2396 St. Urbain St., house containing three dwellings on Waverly street, \$3,000; Mde. V. A. Brunet, 971 Berri street, house containing three dwellings on Berri street, cost \$3,500; Mde. M. Davis, 239 Bishop street, house containing four dwellings on Summerhill avenue, \$24,000; J. Brousseau, 721 St. Hubert street, house containing three dwellings on Park avenue, \$6,500; N. Corneiller, 69 St. Germain street, house containing five dwellings on Cuvillier street, \$4,500; J. C. Gauthier, 1235 Sanguinet street, three houses containing nine dwellings on St. Denis street, \$9,000; J. J. Dempster, McGill St., a three storey residence on Howard avenue, \$4,000; Estate Masson, 13 St. James street, alterations to property 467 Dorion street, \$4,000; W. Gauthier, 210 Joliette street, alterations to property, cost \$2,600; Eastern Townships Bank, Sherbrooke, P.Q., a bank building Crescent and St. Catherine Sts., \$35,000; St. Lawrence Milling Co., Ltd., 1110 Notre Dame street west, a flour mill building, cost \$77,000.

Toronto, Ont.

The time for receiving tenders for supply of two automobiles has been extended from October 4th until October 11th. G. R. Geary, mayor.

Recent building permits include: J. L.

Nichols Co., 3 storey brick addition to factory, 184 Spadina avenue, \$6,000; Dr. C. Brown, two storey and attic brick dwelling, and a garage, corner Bloor and Major, \$5,500; Rev. G. A. Mitchell, 2½ storey brick dwelling, on Hinchey, \$7,000; Queen City Oil Co., reinforced concrete tank, north side Antler, \$10,000; W. P. Graham, one pair semi-detached 2 storey brick dwellings on 131-3 Emerson avenue, \$4,000; Thos. Edmunds, 2 pair semi-detached 2 storey brick dwellings, on east wide Symington, \$11,200; Alexander & Son, 2 pair semi-detached 2 storey brick dwellings on Roxborough, \$9,000; Wickham Bros., 3 attached 2 storey brick dwellings, Bartlett, \$6,000; A. W. Reid, 2 detached 2 storey brick dwellings, Summerhill Gardens, \$6,000; G. M. Bryan alterations to one pair dwellings on Yorkville, \$4,000; W. Pinkerton, 3 attached 2 storey brick dwellings, east side Dufferin, \$6,000; T. H. Smith, 2 storey brick dwelling, on Roxborough St. east, \$6,000; Dr. F. C. Husband, 2 storey and attic brick dwellings on Roxborough street east, \$6,000; Thompson & Mitchell, 2 rows of 3 attached 2 storey brick dwellings, on east side Montrose, \$12,000; Thompson & Mitchell, 1 pair semi-detached 2 storey and attic brick dwellings, corner Montrose and Harbord, \$4,500; Glidden Varnish Co., 1 storey brick grinding mill, corner Wallace and G.T.R., \$8,000; J. P. Uren, 1 pair semi-detached 2 storey brick stores and dwellings on Dundas, \$7,000; Robt. Luxton, 1 pair semi-detached 2 storey and attic brick dwellings, corner Pape and Globe, \$4,600; J. Singer, alterations to dwelling, on 308 Jarvis street, \$5,000; H. M. King, 2 storey brick dwelling on Glendale avenue, \$4,000; F. W. Leeming, 3 pair semi-detached 2 storey brick dwellings, on south side Millicent, \$12,000; G. B. Cooney, 2 detached 2 storey brick dwellings, on east side Dufferin, \$4,000; A. J. Peppiatt, 1 pair semi-detached 2½ storey brick dwellings, 13-15 Boustead, \$4,400.

Vancouver, B.C.

Building permits were granted as follows: A. B. McLellan, 2621 First avenue west, \$3,700; J. P. Chisholm, 1920 Charles street, \$2,300; Gold Seal Liquor Company, 722 Pender street, \$3,500; T. G. Gray, 1258 Seymour street, \$4,000; W. Winburn, 2817 Fourth avenue west, \$2,300; Vancouver Engineering Works, C.P.R. reserve, \$8,000; J. J. Skinner, 2070 Harris street, \$2,000; J. Morley, 1644 Sixth avenue west, \$2,400.

Victoria, B.C.

The following bids for repairs of steamship Princess May were received: Hefferman Engine Works, Seattle, \$131,200 (including duty), 85 days; Hall Bros., Eagle Harbor, \$120,000 (plus duty), 95 days; Moran Shipyards, Seattle, \$125,000 (including duty), 60 days; Williamette Iron Works, Portland, \$105,000 (plus duty), 90 days; Wallace Shipyard Co., Vancouver, \$98,750, 76 days; Victoria Machinery Depot, \$94,300, 84 days; British Columbia Marine Railway Co., \$85,000, 80 days. None considered. Two courses are open, to call for new tenders or to repair the vessel by day labor.

Guertin & Fils, sawmill proprietors, Grand St. Esprit, Que., are reported to have assigned.

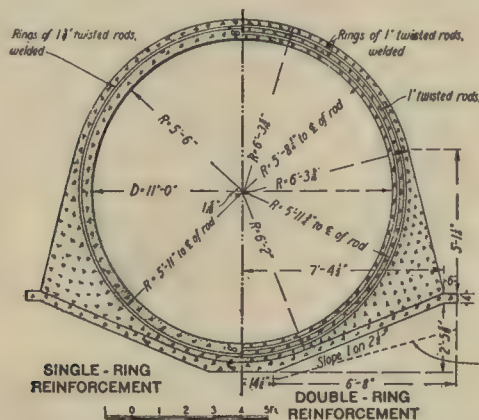
Pressure filters, placed direct on the mains, are in use by the Krugersdorp municipality, South Africa, which obtains its supply from a reservoir in which the water, during heavy rains, becomes highly discolored. The filters are of the Candy type, according to the "Surveyor." Each is 7 feet in diameter, has a capacity of 6,000 imperial gallons per hour, and operates under a head of approximately 70 feet.

Results of Tests for Leakage under Pressure of a Reinforced Concrete Pipe

The reinforced concrete pipe shown in section by the accompanying cut was constructed for test purposes at Hunter's Brook on the Catskill Aqueduct of the New York water supply. The section 210 feet long was built in place with the purpose of making it a part of the permanent construction should the tests prove satisfactory.

The principal features of this pipe are: Length, 210 feet, made up of seven 30-foot sections; inside diameter, 11 feet; thickness, 8 inches; reinforcement, welded rings of twisted square steel bars, about 1 square inch of cross-section for every 2½ inches of pipe length. The concrete, consisting of 1 part Portland cement, 2 parts sand or stone screenings, and 3½ parts gravel or broken stone, was machine mixed, quite wet. Transverse tests made on samples of this material at 7 months — the average age of the pipe when tested — indicated an average tensile strength not less than 330 pounds per square inch, the so-called average transverse strength being 400 pounds per square inch.

When first tested under a head of 28 feet the leakage from the pipe was at the rate of 560,000 gallons per



Section of Reinforced Concrete Conduit Tested for Leakage

mile per day, most of which was due to porous spots in the sides of the pipe, especially where stone screenings had been used in the concrete instead of natural sand. After grouting and pointing the defective portions with cement mortar, the leakage was as follows:

Head feet.	Gals. per mile per day.
30 Leakage	55,000
62 Initial leakage	119,000
Decreasing after 6 hours to	78,000
93 Initial leakage	215,000
Decreasing after 2 days to	110,000
125 Initial leakage	465,000
Increasing after 5 repetitions in 6 days to ..	816,000

After again pointing and painting the interior surface with cement grout, the leakage was as follows.

Head feet.	Gals. per mile per day.
34 Leakage	28,000
62 Leakage	36,000
92 Leakage	114,000
125 Initial leakage	240,000
Increasing after 6 repetitions within 6 days to ..	497,000

The magnitude of the leakage in the first test was due mainly to imperfections in the concrete. Under a moderate head, less than 100 feet, the leakage decreased

while the head remained constant, but when the head was increased the leakage increased at a somewhat higher ratio. On reaching a certain "critical head," in this case about 100 feet, the permeability of the pipe was radically changed, the leakage not only increasing at a much higher ratio than the head, but with each new application of pressure, indicating that the concrete begins to crack when the "critical head" is exceeded. A large number of longitudinal cracks were actually observed; most of them, however, were so fine as to be perceptible only by color differences while the concrete was still damp after the pipe was emptied. When the first cracks appeared the tensile stress in the concrete was estimated at 270 pounds per square inch, or 82 per cent. of that derived from beam tests. The above results are for the pipe as a whole, although considerable portions of the pipe remained dust-dry under the maximum head of 125 feet.

Method and Cost of Wedging and Chiselling out Concrete in Tunnel Lining

To install ventilating apparatus in the permanent shafts of the new East river tunnels of the Pennsylvania Railroad at New York City there had to be removed some 28 cubic yards of previously placed concrete lining in the adjacent tunnel walls. This concrete lining was inside of the cast iron lining rings and fear of breaking these prevented drilling and blasting. The method adopted is described as follows:

Holes were drilled in the concrete about 4 inches apart on a horizontal line, and perpendicular to the face. Parallel to the first row and about 8 inches above it, another row of holes was drilled, the holes being pointed downward at an angle of about 40 degrees. Steel wedges were driven into the upper holes, and resulted in breaking out wedge-shaped pieces of concrete. Another row of inclined holes was drilled about 8 inches above the second row. Steel wedges driven into the holes of this row broke out other fragments of concrete. This process was continued until the space for the nozzle was roughened out to approximately its final dimensions. It was then finished to nearly its final form by chisels operated by air hammers, and smoothed up with a stone-axe operated by hand.

In each tube this work required the removal of about 14 cubic yards of material. The cost of this removal was about \$72.50 per cubic yard, including the work of finishing the surface. The surface dressed was 515 square feet. The average depth of cutting was about 9 inches. The cost was about \$2 per square foot of surface dressed, including the removal of material.

Hintonburg Drainage System

The Hintonburg, Ottawa, drainage system, commenced in 1908 was completed in 1909 at a cost of \$52,532.37 including interest. The tile pipe sewers were of varying sizes, 24, 18 and 12 inches in diameter at varying depths below the surface from 13 feet to 6 feet. The strata proved to be very hard and difficult to work, including running sand with boulders, hard pan, granite boulders and limestone rock of a very finity nature. The Ingersoll Sergeant steam drills were used where possible, but on Wellington street hand drills were used exclusively owing to the rock being on twisted beds and making drilling and blasting difficult.

A dearth of bricklayers is reported from Winnipeg, Man.; where the prevailing wage is as high as 70 cents an hour.

Contract Record

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Advice that Lacks Conviction

Mr. A. W. Smithers, the chairman of the Grand Trunk Pacific, speaking at a Canadian Club luncheon in Winnipeg, a few days ago, said that the people of Canada were trying to go ahead too fast. Mr. Smithers should have been more specific than he was in indicating the direction in which the country is going ahead too quickly. To generalize, in matters of this kind, is to rob the advice, sought to be given, of any real value. It is possible that, as chairman of a transcontinental line, still under construction, he has his eye on other fields, the rapid development of which would militate against the chances of his own concern for future extension. Mr. Smithers' statement does not appeal to us.

The Old, Old Story at Montreal

The Montreal Board of Control have asked the Roads Department for a report as to the advisability of the city's undertaking practically all its own paving work, instead of awarding it by contract. Some of the members of the Board, it is stated, are of the opinion that this work can be carried out equally as well by the city as by contractors, and at a great saving.

If Montreal decides in favor of day labor it will be characteristic of the blundering that has marked the city's administration in recent years. One would think that in Montreal, of all places, the officials would scout the very idea of anything that lent itself to patronage. Yesterday, as it were, the city turned over a new leaf after the most humiliating exposures. To-day it inserts the thin edge of the wedge with a view to re-opening the old breach. It cannot be said that ignorance or inexperience is accountable for the proposal under discus-

sion. The city has had every opportunity for learning both the consequences of the patronage evil and the economy of contract work. There can be no excuse for making the same mistake twice.

It is difficult indeed to assign any substantial reason for this opposition to the contract system. Under any other system there are always occasions when those so minded take a slice off some fat job either for themselves or their friends. It stands to reason that the interests of the city will suffer if the stimulating influence of competition is removed. Moreover, the city obtains from the contractors a five years' guarantee of the streets paved. These and many other considerations, which have been discussed before, are against the course the city is taking, and if the proposal goes through it will prove a costly blunder.

Methods of Finishing Concrete

There is a small school of concrete workers which holds that the rough, board welter surface left by the forms is the only concrete finish that is truly artistic. Popular tastes, however, approves a finer finish, says "Engineering-Contracting." Now as fine a surface finish as desired can be given to concrete—it may be made to take a very satisfactory polish and it may be tinted in a variety of shades. The real question in any case is merely a question of reasonable cost.

In glancing over the variety of methods of finishing concrete, listed in a recent report, one is compelled to notice the almost complete breaking away that has taken place from the idea of moulding concrete to a perfect finish or surface. We speak, of course, of plain run concrete surfaces. Mouldings, ornaments, etc., are still moulded and probably best moulded for most work to perfect surface. But ten years or so ago it was the prevailing practice to seek surface finish by minute care in building the forms or moulds. Builders of concrete work whose experience runs back a dozen years will recall the almost cabinet work finish of form facing which was required, the covering of the forms with paper, the puttying of joints, etc. These requirements are rarely met with at present, though the demand for careful finish is more common in all concrete work than formerly.

There are few features of concrete work on which the general contractor is so likely to go wrong in estimating as the cost of surface finish. This comes, of course, from the want of good cost data. Contract prices for finishing are particularly misleading. This comes from the fact that few contractors have accurate costs on which to base estimates, and also from the fact that finish is regarded as one of the incidental items and is either lumped in with the total price or, if required to be bid on as a separate item, is put at some approximate figure, on the reasoning that any error which may result will be taken care of by the general profit on the job.

An increase in the total deposits in Canadian banks of no less than \$116,290,649 over the corresponding month last year, is the feature of the August statement, which has just been issued by the Finance Department.

The assessor's returns are evidence of Toronto's wonderful growth in recent years. During the last five years Toronto's population has increased 48 per cent. compared with Montreal's 21 per cent. Toronto's present population is 341,991. This represents an increase of 509 per cent in 40 years. The head offices of 11 of the 33 chartered banks of Canada are located at Toronto.



Crescent Road, Rosedale, a charming locality in North Toronto, showing the possibilities of street improvement and design.

Modern Methods of Highway Improvement

Useful Lessons from the Experience of Mr. W. A. McLean, Provincial Engineer of Highways for Ontario—Merits of Various Equipment

A detailed account of the methods of highway improvement practised throughout the Province of Ontario will doubtless be of interest to our readers, and offer instructive pointers to many Canadian municipalities taking an active part in good roads work. The following extracts, taken from the annual report of Mr. W. A. McLean, provincial engineer of highways for Ontario, serve to show not only the advantage of highway improvement, but also, to just what extent those advantages are realized in the eastern province.

County Road Expenditure.—Seventeen counties have established county road systems under the Highway Improvement Act. These are: Carleton, Frontenac, Halton, Hastings, Lanark, Leeds and Grenville, Lennox and Addington, Lincoln, Middlesex, Oxford, Peel, Perth, Prince Edward, Simcoe, Waterloo, Wellington, and Wentworth.

The Act is applicable to thirty-seven counties, so that nearly one-half of the province is working under the Act.

The Act was passed in 1901, and in the next year the County of Wentworth created their present county road system; this being followed in 1903 by the Counties of Simcoe, Wellington, and Lanark. With this nucleus, the number of county systems has steadily grown. In 1909, the last two counties, Leeds and Grenville, and Carleton, passed the necessary by-laws.

To the end of 1909, the average has been equal to fifteen counties, each operating for four years, in which period 1,125 miles of stone, or good gravel roads, have been built. This neglects a large amount of minor, incomplete and scattered improvements which will eventually be a part of the permanent work.

Combining the items of road construction and supervision (the latter about \$75,000), the total cost of road construction is \$1,404,497.88. With 1,125 miles of road built, the average cost per mile has been approximately \$1,250. This, as previously stated, neglects a large

amount of incomplete and scattered work, so that the average cost per mile would be less.

Expenditure under the Act since 1902 has been as follows:

Toll roads purchased	\$153,897.98
Sundry grants to townships, villages and towns	89,957.02
Permanent bridge construction	366,225.21
Machinery, plant, etc.	113,544.84
Road construction and supervision	1,404,497.88

Total \$2,128,122.93

Of this amount the counties have spent \$1,418,748.63. The provincial expenditure, extending over eight years, has been \$709,374.30, the province contributing one-third of the total, or one dollar to each two dollars raised by the counties.

Oiling Roads.—Crude oil sprinkled on macadam roads is proving itself a very satisfactory means of keeping down dust, and in this way largely overcoming the damage done to the roads and to adjacent property by constant automobile traffic. Oiling has been largely used in Toronto, and has displaced the use of water on all macadam and earth roads for preventing dust. An experiment was tried by the County of Wentworth in 1909, on a mile of the Stony Creek Road, where motor travel is frequent. This year (1910), it is to be used to a considerable extent, especially in fruit growing sections, where dust is a cause of much loss.

Oils with an asphaltic, rather than a petroleum base, are preferable. Two or three applications of oil within a fortnight early in the summer; this followed by applications four or six weeks apart during the summer have, to the present, been the most effective method of dealing with the dust produced by automobile traffic. A mixture of crude oil and limestone dust makes a toughened skin over the roadway that prevents dust and pre-

serves the metal surface. The oil is sprinkled from a watering cart driven at a fairly rapid rate. The oil should be scattered—not allowed to collect in pools, to be splashed by traffic or stain the clothing of pedestrians. A man should follow the cart with a broom to brush such pools away. The quantity of oil varies with the condition of the street—but ordinarily 1,500 gallons per mile will make the three first applications on Toronto streets, 24 feet wide. The oil lasts longer on shaded streets, and dries out more quickly when exposed to the sun. The oil costs four cents a gallon, and is applied for less than one cent. While not itself a bonding material, its influence upon the bond of a road is such as to deserve consideration in this connection.

Road Rolling.—Rolling is essential to the construction of a good stone road. It is impossible to build a stone road cheaply and durably without a roller, and the same is true with regard to the best class of gravel roads. Roads built of loose stone take from one to three years of traffic to consolidate them. During that time the roads are a serious obstruction to traffic. On short patches this is not so noticeable; but on long stretches of one or two miles, it is distinctly objectionable and much dissatisfaction arises. Before traffic can, with comfort, use the metalled roadway, the earth sides are cut up, drainage is blocked, and the entire roadway is frequently rutted or worn out of shape by vehicles travelling along one side of the stone.

Councils in selecting a steam roller should choose the best; and respective merits should be carefully studied. A saving in first cost may be many times offset by the additional cost of operating or maintaining an inferior machine. Maximum results and fewest stops for repair are all-important in seeking true economy. Rolling is

not an added expense to the cost of a stone road. The cost of rolling is more than made up by the saving that results in several ways.

Coarser stone can be used in a road that is rolled so that the cost of crushing is reduced. Between stone crushed fine enough to be used without rolling, and the coarser stone suitable for a rolled road, there may readily be a difference in cost of from eight to ten cents a ton. This alone will nearly pay the cost of rolling limestone.

Roads built without rolling, demand a great deal of attention for several years that is not given to rolled roads. The stone has to be raked to place from time to time; the earth sides have to be levelled where they have been cut up and destroyed; new material has to be added to fill hollows and ruts.

Rolled roads are more durable, and in consequence the cost of repair and maintenance is greatly reduced. With coarser stone in the roadbed it is stronger to resist wear; and it is more securely bonded than where it is first rutted and mixed with mud. Less stone is required on a rolled road, as loose stone is largely forced down into the mud or is knocked to the ditches by traffic.

A good road should have a foundation of uniform strength, surfaced with a well-bonded coat of stone of uniform thickness. By rolling the sub-grade, weak spots are developed which can be filled with earth and again rolled to produce the uniform foundation. Earth for this purpose is cheaper than stone. When weak spots are brought to grade in this way, the uniform coat of stone can be applied and rolled to its permanent place. Only a roller will do this work.

In addition to less cost, a stone road built with a steam roller is a complete work. It is in the best of condition to drive on as soon as rolling is finished. Rolled



The "Eaton" Road at Islington, Ont., in course of construction. The first step was to scrape from the top and sides all dust, mud and loose material, getting down to the old stone roadbed.

roads are a delight to those who have been accustomed only to old-time methods, and have done much to popularize county road systems.

The Grading Machine.—The grading machine has done much to reduce the cost of grading, draining, and turnpiking roads, and to improve the character of the work. The usefulness of a grader, however, depends wholly on the skill and experience of the operator, and the system of using it. The machine has not itself intelligence—this must be supplied by the municipal council in the provision made for operation.

The grading of the roads of any municipality should be undertaken as early in the spring as condition of the soil will permit. The work should have been carefully staked out by the road superintendent. The machine and equipment, horses and men, should be employed for the season or until the work for the season is all completed. The several jobs should be taken up in series across the township or county instead of sending the machine and equipment here and there, back and forth in an unsystematic way. When the work is undertaken without system, green horses are used on every new job and have to be trained for the work. New men have to be trained for every new job. Half the time of the men and horses is taken up in hauling the machine back and forth across the municipality. The work of grading is too important to be carried on by unskilled labor, and the grading machine should be in charge of one man for the season; and he should be employed year after year for this work, as far as circumstances will permit.

The grading or turnpiking of roads is a much neglected department of road construction. Any one without experience or training in roadmaking can haul gravel and dump it on a road. Any one can break up stone

and spread it over the road surface with ordinary results. The spreading of gravel and stone on a road is commonly looked upon as the important phase of roadmaking; some appear to think it the only part of roadmaking that deserves consideration.

The common method of making a road in some townships is to merely haul the gravel or stone to the road and string it along in a more or less irregular line. It frequently follows the windings of an old earth roadway thrown up by statute labor years ago, before the country was wholly cleared. It was consequently bent and twisted along the road allowance to avoid streams, logs and other obstacles. The cutting of hills and the filling of depressions was only partially undertaken. To call the spreading of stone in this way "road construction," is a very unfortunate meaning to attach to the work.

The grading of a road requires careful and discriminating judgment based on experience. The grading of a road means that it will be turnpiked; that the alignment of this turnpike will be straight and in the centre of the road allowance; that hills will be cut down and hollows filled up with the excavated earth; that the drains will be deepened or cleaned, or carried to a free outlet as circumstances may require; that the camber or crown of the road will be carefully considered; that the shoulders will not drop off in straight lines, but will be given a full curve; that earth will be brought to the edge of the stone so as to give the roadway a full and complete surface.

The placing of stone or gravel on roads, as commonly done, requires little judgment. Grading, on the other hand, means that the man in charge will use intelligence, coupled with painstaking effort to get the work right. The grading of a road is the cheapest part of the work as a



The "Eaton" Road at Islington, Ont. All soft and loose material from the old stone roadbed, having been graded, new crushed stone was spread to a width of 18 feet, and an average depth of 10 inches at the centre and 4 inches at the sides.



Standard Concrete Culvert, designed for the Sudbury-Soo Trunk Road.



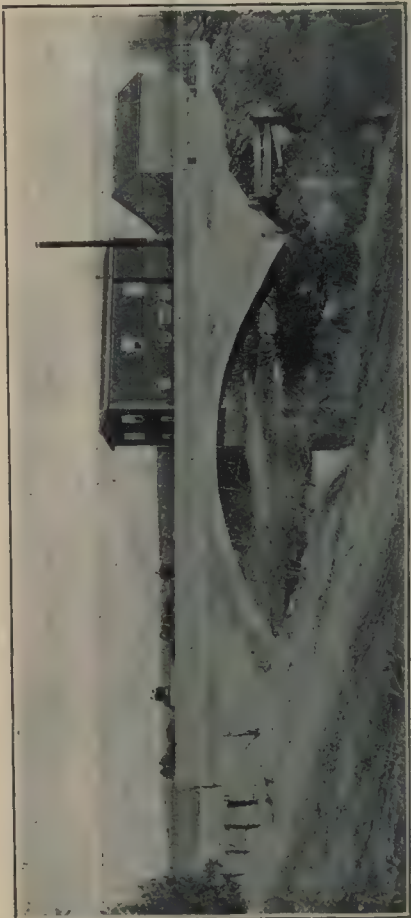
Crushing gravel near St. Mary's, Ont., for Perth County Roads—Plant of the Climax Road Machine Company, Hamilton, Ont.



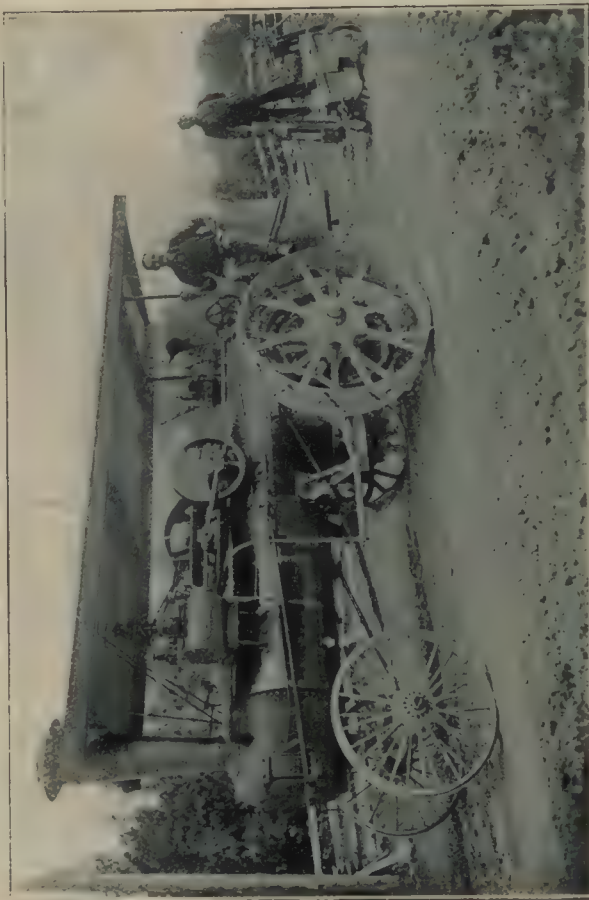
Stone-crushing with Climax plant in Prince Edward County—Loading screened stone from the bin.



Crushing stone for Frontenac County Roads near Kingston—"Climax" plant.



Concrete arch on the Middlesex County Road System. Built in 1909 at St. John's. Span, 75 feet clear; roadway 16 feet wide. Cost \$4,118.



A Road Scarifier operated by traction engine in Frontenac County, Ontario.



Stone Crushing in South Oxford, using coarse gravel.

rule, for the expense in most localities will arise through the treatment and hauling of gravel or stone. The cost of grading is low, but it is the crucial point in the building of a road.

The Rock Crusher.—Rock crushers with screen attachments are used for breaking quarry stone, field stone, and for treating gravel. They are being largely purchased throughout the province. Under suitable local conditions they are an essential part of a road-making plant. They are subject to severe strain, and in selecting one of these machines, municipal councils should seek strength and economy of operation, rather than a low first cost. Portable crushers, such as are rated at 100 cubic yards in ten hours are more economical than small sizes, as the cost of operation is nearly the same in either case.

Crushed quarry or field stone of reasonable quality is much more durable than is common gravel. The comparative life of stone and gravel roads depends on the amount of traffic. Gravel may give good service under light travel. But the heavier the travel, the more favorable becomes the use of broken stone, which is more durable and does not wear and rut so readily as does gravel. It is ordinarily assumed that one load of crushed stone is equal to two loads of gravel. Crushed and screened gravel very often does not cost any more, on the road, than does gravel in its natural state. This arises in two ways from reduced cost of teaming and loading:

(1) Coarse or loamy or sandy pits near the work may furnish a supply of gravel suitable for crushing or screening, but not fit for use in its natural state, and in this way the shorter haul and reduced cost of teaming offsets the cost of crushing.

(2) By elevating the crushed gravel to a bin, wagons may be loaded in three minutes, instead of in a quarter of an hour or twenty minutes, so that teams are not paid for standing in the pit.

Bins should always be used to receive stone from the crusher. Unless this is done, the crushed must frequently be stopped, keeping the entire equipment of men and machinery idle, while waiting for empty wagons. For the same reason, if field stone is used, it should be piled in advance of crushing, so that the outfit will not be idle while waiting for loads of stone to come up. By piling stone in the winter when farmers are idle the cost is usually lessened.

A rotary screen should be used on each crusher, elevating the crushed gravel or stone to the screen by means of chain buckets. The size of perforations in the screen will depend on the material being crushed. For ordinary quarry limestone or field stone when a roller is used, it is desirable to separate the material into three grades:—(1) Such as will pass a 1-inch mesh; (2) Such as will pass a 3-inch mesh; (3) Tailings.

The "tailings" or coarsest size passing the crusher should be put in the bottom of the road. The 3-inch material should be spread over the tailings. And the 1-inch material can be used as a surface dressing. Care should be taken not to use too much of the surface dressing—merely enough to assist consolidation with a roller.

For crushed gravel the screen should have a wire dust jacket wrapped around part of the 1-inch section of the screen to remove sand, dust and loam, using a $\frac{3}{8}$ -inch mesh for this purpose. This fine material should not be wasted. When spread on top of the stone to a depth of two or three inches as is sometimes done, the effect of screening is largely lost, as the fine stuff turns into slush in wet weather and ruts are commenced. There is usually plenty of sand and mud on the road without paying

for hauling more. Clean stone, well consolidated by rolling, is what is needed on the roads.

Staking the Work.—Work should always be staked out in advance of grading, draining or metalling, so as to keep the road as straight as possible or in the most desirable location. Stakes should be about 12 or 18 inches long, and placed about 100 feet apart on straight stretches. On curves, they should be close enough to guide the plow, grader, and spreading of stone.

The centre of the road should first be determined at points several hundred feet apart—as far as pickets can be seen. Then measuring a uniform distance to each side of the road, where a line of stakes will not be disturbed in grading (say 20 feet from the centre), plant pickets. Measure with a tape line and place stakes temporarily at proper intervals (usually 100 feet); and when this is done sight them into a true line between pickets. An engineer can use a transit for this work; but a reasonably true line can, with experience, be sighted with the eye.

From the stakes so planted, foremen can measure to the centre or side of the road, drains, edge of metal, etc., and keep the work in alignment.

The Scarifier.—The road scarifier is a machine almost unknown in Ontario, but is an extremely useful one for road-making purposes. A scarifier has been used by the County of Frontenac during 1909. This machine cost \$475, and is used in breaking up the surface of old stone roadbeds, in order that the roadbed may be properly shaped before putting on new material. It is of special use in a locality such as Frontenac, where crushed stone has been largely used for years. By means of the scarifier, the grading of these old roads can be more cheaply and effectively done. When properly shaped, there is a considerable saving of new material, as less new crushed stone is required to crown the road and fill up inequalities. This work is at times done with a road grader, but is a severe strain on that machine, and usually results in considerable outlay for repairs. Counties and townships having the treatment of old gravel and stone roadbeds to consider should study the results obtained by the use of a scarifier.

Hand Scraping of Mains

The scraping of mains at Dundalk, Ireland, is accomplished both by hand and by pressure-driven tools. The hand method is used on pipe of from 3 to 5 inches in diameter; a 5-foot length is cut out of the line and scrapers fixed to the ends of stout cane rods inserted in each direction. During the operations water is allowed to run freely from the pipe. Two types of tool are used on the hand work; a round chisel-pointed bar with a bow spring on one side, made to fit the circumference of the pipe, or a spring steel coil fitted on a $\frac{3}{4}$ -inch round bar centre. Mr. M. Sellars, town surveyor, who presented a paper upon this subject recently before the Institution of Municipal and County Engineers at Dublin, does not recommend the drawing of scrapers by chains and windlasses. Hand scraping on 3-inch mains is said to have cost from 5 to 7 cents per linear yard. The pressure-driven scraper used is fitted with adjustable blades and with a swivel joint between the sets of knives, to facilitate travel around corners. The head necessary to drive a 5-inch scraper, according to Mr. Sellars, is 60 feet; it is desirable, however, to have an available static pressure of from 80 to 150 feet for pipes ranging from 12 to 5 inches in diameter. The proper rate at which to drive the scraper is given as 4 feet per hour.

Notable Stone Quarries at Sackville, N.B.

Resources and Plant of the Sackville Freestone Company—A Progressive Industry that has made a name in the Canadian Building World

For many years efforts have been made from time to time to introduce New Brunswick and Nova Scotia stones into the western market, but with little success; first, because of the difficulty in securing a satisfactory deposit of rock, and, secondly, because the organization of the different companies operating there was incomplete, and lacked an adequate knowledge of the requirements of the stone trade.

It has remained for the Sackville Freestone Company, Limited, of Sackville, N.B., to place on the market a stone, the equal of which, in the opinion of many, has not been found in this country, and which is now being

in the front rank as a building material, where the very best architectural effect is desired. It is of even texture, great strength and durability, and is practically smoke proof. After many years of service in smoky cities, it retains a fresh and clean appearance. This the open and porous stones do not show, as the smoky moisture is carried into them so deeply through the open pores that cleaning is impossible.

While the company have an asset in this stone, which has undoubtedly been proven one of the best of its kind in the country, it is not altogether on this alone that its great success has been achieved. The up-to-



General view of the Sackville Freestone Company's plant at Sackville, N.B.

used extensively in banks, churches and other public buildings.

This property at Sackville was opened up a number of years ago by Mr. C. Pickard and later taken over by the Sackville Freestone Company, Limited, of which Mr. Pickard is manager.

The isolated formation of rock deposited at Sackville during the new red stone period so graphically described by Dawson, the noted geologist, is certainly unique, in the respect that it is entirely local and altogether different from the other deposits in the country, being very even in color and quality, of a much finer grain, and taking a crushing test of over 9,100 pounds to the inch; while the other stones in the locality are coarse, uneven and soft, showing a much lower crushing strength.

The formation is in horizontal beds, from 2 feet to 9 feet thick. The quantity is unlimited, covering 40 to 50 acres of the company's property. The stone is uniform in quality, possessing that depth of covering which only the better class of stone displays, placing it at once

date methods of handling the stone in the quarry, and the business-like way in which the industry has been conducted have also been important factors.

At the quarries will be found an up-to-date plant, costing over \$45,000. Excavation work has reached that stage where any order, no matter how large, can be filled with the utmost despatch. As each order comes in the stone is cut to size in the quarry by steam drills. From there it is conveyed by steam cranes to the steel gangs in the power house. There it is finished off to the exact requirements specified. Two of these steel gangs are constantly in operation. A duplicate steam plant is maintained on the other side of the quarry. In addition to this the company have in connection the electric plant, so that it is impossible for operations to become suspended by a breakdown in any part of the power house, as either of the two auxiliary plants could immediately take up the work.

The fact that this stone was chosen for the extension to the Ontario Parliament Buildings, Toronto, in com-



Power House of the Sackville Freestone Company, where the stone is conveyed to be sawn.

petition with all other Canadian and American stones, is proof that the quality is of the best, and that the facilities for expeditious handling are equal to any in Canada.

The following is what an expert, sent to Nova Scotia by the Ontario Government to inspect different quarries, says in a letter to this company:

"I looked over your plant, and was surprised to note the extensive developments that had been done, the up-to-date equipment and your method of opening and showing up quarry face, making crosscut and blocking off. The quantity and quality of the stone in sight are the best in Canada."

The Sackville Freestone Company enjoy a large and growing trade in western Canada. The more the quality of red freestone is becoming known, the larger are the orders received for it. The manager, Mr. Pickard, is

ever alive to improvements in the facilities for handling his output. He is now negotiating with several firms that are putting on a line of steamers from Cape Tourmentine to Fort William, Ont. The stone will be carried to western points by water. This method of transportation will cut the price of freight in half and thus reduce the cost of the stone considerably.

The firm has a reputation among contractors of being businesslike in every sense of the word. No work is undertaken that cannot be completed, and contractors are not delayed by the tardy execution of orders.

Wood-stave insulation joints have been substituted for rubber insulations on certain mains of the Metropolitan water system. Boston, to reduce electrolytic action. Tests of a 48-inch rubber gasket joint, which had



One day's shipment from the quarries of the Sackville Freestone Co., Sackville, N.B.

been in service four years, showed considerable electrical leakage, and upon removal was found to be black and hard in spots, with a cinder-like appearance, as if it had been carbonized. The positive section of the reports of these experiments it is not generally stated whether the concrete is tamped parallel with, or joint contained numerous pittings $\frac{3}{8}$ -inch in depth. A wood-stave joint which was substituted for the rubber joint stopped the further flow of electrical currents. The wood-stave joints, which were used on all new pipe lines laid during 1909, according to the last annual report of Mr. Dexter Brackett, chief engineer of the Metropolitan Waterworks, were placed at 500-foot intervals. The pipe sections at joints differ from the ordinary form, only in the bell end, which is cast without a lead groove; pine staves are used. The cost per joint varies from \$12.45 for a 60-inch pipe to \$4.85 for a 12-inch pipe.

rods had not been in contact at many places. In the extreme case there was no contact on the underside for a length of 18 inches. Either air had collected underneath the rod, due to improper tamping, or, the concrete in setting had shrunk away from the steel. In most structures where adhesion plays such an important part the rods are placed horizontally as in beams, and the tamping is done at right angles to the length of the rods. In columns, however, where adhesion is of relatively less importance, since safety would seldom if ever depend entirely upon it, the tamping is parallel to the rods. It is quite evident that the bond of union would be different in the two types of structures, namely, those in which tamping of the concrete is carried on at right angles to the rods, and those in which it is parallel thereto. It seems proper, therefore, that in making laboratory experiments to determine working values of the bond of



The high-grade stone shipped from the quarries of the Sackville Freestone Company, Sackville, N.B., is attracting much attention.—The above is a typical carload.

Strength of Reinforced Concrete Beams

The strength of reinforced concrete beams depends, not only on the amount, kind and position of the steel, but upon the adhesion existing between the steel and the concrete. If the contract between these two materials is imperfect, or if the adhesion is insufficient or imperfectly distributed, the rods may slip and the failure of the beam may result, says the Engineering Record. This is especially true of plain round rods where the resistance to slipping is due entirely to adhesion. With deformed bars the bond is greater, and of a different nature, yet even here proper contract between the reinforcement and the concrete is of great importance. Plain square rods have the lowest value in adhesion, and this is one of the reasons why they are so little used in reinforced concrete construction. Recently in a series of test beams reinforced with plain square rods, the concrete between the underside of the steel and the concrete was examined after the tests had been made, by removing the concrete layer underneath the rods, and in several cases it was found that the concrete and lower surfaces of the

union, this should be taken into account by preparing some specimens in one way and some in the other. Most experiments thus far recorded have been made by determining the amount of pull necessary to withdraw an embedded rod from a block of concrete, and from this the adhesion per square inch is computed; the assumption being made that the adhesion is uniform over that part of the rod's surface in contact with the concrete. In at right angles to the rod, but in most cases where this information has been given the tamping was parallel to the rod. From tests recently made, but not yet published, it seems that the adhesion for tamping at right angles is only about one-half that for parallel tamping. Recent tests to determine the adhesion by means of short beams are along the right direction, for it is not good engineering to obtain data from tests, and then apply them to designs where the conditions are entirely different. If rods are to be used horizontally in a beam then by all means let them be placed in a similar position in the tests which determine the adhesive values that are used as a basis on which the beam is designed.

Building a Railway Bridge under Traffic

Novel Methods Employed in the Construction of an 80 ft. concrete arch at Philadelphia—Suggestive Ideas from Scheme of Progress Employed

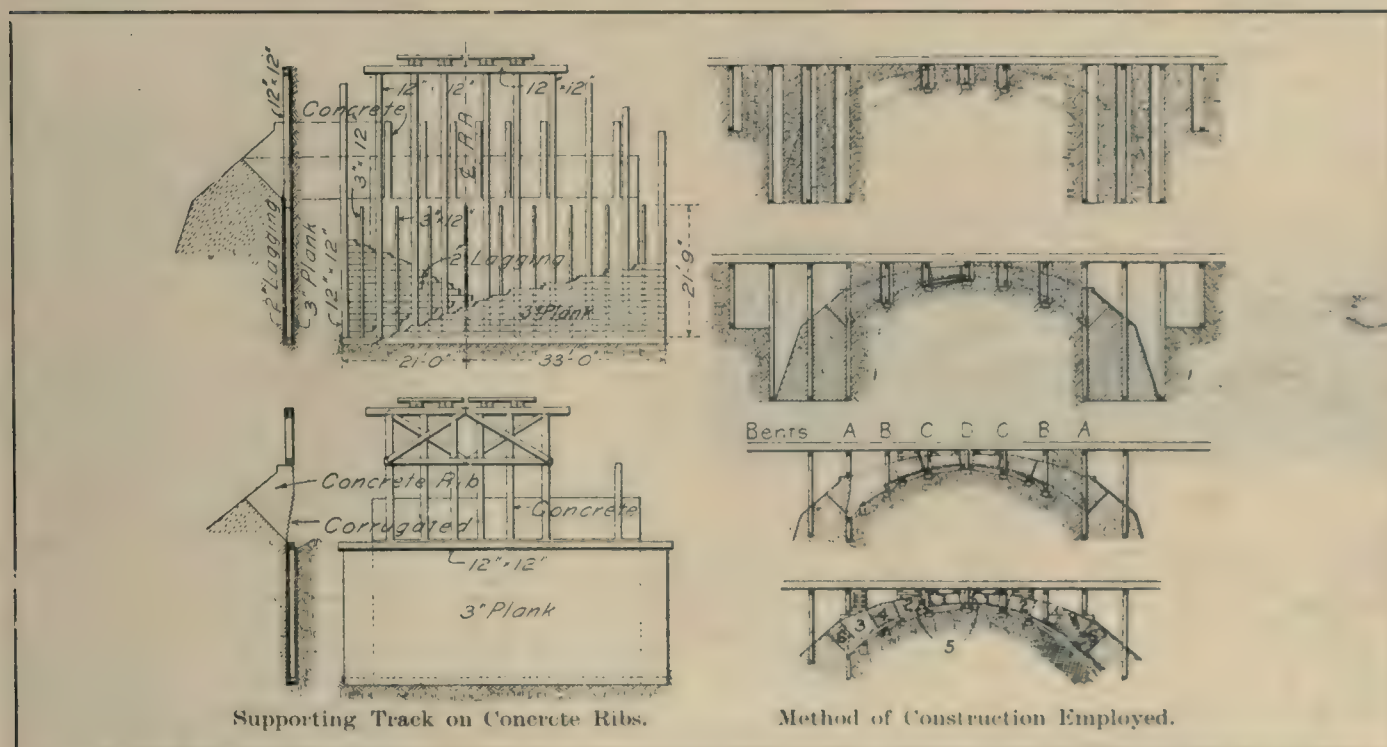
The City of Philadelphia has recently completed a plain concrete arch bridge of 80-foot span to carry the Tabor Branch of the Philadelphia & Reading Railway over Belfield Avenue, a street hitherto closed by the railroad embankment. The chief item of interest in connection with it, says the Engineering Record, is the method of construction. The bridge was built directly under the railroad tracks without interruption of traffic, and the centre for the arch was constructed on the earth of the embankment without any trestle work under it.

The arch has a rise of 16 feet 11 inches, and the ring in $3\frac{1}{2}$ feet thick at the crown and $8\frac{1}{2}$ at the springing

crete any of the trestle legs except those portions of the bents in front of the abutments which passed through the upper part of block 8. Moreover, costly and undesirable detours of the railway were avoided and much heavy falsework was saved.

The tracks on the completed bridge are at the same elevation as the original ones on the embankment, which was about 30 feet above the grade of the street.

Operations were begun by putting two 12 x 16-inch stringers under the ties beneath each line of rails, following this work by sinking trenches, transversely to the tracks, in which the timber bents were to be set for carry-



line. The material throughout is rubble concrete with all exposed surfaces made of white pebble. Reinforcement is used only in the architectural details of the railing.

The new bridge is $45\frac{1}{2}$ feet wide and accommodates three tracks, though the line originally had only two tracks.

The scheme of construction adopted utilized the existing railroad embankment for the support of small concrete piers upon which the curved joists of the centreing rested, thus dispensing with any trestle work to carry them. The trestles for the temporary support of the tracks over the arch also rested upon these piers until the arch voussoirs constructed between the bents had seasoned. Cribbing was built on the voussoirs up to the temporary track stringers. The track loads were taken on blocking on the voussoirs, and the trestles were removed, the openings thus left over the temporary supporting piers constituting the key spaces. In this way the arch was constructed without embedding in the con-

ing the railroad. The trenches were placed about 13 feet apart, centre to centre.

The bents consisted of 12 x 12-inch yellow pine posts approximately 5 feet apart centre to centre with a 12 x 12-inch cap and a 6 x 12-inch or 12 x 12-inch yellow pine sill. The sill rested on a temporary concrete pier, from 24 to 36 inches wide, and 18 inches high, which also served as a support for the 3 x 14-inch yellow pine ribs of the arch centreing. These ribs were placed 12 inches centre to centre and carried $1\frac{1}{8}$ -inch lagging. An additional footing for supporting the centreing was added at each haunch, and the pier nearest the abutments had to be 4 feet high in order to engage the ribs.

When the trestle at the abutments had been completed the main body of each abutment was built up to the skewback and on each skewback were built seven concrete piers 12 inches thick. These piers or ribs served a double purpose; first, of providing support for the track trestle above the front of the abutment, when the lower part of the trestle legs should be cut out for

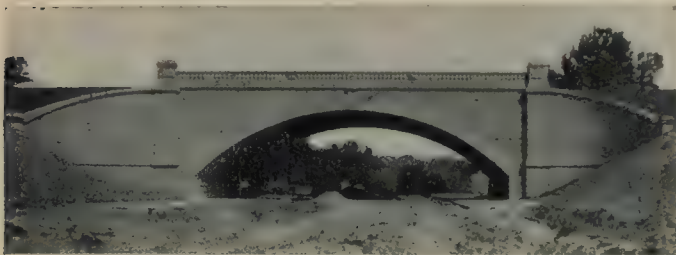
concreting key 6, and, second, of maintaining the key space 6 after voussoir 3 was cast, in other words, holding No. 3 against sliding downhill when its forms were removed preparatory to casting No. 6.

When the trestle over the arch was completed the spaces numbered 1, adjacent to the crown key, were excavated, the curved joists or ribs laid on the trestle piers, the lagging laid in the ribs and side and end forms erected. Each voussoir was then cast in one piece the full length of the barrel of the arch, 45 feet.

The same procedure was followed with the other voussoirs which were cast in the order of the numbers shown on the diagram.

As soon as block 1 had been set sufficiently, cribbing was placed on them up to the stringers to take the railroad load, and the earth was then excavated between bents C and D and the next blocks, No. 2, were cast. They in turn carried blocking after setting, and finally the remaining earth was excavated, blocks 3 poured, and cribbing placed on top of them to engage the stringers, thus leaving the tracks completely carried on the main voussoirs so that bents B, C and D could be removed and blocks 4 and the keys 5 could be cast. Finally blocks 6 were placed, closing the arch.

The temporary concrete piers for supporting the trestle bents and the arch centreing were subjected to the action of train loads during the construction of the centreing, and thereby were settled to pretty firm bearing be-



View of Completed Structure

fore any concrete was laid on them. They were set 2 inches higher than final elevation to allow for such settlement.

The faces of the buttresses built on the abutments were corrugated in order to make them effective afterwards as part of the arch rings. The buttresses were finally concreted in by key 6.

When the arch was completed and carrying the trains the earth beneath was excavated, thus removing the piers and releasing the centreing. The soffit of the arch was bush-hammered as the excavation and removal of centreing proceeded, the top of the excavation serving as a scaffold. The faces of the abutments were also bush-hammered after the removal of the core and centreing, it being, of course, impossible to remove the face forms in time for scrubbing as was done with the exterior surfaces.

Notable Tower at Halifax, N. S.

Work on the construction of the Halifax tower on the site of 100 acres, given by Sir Sandford Fleming for the purpose, and commemorative of the establishment of representative government in Nova Scotia 152 years ago, will commence shortly at Halifax, N.S. The tower will be more than 100 feet high and will command a wide view of sea and land.

In addition to the contributions that will be received from the various governments, the province of the Canadian Confederacy, the governments of Australia, New

Zealand, United South Africa, Newfoundland, and other states will present sculptured stones with armorial bearings for the interior wall decoration. The stone used for this purpose will be brought from quarries in the different provinces and dominions, and will be natural to those localities. Granite from the Yukon may be used and it is possible that Nova Scotia freestone will also take an important part. The merits of the last named material are discussed in this issue, in an article relating to the quarries of the Sackville Freestone Company, of Sackville, N.B.

Cork floor slabs, compressed from an original thickness of 14 inches to less than $\frac{1}{2}$ -inch, are being tried on one of the new steel dining cars of the Pennsylvania Railroad.

Chief Engineer Lafleur, of the Department of Public Works, Ottawa, in his annual report draws attention to the growth of the West and emphasizes the necessity for paying greater attention to public works in that part of the country. The annual expenditure will have to be increased to keep pace with the development.

The building returns from Victoria, B.C., up to the middle of September, represented a total value of \$1,725,680 compared with \$1,673,420 for the whole of 1909. This is an increase of \$52,260 over the largest total for any year in the history of the city. Building is still very active at Victoria, and it is expected that the figures will reach the two million dollar mark by the close of the season.

Extensive contract work is under way at Vancouver, this being more especially in the way of paving and sewers. The progress made on these works has been very slow this fall, and City Engineer Clement, has notified the contractors that the penalty clauses will be enforced if the work is not delivered in time. The Board of Works will make an investigation, and Mr. Clement will report on all contracts that are behind time. A shortage of labor is stated to be materially responsible for the delay.

The Berlin, Ont., Board of Trade were addressed recently, by Mr. A. W. Wright, who pointed out the importance of immediate steps being taken in order to keep the Northwest carrying trade on an all-Canadian route. Otherwise it would go by way of the improved Erie Canal, which would be completed in five years. He argued that even were the Georgian Bay Canal built, a deepened Welland Canal would be required to provide for return freight, which naturally would go by way of the lower lakes. The cost would be \$20,000,000, but the total for the deepening of the whole system, including the Welland and St. Lawrence Canals, would be seventy or eighty millions.

It is stated on the authority of Sir Robt. Perks, the British engineering contractor, who was in Ottawa recently, that in all probability a new dry dock, estimated to cost \$4,000,000, will be erected shortly at Levis, Que. The construction of the dock has been entrusted to Sir Robt. Perks' firm. The plans, which are now ready to submit to the Government, provide for a dock 1,000 feet in length, 130 feet wide at the coping, 100 feet wide at the entrance and 36 feet wide at the sill. This is 250 feet longer than the present Admiralty dock now building by the Government at Rosyth in Scotland, 75 feet longer than the Canada dock at Liverpool, and 150 feet longer than the Avonmouth dock at Bristol.

General Principles of Steel Construction

Economy the First Motive—Importance of System in Planning and Erection—Careful Study of Conditions Essential—Notes on Manufacture and Shopwork

The object of the design should be to obtain the best result for the minimum amount of money, and this can only be obtained when the different building materials are employed to their greatest advantages. It is obvious that the steelwork, brickwork, and stonework must be designed simultaneously, in order that no material should be wasted.

Good practice is to use a safe stress for steel equal to one-quarter of the ultimate strength of the material, or $7\frac{1}{2}$ tons per square inch, if the ultimate strength of the material is 30 tons per square inch. As the elastic limit of medium steel is about 15 tons per square inch, the actual factor of safety will be two.

The general lay-out of steelwork for a building is primarily dependent upon the size of rooms and type of floor construction; secondly, upon loads to be carried and requirements as to decorations. The spacing of columns should be uniform if possible, in order to permit repetition of sections and details.

Loads.—The actual live load is not used in the calculations, but the corresponding dead load which would cause the same stress in the steel as the actual live load.

This dead load is usually referred to as "superimposed load," and varies from 70 lbs. to 120 lbs. per square foot for apartments, houses, hotels, and office buildings, and from 150 lbs. to 400 lbs. per square foot for warehouses and factories. To the above loads should be added the weight of the floor itself (including steel girders and beams, which is about 100 lbs. per square foot for an average concrete floor. The dead load of floor must be carefully calculated in each particular case.

Steel may be used in a building for the following reasons: 1. By necessity. 2. For economy. 3. For fireproofing.

Steel may have to be used in buildings where the design will not permit of the use of only brick and stone work on account of large rooms, great loads, architectural features, or planning requirements. It is used by reason of economy, where steel is found to be cheaper than any other material, or where the floor space saved by using steel columns instead of brick wall or piers will more than compensate for the extra cost of steel compared with the cost of brick.

Steel beams and concrete are substituted for wooden joist floors and roofs in order to obtain a more fireproof construction, often to a considerable increase in the first cost of the building. However, the fireproof building may be more profitable to the owner than the old wooden construction, when the reduced insurance premiums and the increased rigidity and stability are taken into consideration.

No doubt fireproof construction will soon be adopted generally for large towns, and I will, therefore, in this paper only deal with that kind of construction.

In addition to the before-mentioned reasons for using steel in buildings, there are others more or less important according to conditions or circumstances: 1. Rapidity of construction. 2. Possibility of changing the arrangements of rooms after the carcass of the building is completed. 3. Increased stability and rigidity; uniform distribution of loads on foundations to prevent unequal settlement.

Rapidity of construction is generally a question of economy. By speedy completion of the building, interest on the capital is saved.

Possibility of changing the arrangement of rooms saves cutting away brick walls and putting in steel girders to suit the client's requirements. Such alterations of rooms may in

many cases increase the value of the building. A steel-framed building, where steel is properly covered with protective material, is, I believe, the most durable fireproof building that can be produced at reasonable cost.

Difference Between Brick and Steel Construction.—Let us compare the setting out and construction of a brick building and a frame building.

The setting out of a brick building need not be very accurate as to dimensions. The accurate dimensions of the site are often not ascertained before the old building is taken down, and the builder is ready to start work building the walls.

A little variation between the dimensions scaled from the drawings and the actual dimensions of the site wall will not present any great difficulties or cause delay or additional cost. The dimensions can simply be agreed upon between the builder's foreman and the architect's representative on the site.

It is neither necessary to have particulars of details when starting the work, as cutting away of little brickwork is not accompanied by any great difficulty should it be found at a later date that some alterations were necessary on account of some of the detail drawings not being ready when the work was commenced.

In the case of a steel structure, however, it is most essential that the drawings are completely worked out beforehand, and all details made.

Ventilation, heating, drainage, lighting arrangements, etc., should be set out beforehand, and the general lay-out and steel plans made to suit the different requirements.

Economy.—Economy is the essential thing to aim at, and, generally speaking, steel is being used in buildings because it admits of cheaper construction than other materials, and at the same time ensures a reliable structure.

By the use of steel the rental floor space is increased considerably; it also permits the use of large spans and less pillars, thereby enabling the future tenants to arrange the rooms according to their requirements.

Buildings can be quickly erected and completed, thus saving interest on capital.

In order to obtain true economy, however, it is necessary that the planning and designing, and also the method of carrying out the work should be systematical, and in accord with the general principles which I will deal with hereunder.

Systematical Progress of Work.—The steelwork plans should be ready several months before work can be started on site, to allow for the time required for the manufacture of the steelwork at the mills; also, it should be borne in mind that the steel can be obtained at a smaller cost if ample time is allowed for the steel contractor.

It is advisable to order the full quantity of each section in one lot, and get the pieces cut to exact lengths at the mills. Considerable waste occurs if the shop has to draw material from stock. To take material from stock should only be permitted when very quick deliveries are absolutely essential.

Generally speaking, complete dimensioned shop drawings should be made in the office in preference to setting out the rivets, connexions, and details by workmen in the shop.

It is, of course, necessary for the engineer in charge of making the detail drawings that he must have a well-trained staff of draughtsmen who are thoroughly familiar with shop work, as the draughtsmen are called upon to do such work as the template worker would otherwise do according to the old practice. Positions of every rivet should be shown on the

detail drawings, and nothing should be left to the judgment of the workmen in the shops.

More reliance can be placed upon drawings which have been checked than upon setting-out in the shop, which setting-out is not usually checked.

Another advantage of having complete shop drawings is that every piece can be inspected and compared with the detail drawing, and errors in shop work can more easily be detected than if the work is set out in the shop without shop drawings. Every piece can be made complete to the detail drawing without fitting the different pieces together, and still they must fit perfectly when erected. The essential thing to remember in steel construction is that there should not be any alterations of the steelwork on the site.

Alterations During Construction.—It is a very serious proposition to make alterations to the steel designs during progress of manufacture, and still more during erection. Not only will it incur delay and additional cost, but also less satisfactory work. Alteration work cannot as a rule be so well made as is possible if the original design was carried out. Records are difficult to keep and inspection is unreliable. If all drawings are properly worked out and completed before work is started, the possibility of alterations is materially reduced.

We will now follow the progress of manufacture of the steel from the date the steel-work drawings are ready and handed to the steel contractor.

Manufacture.—The first thing the contractor has to do is to issue orders for rolling of the material. An inspector will be appointed by the architect or engineer to inspect the quality of material at the place of manufacture.

The inspector will be at the mills when the material is rolled. He will be present when the chemical and physical tests are made, and make records of the results of the tests, and order additional tests to be made if the material does not run evenly.

The inspector will reject and order such material to be removed which will not meet the requirements of the specification, and stamp and approve such which is satisfactory.

The approved rolled material is stamped with the inspector's mark of approval or quality of material. Any piece coming from the rolls is stamped with the blow or melt number, and this number is referred to on the test sheet reports. Great care should always be taken to have the melted steel well mixed before it is put into the ingots. Every piece is also marked with an identification number given on the detail drawings. This number is used for reference when consulting the drawings in the shop, or when locating in which place the piece is to be erected on site. After being rolled and straightened the material is placed in the stockyard until required in the shop. As a rule the material cannot be rolled in the order it is required in the shop, but in such order as the rolls go in according to the rolling programme for the rolling mill. Weeks, and often months, may elapse before the same section is rolled again. It is often, therefore, advisable to roll the beams for the roof at the same time as for the lower floors, when same section is used. In the shop, however, the material is usually fabricated in the order as it is required on the site. The inspector is kept well informed as to the dates of rolling and manufacture, so that he can be present and inspect as required and as the work proceeds.

Shopwork.—From the stockyard the material is brought to the working shop, and skilled workmen mark on the position of the holes, lines of cutting, etc., on the steel pieces direct, with or without template. The number of the shop drawing and number of the job is often painted on the piece before it leaves the working shop, in order to assist the checker and inspector. Therefrom the marked material is brought to the drilling shop.

In the case of built-up sections, as, for instance, a column composed of angles and plates, all the angles and plates are

not marked and drilled separately, but only a few holes are first drilled; the different plates and angles are then bolted temporarily together, and the whole thickness of metal is drilled through at the same time, thus saving time and assuring greater accuracy and all holes being true. Several drilling machines can be used for one member at the same time. Burrs are removed after the drilling, and the ready-drilled piece is sent to the assembly shop. Some pieces are milled or ground to fit; the different pieces forming one member are temporarily bolted together and sent to the riveting shop.

During assembly, the detail drawings are consulted and dimensions checked.

When the pieces are rivetted they are sent to the milling machines if any part has to be machined, such as ends of columns or bearing plates on girders.

Before assembling some surfaces must be painted, as after assembly they are inaccessible. Open holes which are to be filled with rivets in the field are marked by the assembler, so that such holes shall not be filled in by rivets in the shop. Holes in small pieces and brackets are generally punched and rimmed after assembling, but main members are drilled. Before the finished steelwork is painted it is examined by the inspector, and all dimensions are checked. Ends of compression members which are machined must be examined, and it is ascertained if the ends are square to the axis of the member. If all measurements are correct, and the workmanship is satisfactory, the inspector stamps the piece with his shop inspection mark.

The material will not receive its shop coat of paint or oil before shipment.

Marking.—Any piece or bundle of pieces must not be shipped unless having the following marks applied:—1. Blow or melt number. 2. Identification number. 3. Mark of mill inspection. 4. Mark of shop inspection. 5. Shipping mark.

When painting the material before shipment, all marks made in the shop are extinguished, except those above stated. A small circle or triangle with white paint is made around the marks previously indented by stamps. The shipping mark and the identification mark is applied by paint in large and distinct letters or figures. Sometimes pieces for different parts of the building are painted in different colors, or a spot or ring of a distinguishing color is applied to facilitate selection of the material at erection. If the above described methods are used, little or no difficulties will arise at erection, and no risk is taken of material arriving at the site incorrect. The inspector makes remarks on his copy of the shop drawing when approving any piece at the time when his stamp of approval is applied. He has also to see that the material is shipped in the right order as required on the site. After completing inspection for each lot, he makes up a proper list of materials. The works do likewise, and the two lists are compared and checked. Several days before a shipment is made the shipping statement is written out in detail, and instructions are issued for shipment or transport of the material to the site.

As the material passes out of the works it is weighed, and the inspector records the weight and counts the pieces weighed, and sees if they are in agreement with the advice of shipment. The weighing machine should be checked at regular intervals by an independent party to assure that it registers the correct weight.

The shipping statement, advice, and invoice is now sent to the contractor as the material is shipped, if the contractor only buys the material but executes his own erection.

Shipment.—According to requirements the steel is transported on van, railway car, or barge, or by ship. Considerable damage to the material may occur during transport if proper precautions are not taken against careless handling when loading and unloading, so that small pieces are not bent or crushed by large or heavy pieces placed on top.

Delay, mixing up of the different consignments, is a source

of great inconvenience, and prevents speedy and methodical erection.

Erection.—The material is usually brought alongside the building on vans, and is hoisted by the erection cranes to a place on the building near to where it is to be erected, or sometimes directly placed in its final place. The different pieces are first temporarily bolted together and afterwards set to correct level and made plumb, after which all holes are filled with rivets. The steelwork is painted immediately after erection, and if more than one field coat is applied, different colors of paint should be used. Floors and walls are built and fireproofing applied. The erection of the steelwork should be two storeys ahead of the floors. The floors should be put in one storey ahead of the walls, as may be convenient. In cases where the walls partly support the floors or girders, the walls must, of course, be built the same time as the steel is erected. In order to prevent accidents to the workmen below, the floors should be put in close to the steel erection, or the floor framing should be boarded over to prevent any tools or material falling on the men below. At the same time, the different trades should be kept separate, so as not to interfere with the rapid progress of the work. When the carcase is complete and the roof is on, heating, ventilation, etc., are installed, partitions built, and joinery and finishing completed. In the carrying out of a large job it is not always satisfactory to put the responsibility on to different parties for designing, detailing, manufacture, inspection, and erection.

In my opinion, one man should be responsible for the systematic carrying out of the work.

The engineer responsible should bear in mind that no work is satisfactory unless the following requirements are fulfilled: 1. Economic and safe design. 2. Good material and workmanship. 3. Correct work as to dimensions. 4. Prompt deliveries. 5. Proper erection.

Satisfactory design can only be obtained by making a special study of the conditions and preparing accurate drawings and calculations. Good material can be assured by tests and inspection. Correct work can be obtained by systematic working and supervision.

Prompt delivery is dependent on each portion of the work being ready in schedule time. Careful watching of each department is necessary, particularly at the early stages of the work. It is wrong to suppose that after a good design and specification are made, the responsible engineer's work is done. A good specification is of little use without inspection, as a clever design without proper shop drawings.

The practice of taking a few test pieces from a job and sending them to a testing firm is not reliable, and is more deceiving than convincing. It may be that the test pieces selected will show good results, while material in other parts of the structure is bad. The material should be tested at the mills during the progress of manufacture. As I have previously said, satisfactory results can be obtained by the use of steel for buildings if the architect and engineer work hand in hand, and the work is carried out systematically in all detail.

Calculations and Preparation of Plans.—When preparing plans and calculations for a building, the work should proceed in the following order:—

1. The specification drawn up for stresses and loads
2. The principal members for the structure to be calculated, and it should be ascertained whether the setting-out of the columns and girders is economical and reasonable, and, if necessary, such modifications made as will improve the construction.
3. When the architectural plans are completed, the engineer will calculate all the loads of floors, walls, etc.; make stress sheets for each member, after which a set of plans is made and the required sizes given. The sizes of the steelwork thus obtained are drawn to scale on the architectural plans, and, where necessary, the engineer will modify the sections to suit architectural requirements; after which the architectural plans are practically completed, the shop drawings made, the contract placed with the steelwork contractor.

Good Fall Prospects at Ottawa

Activity in Commercial Building—Satisfactory news concerning labor situation and supply market

Ottawa, October 1, 1910.

Building in Ottawa this fall will be confined largely to commercial structures. The number of medium-priced and cheap houses built during the next few months will be smaller than last year. The commercial building, however, far exceeds other years.

Between four hundred and five hundred men will be employed all winter on the Grand Trunk hotel and station alone. Then the Blackburn building (a description of which is given below), the Rosenthal building and the Hope building, are all large fireproof constructions, which will take at least the winter, and, in some cases, most of the summer to complete. There are also a number of smaller buildings, including the Masonic Temple, Matthews building, City Fire Station, Slim-Shouldis factory, to be built very soon.

The labor situation is excellent just now. With the exception of a few plumbers on the Cateau Laurier, who are on strike, as a result of the strike in Montreal, there are no labor disputes.

There is a scarcity of the lower-priced labor which will be marked from now until the corporation works close down, on account of the frost. This is due to the overlapping of the season in the lumber camps, and the season in the corporation work. The City Engineer's Department has about eight hundred men employed at wages ranging from \$1.80 a day to \$4 a day. These works mostly close down as soon as frost interferes, while the lumber camp season opens on Oct. 1st, when several hundred men leave the city for the "shanties." The demand for skilled labor about equals the supply.

There promises to be little change in building supplies this fall. Coarse lumber has gone down a little, but the better qualities are even stiffer than ever, about levelling things up as far as the local market is concerned. Cement is steady now, the firms in many cases guaranteeing no increase this fall. Prices range around \$1.85 per barrel, according to quantity. Cartage remains as high as in the spring, from \$4.50 to \$5 for a team and man. There is a sufficient supply of all materials.

Tenders will be called very soon for the Government departmental block on Mackenzie Avenue, but it is not expected that work will be begun until next summer.

Tenders are being called for the Blackburn building, corner of Sparks and Metcalfe. The entire size of the building will be 132 feet by 91 feet. It will be built in three sections in order to accommodate the tenants occupying the buildings at present on the site. The first section will face Metcalfe Street, and will be 45 feet frontage and 89 feet deep. It will have a basement and seven storeys. The construction will be fireproof steel, and will be strong enough to carry three more storeys, when such an addition is desirable. The facing of the building will be of Stanstead granite or marble. The other sides will be brick. All the floors will be of reinforced concrete. The main floor will have a ceiling 16 feet high, the basement 14 feet, and the other storeys 10 feet 6 inches. The main floor will be utilized as a restaurant and cafe, and the other floors for offices, etc. Mr. W. E. Noffke is the architect.

The Matthews building, on the corner of Rideau and Mosgrave, will be 36 feet 6 inches by 90 feet, and will be three-storey with a basement. The construction will be semi-fireproof. Mr. W. E. Noffke is architect.

The plans for the Masonic Temple on Metcalfe Street have been approved. This building will have 60 feet frontage and will be 95 feet deep. It will be of steel fireproof construction, with all sides of brick. Mr. J. A. Ewart is the architect.

Winnipeg Makes New Record

**Adds to itself in nine months a city greater than
Brandon — Trade Conditions and Prospects**

Office of the Contract Record,
Winnipeg, Sept. 30, 1910.

Building activity, as a result of the culmination of labor disputes, has resumed the briskness which characterized Winnipeg since early spring, and owners, architects and contractors are now working overtime. The anxiety is now for the completion of outside work before winter sets in. If the season should prove no more severe than last winter, there will be little cause for worry. In this there is an element of chance, which builders are not prepared to accept, and every available man is now being pressed into service by the building trades. If an early winter sets in the result will be serious and will handicap brick and concrete structures. Contractors had carefully estimated the time on their hands to conclude work with safety, but they failed to anticipate the lock-out of bricklayers and masons. If a number of works are left over until spring, it will be attributable to these sources.

The quietness which prevailed in architects offices during the strike has given way to genuine activity.

Winnipeg, in less than nine months of this year has added a city of greater proportions than Brandon, the second city of the province. Building permits have passed the thirteen million dollar mark, and the total cost of construction work done in the city this year is over fifteen million dollars.

To have built a city within a city is evidence of the activity of contractors and architects this year. Brandon is a city of almost 20,000 people, yet the buildings which have been erected here this year, would house that population and provide space for all its factories, stores and commercial, as well as financial, interests.

It is improbable that Winnipeg will have any more really large structures this year, but the building total will pass up to nearly \$17,000,000 before the close of 1910.

Already possibilities for next year are being talked about. The permit for the Bank of Montreal, will probably be the first issued. The Hudson's Bay Company and the Herrod interests, which have amalgamated, are stated to be contemplating a mammoth structure here next year to compete with the Eaton Company for retail trade, and also to enlarge wholesale facilities.

The 8-storey structure for the Canadian Bank of Commerce will be started next spring. Work on removing the present bank building to Regina is billed to commence during November, and as soon as the ground is cleared the big local structure will go up. Darling & Pearson, Toronto, are preparing the plans for the new building.

L. B. Merriam and H. J. Symington, contractors, have issued a writ against the Parks Board, of Portage la Prairie for \$13,600, which they claim to be due for damming the river. Their claim is based on the alleged faulty specifications of the engineers. The contractors claim \$5,110, the amount of the final estimate which was withheld by the board after it had been passed by the engineers; \$490.84 which was retained by the board for engineers services, the contractors claiming that this was forfeited on account of the delay occasioned in the engineers altering their plans, a claim of \$8,000, because the blue prints of the river bottom were faulty and therefore the specifications could not be followed out. In the alternative the contractors will accept \$14,055.92, being the balance for work done and material supplied.

It is understood that Mr. Allen Hazen, the water purification expert, in his report on the Ottawa water supply, which will be ready in a week or so, will recommend that the city

draw its water from McGregor's lake. McGregor's lake is 14 miles from Ottawa, north of the river. The engineering difficulties in the way of laying water pipes down to the city are great, but by no means insurmountable, and it is said that the cost would not be so great as it would appear. The greatest difficulty would likely be found in laying the pipes under the Ottawa River. Mr. Hazen's report will probably be received in Ottawa before Oct. 15.

Canadian Railroad Development

The contract for the clearing of the right of way and grading of the Cowichan Lake branch of the Esquimalt & Nanaimo R. R. has been let to the contracting firm of Janse, Macdonnell & Timothy, who are building the Alberni branch of the same railway. This branch is to be ready for traffic early next summer.

Advices from Victoria, B.C., state that the Canadian Northern Railway has signed the contract for the construction of the first section of its railway on Vancouver Island, giving connections from Victoria to Barkley Sound, in accordance with the terms of the contract with the Government. The first section is about 30 miles long, and runs to Sooke.

Advices from Belleville state that Andrew McGuin, contractor for the three miles of the Canadian Northern Ontario Railway, Toronto-Ottawa line through that city, has started on active construction work west of the river. Grading has also been commenced at Trenton, and operations will soon be general on the sub-contracts between that town and Belleville.

The City of Toronto, has had work started on the construction of the new industrial spur line along the east bank of the Don to Ashbridge's Marsh. E. L. Cousins, railway engineer, formerly on the Grand Trunk staff, is in charge. The line will be used by the three railway companies on equal terms, and will be operated by the companies alternately, for periods of one year, but the city retains control for all time.

Work has been progressing for the last two months on grading and ballasting the roadbed of the Temiskaming & Northern Ontario Railway, of the Canadian Government. Trestles have been filled in and many miles of track have been raised. During August 1,501 cars of ballast were taken from the Redwater Pit, 2,674 from the Cassidy Pit, and 1,415 cars from the Wataybeag Pit. Along the section between Cobalt and Haileybury, which has been double-tracked, 1,398 carloads of ballast were used.

Officials of the Hudson Bay & Pacific Railway have been advised from London that all the money necessary for the construction of the proposed line was ready, and that work should be rushed. In addition to building a line from Prince Albert, Sask., to Hudson Bay, it has been decided to build southwesterly to Pacific Junction, Mont., to a connection with the Great Northern R. R. This latter line would lead to the belief that James J. Hill has become interested in the project. George Atwood, Prince Albert, Sask., is chief engineer.

The Dominion Railroad Commission has ordered the building of a subway under the C. P. R. tracks at Broad Street, Regina, Sask. The plans are to be filed within 60 days and the question of the apportionment of cost between the railway company and the city will be settled by the commission after the plans have been submitted. The proposed subway, it is stated, will be one of the largest of its kind in the west, providing, as it will, according to the commission's order, for 19 tracks. The superstructure to carry these will be 400 feet in length. About 950,000 lbs. of steel will be required for the superstructure. While no official estimate of the cost has been made, it is said that the undertaking will

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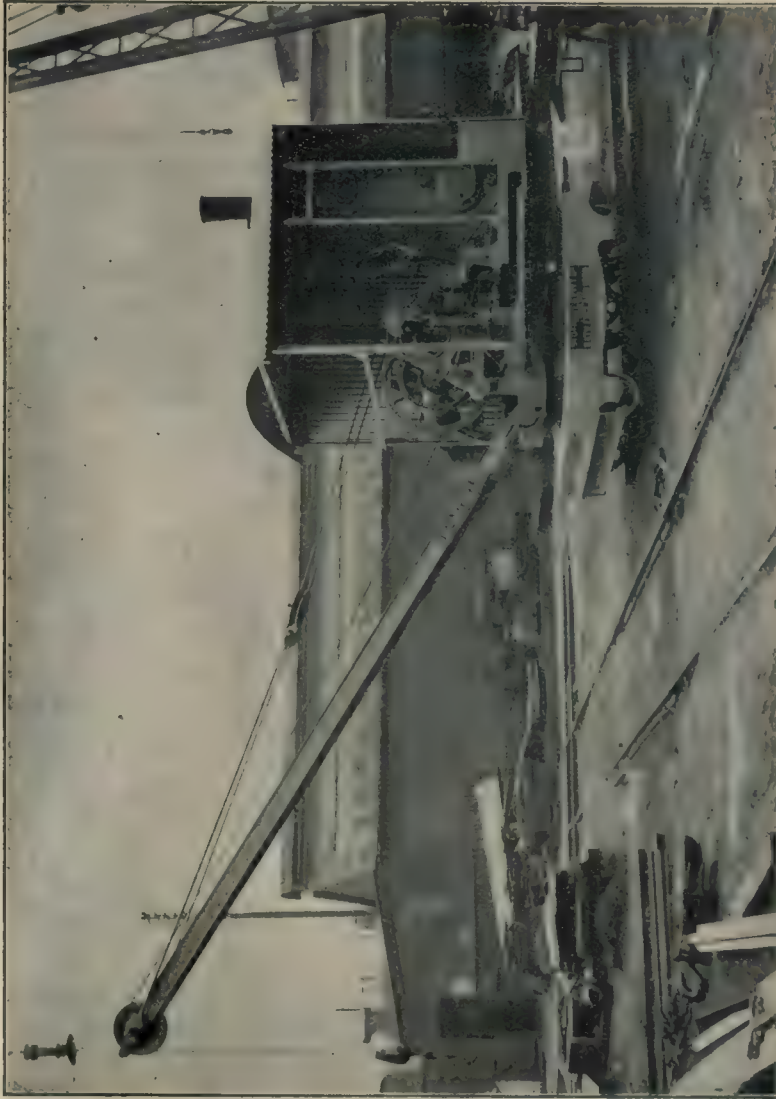
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involve an outlay in the neighborhood of \$250,000. J. E. Schwitzer, Winnipeg, Man., is assistant chief engineer of the Canadian Pacific.

The Canadian Northern Railway (T. Turnbull, assistant chief engineer, Winnipeg, Man.), will call for bids during October, for the construction of its line between Chilliwack and Lytton, at the junction of the Fraser and Thompson Rivers, a distance of about 90 miles. This will consist mostly of heavy rock work along the south bank of the Fraser River, including the canyon. Owing to the facilities afforded by the Canadian Pacific Railway the successful tenderers will be able to get in outfits and supplies at comparatively little expense, and undertake construction simultaneously at many points. Mr. Mann, president of the Northern Construction Company, of Winnipeg, is expected at Vancouver shortly, and will go over the route preparatory to submitting a bid. His company recently secured the contract for building the first 60-mile section between Port Mann and Winnipeg. The Canadian Northern, with regard to the second contract, will stipulate that construction work will be proceeded with during the coming winter. It is estimated that a large portion of the line through the Fraser River canyon will cost \$100,000 a mile. It is probable that tenders will also be called this fall for the 90-mile section extending north from Kamloops, through the valley of the North Thompson. Early next summer will see under contract the entire section between Yellow Head Pass, at the summit of the Rockies, and tidewater at Vancouver.

Personal News and Notes

During the first three weeks of September the building permits issued at Calgary, Alta., represented a total value of \$525,000.

A by-law has been passed at Calgary, which renders it imperative for buildings five storeys in height to be constructed of fireproof material.

J. A. Ritchie, manager of the Quebec branch of the Ritchie Contractors Supply Co., left recently for Vancouver, B.C., on a combined business and pleasure trip.

Col. Ruttan, city engineer, of Winnipeg, will preside at a meeting of the Canadian Society of Civil Engineers, to be held at Montreal early this month.

Mr. W. S. Painter, the C. P. R. architect, is making a trip through British Columbia, with a view to ascertaining the need for enlargement of the company's hotels in that province.

Winnipeg's building returns to date total more than thirteen million. This is more than double the returns for either 1907 or 1908. The highest total on record was for 1906, when the figures were \$12,625,950.

A tentative arrangement has been made between Mr. Angus Smith, city engineer, of Victoria, B.C., and the council of that city, whereby Mr. Smith will discharge the duties of his office for another six months.

Doctors Nasmith and Archibald, of the Provincial Board of Health, have been instructed to make a further test of the ozone purification plant at Lindsay. The results of the second investigation will be awaited with interest.

Messrs. Waddell & Harrington, of Kansas City, Mo., have been recommended by the Vancouver Finance Committee as consulting engineers for the city for a period of five years. The rate paid the firm will be 3½ per cent. of the total costs, and incidental expenses.

Mr. W. H. Reynolds, who is well known in the electrical field, and who was formerly connected with the sales department of the Eugene F. Phillips Electrical Works, Limited,

at Montreal, has been promoted to be western manager for that concern, with headquarters at Winnipeg.

At Victoria, B.C., there is a prospect for much building activity during the fall and winter months. An unusually busy season is assured, owing to the fact that the contractors have so many orders ahead. The city building inspector has been working overtime issuing permits during the last month.

Mr. Alcide Chausse, city architect and building inspector of Montreal, was seriously injured last week while driving. His horse bolted while passing a concrete mixer, and Mr. Chausse was thrown out violently into the road. Mr. Chausse is well known as the Hon. Secretary of the Royal Architectural Institute of Canada.

Factory Products Limited, Toronto, sole Canadian agents of Pirelli Limited, of Milan, Italy, have just been advised by their principals that they have been awarded the Grand Prix for automobile tires, at the International Exhibition, at Brussels. The company handling these tires in Canada will be a subsidiary company of Factory Products.

Mr. Cosman, a representative of the Raymond Concrete Pile Company, the firm which has the contract for the concrete piles for the high level bridge at Strathcona, arrived in that city last week. This firm drove the concrete piles for the C. P. R. bridge at Lethbridge, and also for the same company's structure across the South Saskatchewan at Outlook.

Mr. E. T. Nesbitt, of Quebec, president of the Canadian National Association of Builders', and Mr. J. H. Lauer, secretary of the association, addressed a meeting of the Winnipeg Builders' Exchange at Winnipeg last week. Organization is being effected in that city along the lines suggested by the Canadian manufacturers with a view to fighting the present labor legislation.

Mr. J. W. McCready, honorary secretary of the New Brunswick Union of Municipalities, has been advised that the Provincial Government will be represented at the convention to be held at Woodstock, N.B., on October 19 and 20. It is expected that Mr. A. R. Wetmore, chief engineer of the provincial department of public works, will read a paper on the construction of roads in rural districts.

The Dominion Glazed Cement Pipe Company, Limited, which has located at Vancouver, B.C., seems to have a promising future. The president of the new concern is Mr. Jas. A. McNair; Vice-President, Mr. Thos. Duke, and the Secretary-Treasurer, Mr. Gregory H. Tom. The material manufactured by the company is a product of high quality for which there should be a good field. Concrete both for sewers and water mains is coming into increasing favor.

Investigation is being made by the Toronto Board of Trade with a view to placing at the disposal of the Special Committee on Harbour and Water Front Improvements the latest information calculated to be of service to the committee in the formation of their suggestions. The Board of Trade will support any application made to the Government for legislation provided the city adopt a satisfactory scheme for the improvement of the water front at Toronto.

Ambiguity in verdicts returned at coroners' inquiries are not uncommon, but the following, returned recently by twelve citizens of Cochrane, Ont., appointed to investigate the death of a workman killed by the collapse of a building in that town, is a rich example:

"We, the jury empanelled to enquire into the cause of the death of Wm. Ryan on the 17th day of September, 1910, find that the said Wm. Ryan, who came to his death by the collapse of the building on which he was employed, was fully responsible, yet proper precautions for safety were not taken by the contractors."

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brandon, Man.

The city council plans an early start on the paving of all the streets in the business sections of the city.

Barrie, Ont.

The tenders for the sewers were as follows: John Coun of Windsor: Clapperton street, \$3,115.50; Small street, \$2,479.; William street, \$969.68; Ross and Bradford streets, \$3,979. This was exclusive of cost of manholes, catch basins, etc. D. J. Tuck's tender was: Clapperton street, \$2,475; Small street, \$1,775; William street, \$775; Ross and Bradford street, \$3,450. Wm. Simpson, of Collingwood, submitted a tender for the Small street contract only. His figures were \$2,454.26.

Hamilton, Ont.

City Engineer Macallum has announced that he is looking for a site for a new reservoir capable of holding 25,000,000 gallons of water. He is looking for a site containing approximately 10 acres half way up the face of the mountain. Cost, \$100,000.

London, Ont.

Dundas street hill will be paved with cedar blocks.

Meaford, Ont.

Mr. Cook will advertise for tenders for grading of Nelson street hill.

Montreal, Que.

A proposition has been made to the Board of Control by James H. Maher, the well-known local contractor, who offers the city the land for a boulevard extending four miles from the St. Catherine road to the Back river near Bordeaux. The boulevard is to be 125 feet wide, with double-track space and double driveway, and is to be given to the city free of charge, provided they undertake to make the boulevard.

The tenders for steel pipe dredging work and concrete pier in connection with new intake for waterworks were received from the following firms: (a) Lemome & Son and L. Desy, (b) M. Connolly, (c) Laurin & Leitch, (d) Canadian General Development Company, (e) Quinlan & Robertson, (f) Harris Construction Company, respectively, at the following prices: (a) \$52,000; (b) \$49,200; (c) \$52,810, \$55,270; (d) \$50,500; (e) \$59,000, (f) \$47,623; for laying pipe: (a) \$81,500; (b) \$90,000; (c) \$85,500; (d) \$92,400; (e) \$104,000; (f) \$120,000; concrete work: (a) \$18,000; (b) \$32,000; (c) \$26,145; (d) \$33,100; (e) \$16,000; (f) \$25,000; for crib work: (a) \$4,000; (b) \$13,000; (c) \$2,544; (d) \$4,000; (e) \$7,500; (f) \$5,000. The totals were respectively: \$155,500, \$184,000, \$167,000, \$169,463; \$185,000, \$186,500, and \$197,623. Munderloh & Company tendered for supply of pipe only, \$45,175; John Inglis Company also, at \$61,500.

North Vancouver, B.C.

Through efforts of Ald. Wm. McNeish of North Vancouver, the provincial gov-

ernment has promised to waive its claim to reversionary rights to three acres of land in the Indian reserve, which, according to an agreement entered into between the city council and the Indians three years ago, the former was to obtain for \$3,000, and in return promised to install a water system. Difficulties occurring with the federal government regarding reversionary rights have thwarted the efforts of the council in the past. The water will be installed as soon as the necessary papers have been properly signed by all parties concerned.

Sewer appropriation By-law for \$40,000 was carried.

Prince Albert, Sask.

The by-laws to install a filtration plant, \$12,000; to construct a trunk sewer, \$110,000; to construct extensions to sewer and waterworks, \$2,600, were all carried.

Swan River, Man.

The town council has decided to lay cement sidewalks along the principal streets.

Toronto, Ont.

The Board of Control has adopted the Park Commissioner's plan for the beautification of University avenue at a cost of \$30,000.

Verdun, Que.

The town of Verdun has passed a by-law for the issue of debentures to raise the sum of \$250,000 for the extension of the river dyke for completion of the electric system, the macadamizing of streets, drainage of the dyke, and a sinking fund.

Victoria, B.C.

Tenders for paving Vancouver street between Pandora avenue and Humboldt street (14,000 square yards) will be called at once. Estimated expenditure, \$100,000.

Vancouver, B.C.

The city engineer will shortly present estimates for bitulithic paving on Seventh avenue from Scotia street to Bridge street.

The by-law to authorize the loan of \$500,000 to cover sewerage repairs and extensions in the city will be submitted to the ratepayers on November 5th.

Tenders addressed to Wm. McQueen, city clerk, will be received until October 18th for re-surfacing Abbott street and, etc., with asphalt or bitulithic pavement. Plans, etc., at office of city engineer.

Tenders addressed to Wm. McQueen, city clerk, will be received until Oct. 18th for construction of wood block pavement in the lane north of Hastings street, etc. Plans, etc., at office of city engineer.

Proposed by-laws for \$110,000 for grading, macadamizing and constructing concrete culverts and wooden cribs on Clark drive from Powell street to the south city limits, and for \$45,000 for grading and macadamizing Broadway from Glen drive to the east city limits, are being discussed by the Council. City Engineer Clement.

Wetaskiwin, Alta.

The C. P. R. announce their intention to construct another dam at Bigstone creek

in the spring. It is supposed to make by this dam a reservoir for 1,000,000 gallons of water.

Winnipeg, Man.

At a meeting of the Kildonan Council held recently a deputation of ratepayers appeared to protest against the proposed construction of a sewer by the city of Winnipeg in Kildonan, two blocks north of the present city limits.

AWARDED.

Barrie, Ont.

The contract for sewer here was awarded to D. J. Tuck, Barrie, at \$8,475. E. Donnell, town clerk; K. S. Macdonnell, engineer in charge.

Edmonton, Alta.

E. Wondus secured the contract to lay three blocks of the Namayo avenue sewer at \$14,435.

Montreal, Que.

The Montreal Water & Power Company, which is now supplying about 157,000 people in this city and its suburbs, has placed a contract with the New York Continental Jewel Filtration Company, New York, N. Y., for a water purification plant of 30,000,000 United States gallons capacity. The contract calls for low-lift pumps drawing the supply from the St. Lawrence at the present pumping station, and sedimentation basins and filters. The amount of the contract is understood to be about \$375,000,000.

Nanaimo, B.C.

Moore & Pethick, of Victoria, were awarded the contract for the construction of a cement dam at No. 1 reservoir, at over \$13,000.

New Liskeard, Ont.

The contract for laying sewer pipe here has been given to H. Proctor at \$2,083. C. H. Fullerton, engineer.

Stellarton, N.S.

Donald Sutherland, of this town, has secured the contract of laying over four miles of sewerage.

St. John, N.B.

At a special meeting of the council recently the contract for the Germain street permanent paving was finally given to the Hassam Company. The width of the carriage way between Princess and Queen will be reduced to 25 feet, and the boulevard sidewalk as asked for by the residents, built. The cost of the work will be \$10,765, which is \$38 above the figures submitted, the explanation being that an omission had been made.

Railroads, Bridges and Wharves

Brockville, Ont.

The Ottawa, Rideau Valley & Brockville Railway Company, which secured incorporation last session to build a line from here to Ottawa through the south part of Carleton and Leeds counties, will begin construction in the near future. Wm. Wainwright, director, G. T. R.

Calgary, Alta.

Tenders are called until October 15th for grading approach to bridge. B. E. Mitchell, chief engineer, McDougall block.

Tenders are being called by the city commissioners until November 7th for erection of steel bridges across the Elbow river. W. D. Spence, city clerk.

Hull, Que.

Engineer L. A. Vailler, of the Public Works Department, Quebec, sent a letter to the Hull city council condemning the Gatineau river bridge. He also stated that he would allow thirty days in which to make repairs, and if they were not made then he would be compelled to close the bridge. No action was taken.

Montmagny, Que.

Tenders addressed to secretary-treasurer, A. Renaud, will be received until December 1st for construction of iron bridge over the Riviere du Sud.

Ottawa, Ont.

The Provincial Government has decided to aid in the building of a new iron bridge over the Chaudiere river. The cost of the structure will be about \$33,000, and the Government will give a grant of \$15,000 towards the construction.

Plans prepared for the proposed high level bridge over the canal at Bank street call for concrete and 60 feet in width. The main span for the boats to pass through would be 76 feet wide, with a height of 32 feet from the water to the bridge.

Ste. Croix, Que.

Tenders are being called until November 2nd by Public Works Department, Ottawa, for construction of landing pier here. R. C. Desrochers, secretary.

St. John, N.B.

The council has decided to transfer to the C. P. R. a large area of shore lots on the west side of Courtenay Bay, where a seawall is to be built by the Public Works Department, and where the C. P. R. will establish extensive terminals. Mr. C. M. Hays of the G.T.R., has arranged to go to St. John shortly in regard to the negotiations for the establishment of the G. T. P. terminals on the east side of Courtenay Bay. He will meet Hon. Mr. Pugsley, Minister of Public Works, and it is expected that as a result of their visit big plans for the development of the port by the G.T.P. will be announced.

Vancouver, B.C.

The government has approved of the Thompson Company's plans for a drydock at Vancouver, and the company is now assured a subsidy of three and a half per cent. for twenty-five years on the cost of construction. The plans provide for a commercial dock of the second class, under the subsidy act. It will be over six hundred feet long, and will cost over a million dollars.

Winnipeg, Man.

Tenders are called for erection of fourteen steel tanks at stations between Brandon and this city during November and December. For further information write Box 868, Free Press.

Tenders are being called until Nov. 2nd for construction of protection pier at Winnipeg Beach by Public Works Department, Ottawa. R. C. Desrochers, secretary.

Windsor, Ont.

Plans of Essex Terminal Railway for switching the line from Windsor's factory district to the terminals of the five trunk

railways entering the city have been approved by the Board of Railway Commissioners. The order passed by the board gives the company permission to build a line through parts of Windsor and Walkerville, subject to terms and conditions laid down in its application provided the work is completed within three months. This will materially assist Windsor's industrial scheme, which began last spring with the purchase by the city of property for factory sites. All that now remains is to arrange for a crossing over the W. L. & L. S. Railway line, and steps have been already taken by the officials of the Essex Terminal to secure a ruling from the railway commission as to the protection required. W. Woollatt, general manager, Essex Terminal.

AWARDED.**St. John's, Que.**

The contract for construction of concrete piers and abutments for bridge between St. John's and Iberville has been awarded to F. Lemoine & Son, Montreal, at \$28,700, or \$13 per cubic yard; \$2,700 for piling. Harris Construction Company, Montreal, tendered at \$16.90, and Quinlan & Robertson at \$15, and \$3,000 for piling. Engineer in charge, Beaulue & Mercier, St. Hubert street, Montreal. J. A. Raymond, secretary-treasurer.

Virden, Man.

The Wm. Newman Company, Limited, of Winnipeg, received the 60-foot reinforced concrete bridge contract at \$2,800. Geo. Haines, Virden, tendered at \$4,530.

Public Buildings, Churches, Schools, etc.

Chatham, Ont.

A new club composed of John Richmond, William Lecoq, and others has been formed and their intention is to build a large clubhouse near Big Point.

Chatham, N.B.

The Dominion public building here will be extended.

Calgary, Alta.

The Calgary School Board voted to expend \$500,000 on three new schools, an addition to the high school and three sites for new schools.

The isolation hospital site on Twelfth avenue will be offered to the government upon which to build an armory. The government agreed to pay the cost of the erection of a suitable armory, provided the city furnishes the site.

Estevan, Sask.

The by-law to authorize the issue of \$5,000 debentures for the purpose of erecting a rink here will be submitted to the ratepayers on the 20th of October.

Fort William, Ont.

Tenders were received until October 12th for erection of new police station and court house here. R. E. Mason, architect.

Grand Forks, B.C.

Tenders are being called by the Public Works Department, Victoria, until October 25th, for erection of brick and stone building here.

Gunton, Man.

Tenders were received until October 8th for all trades required in erection of four-room school here. Plans, etc., at office of architect, P. H. Eade, Western Iron Works, Limited, Builders' Exchange, Winnipeg.

Lethbridge, Alta.

Tenders for \$75,000 public school debentures at 5 per cent. (20 years) are called until Nov. 1st. C. B. Bowman, Lethbridge, secretary-treasurer.

London, Ont.

The new Masonic Temple to be erected on Queen's avenue will not be built until some time next summer. Next spring the plans will be considered. It is said, and it is expected that the construction work will be commenced about July 1st.

Montreal, Que.

The sum of \$500,000 has been pledged by local business men here and additional capital promised from outside towards the proposed Canadian-Franco-British-American Exposition next year.

Melville, Sask.

The citizens will vote on a by-law to provide \$6,000 for a cottage hospital.

Nelson, B.C.

Tenders addressed to the Secretary of the Militia Council, Ottawa, will be received until October 15th for construction of rifle range here. Eug. Fiset, colonel.

Niagara Falls, Ont.

Plans have been prepared for an addition to the Pierce Avenue Presbyterian Church, to cost \$10,000.

The one tender received for erection of new fire hall was so much in excess of a appropriation made, that the matter was referred back to the Fire, Water and Light Committee to revise plans.

Owen Sound, Ont.

Until October 15th tenders will be received for \$5,000 4½ per cent. 5 year hospital debentures.

Ottawa, Ont.

The First Congregational Church have purchased a building site on the corner of Florence and Kent. Rev. G. Watt Smith, pastor.

Prince Rupert, B.C.

Buildings to the extent of about \$13,000 will be erected here for the Salvation Army. Ensign and Mrs. Johnstone are in charge of the Army's work here.

Regina, Sask.

The successful architects in the competition for the provision of library plans are Messrs. Storey & Van Egmond. The plan provides for erection of fireproof building at a cost of \$40,000.

Smiths Falls, Ont.

The time for receiving tenders for erection of collegiate institute here has been extended until October 13th owing to small number of tenders. W. Newlands & Sons, Kingston, architects. C. H. Wickware, chairman Board of Education.

St. Catharines, Ont.

The trustees of school section No. 1, Clinton, have decided to raise \$5,000 in one year for the erection of a new school. An order has been issued to the council to raise the required amount.

Sandwich, Ont.

The Border Chapter Daughters of the Empire have endorsed the purchase of the Her homestead near here to be used for a free tuberculosis hospital.

St. John, N.B.

Tenders were received until October 10 for all trades required in the extension of Trinity church rectory. Plans at office of G. E. Fairweather, architect.

Sherbrooke, Que.

Rev. Father Girard is in charge of the work of building for the Redemptorist Fathers here. He is a practical builder and architect and will act as supervisor and let contracts, etc.

Stratford, Ont.

A committee composed of Ald. Carter, Sheriff Magwood, Rev. S. M. Hauch, and others has been appointed to look into the possibility of a Children's Shelter on the site recently offered by Mr. W. R. Marshall.

Selkirk, Man.

Tenders for furnishing and installing the heating, ventilating and plumbing systems for the Asylum for Insane here were called until October 7th by Public Works Department, Winnipeg. R. Rogers, Minister of Public Works.

Toronto, Ont.

The controllers decided to expropriate the site for the new fire hall at St. Clair avenue and Hendrick street.

The Board of Governors of McMaster University have decided to sell the present property on which the present buildings are and purchase a site on the outskirts of the city. Chancellor, Mr. McKay.

Uxbridge, Ont.

Tenders were called until October 12th for heating public school, either with steam or hot air. Plans at office of H. Bascom, secretary, or at the office of the architect, Jas. Walker, Toronto street, Toronto.

Victoria, B.C.

The Odd Fellows have purchased 160 feet frontage on View street for the erection in the near future of a first class hall.

Mayor Morly has advanced a scheme to build a new city hall to cost half a million dollars.

Building permit was issued to the Alexandra Club for club building on Courtney street, \$51,200. D. C. Frame, architect; Westholme Lumber Company, contractors.

Vancouver, B.C.

It is probable that a Bible house will be built in this city, to be the local headquarters of the Canadian Bible Society. No definite plans have as yet been made. Rev. J. Knox Wright is the provincial secretary.

Plans for the proposed isolation hospital on the Admiralty Reserve as presented by Mr. Dalton, of Dalton & Everleigh, call for a building two storeys in height, which will cost about \$40,000.

The proposed St. James Anglican Church will be 125 feet in length, 80 feet wide and 70 feet to the peak of the roof and will cost before completed, about \$120,000. The portion to be constructed first will cost \$75,000. J. T. Alexander is the architect; Rev. H. G. Fynes-Clinton, the rector of the present church.

The Vancouver Y. M. C. A. has bought a site in the west end on which they will erect a handsome building. It is stated that plans will be called for shortly.

Warren, Man.

The by-law submitted to the land owners of the consolidated district of Meadow Lea, Invieta and Hanlan, for \$7,500 for the erection of a four-romed school was defeated.

Welland, Ont.

Plans for the new Welland Club house are being prepared. The \$10,000 has been

sufficiently subscribed to guarantee the erection.

Winnipeg, Man.

The architect for the new theatre on Notre Dame avenue to be built for Mr. J. M. Nash is Mr. A. W. Melville. The building will have a frontage of 40 feet, and will hold about 500 people.

The Manitoba Government has announced the purchase of 600 acres at St. Vital, six miles south of the city for the Agricultural Colleges.

AWARDED.**Fort William, Ont.**

The Fire, Water and Light Committee of the City Council awarded the contract to M. H. Braden at \$17,000 for fire station, about \$1,000 under the next lowest.

Halifax, N.S.

The contract for alterations to Naval Hospital for use of Naval College has been awarded to Faulkner & Macdonald, this city.

Montreal, Que.

Tenders were called for the construction of the two branches of the Y. M. C. A. one at the corner of Park avenue and St. Viateur street, and the other at the corner of Sherbrooke street and Arlington avenue, Westmount. Messrs. Robertson Bros. got the contract for the brick work, the D. M. Long company, the carpentering; structural steel, the Calkins Tile and Marble Company, the marble and tile work, and R. D. Clark & Sons the plastering. These buildings are each to be three storeys high, with basement, and will cost between \$60,000 and \$70,000 each.

New Westminster, B.C.

The contract for the repairs and alterations required at the court house here was awarded by the provincial public works department to Contractor J. A. Allen at \$13,500.

Whitby, Ont.

Contractor Trick has the contract for the enlargement of the court house.

Winnipeg, Man.

The contract for the fire alarm and signal station to be erected on Rupert street has been recommended to D. D. Wood for \$62,711, which is slightly below the amount of the estimate. The board will also recommend that he commence the work as soon as possible.

Residences**Calgary, Alta.**

Tenders were called until October 8th for excavation and concrete work required in erection of solid brick residence for Lieut.-Col. James Walker at East Calgary. Lang & Dowler, architects.

Tenders addressed to Lawson & For-dyce, architects, Norman Block, were received until October 8th for erection of brick veneer residence.

London, Ont.

A. W. McCorkindale, has a permit for two storey brick on Grosvenor street, \$3,500.

Montreal, Que.

Tenders are being called for the remodelling of a cottage in Outremont for Mr. H. Mallette. Architect, A. Piche, Victoria Building.

Providence Bay, Ont.

Tenders are being called until Nov. 7th for construction of extension to wharf

here on Manitoulin Island, Algoma, Ont., by Public Works Department, Ottawa. Secretary, R. C. Desrochers.

Toronto, Ont.

Mr. John Walsh will erect an apartment house on the large lot at the corner of Queen street west and Wilson avenue. The building will cost about \$30,000.

Vancouver, B.C.

The following permits have been issued: A. Currie, dwelling, 1561 Twelfth avenue east, \$4,500; Thos. Pledges, dwelling, 1225 Twelfth avenue east, \$4,000; Valley & Desrosier, dwelling, 1065 Thirteenth avenue west, \$5,000; Western Home Imp. Company, three dwellings, 1605-13-21 Sahsbury, \$6,000; F. W. Dodd, dwelling, 1424 Tenth avenue east, \$2,700.

Winnipeg, Man.

Work on the residence for Mr. M. Krolik in Tuxedo Park will not start until the summer of 1911.

Mr. Hugh S. Patterson, a member of the Grain Exchange, has purchased in Tuxedo Park, 130 feet frontage on Cranville Boulevard by 150 feet on Piper Boulevard. This property is to be used as a home site.

AWARDED.**Halifax, N.S.**

Contract for erection of A. L. Malvin's residence on Turner road has been awarded to Obas. Carmichael. Dumaresq & Cobb, architects.

Montreal, Que.

Mr. J. Rawson Gardiner, architect, Quebec Bank Building, has awarded the contract for alterations to property on McGill College avenue for A. P. Stewart, Esq., to Messrs. Sparrow & McNeil, general contractors, Coristine Building.

Contract for the alterations and extensions to property at Chambord and Rachel streets, for Mr. G. M. Ducharme, has been awarded to H. Martin, contractor, 438 St. Antoine street. Architect, A. Piche, Victoria Building.

Mr. C. Dufort, architect, La Patrie Building, has awarded the following contracts for the erection of a cottage on Western avenue, Westmount, for Mr. Vanier, as follows: Masonry and concrete, Labelle & Lesard; brick, Jos. Faille; carpentry, Jos. Marcotte; painting and glazing, W. Rufange; plastering, A. Cusson; plumbing, heating and roofing, Dominion Camp Equipment Company.

North Vancouver, B.C.

Messrs. Tuck & Brewer have obtained the contract for the erection of an \$8,000 residence for Mr. Tappley, Vancouver, on Queensbury Heights.

Winnipeg, Man.

James O'Donohue, proprietor of the Grand Union hotel, has awarded the contract to Patterson, Ingleback & Carter for the building of a residence on Arlington street, \$15,000. H. Matthews is the architect.

Business Buildings and Industrial Plants**Brantford, Ont.**

Tenders are being called until October 15th for construction of alterations and additions to the Vendome hotel, Colborne street, for Mr. A. Howarth. Taylor & Taylor, architects, this city.

The Niagara Bedstead Company, of Buffalo, will locate a Canadian branch of the

factory in this city, in connection with Hame & Nott Company. The foundation will be put in this fall ready for operations in the spring.

Duck Lake, Sask.

The mill and elevator of the Farmers' Milling Company were destroyed by fire on the 25th ulto. Estimated loss, about \$35,000.

Calgary, Alta.

Thomas Underwood, of this city, has had plans prepared for the erection of a new four-storey block to be erected at the corner of First Street West and and Thirteenth avenue. The structure will be a thoroughly modern business block, 100 by 100. Work is to be commenced immediately, and the specifications call for the building to be completed by the end of the new year.

Campbellton, N.B.

The following establishments are being rebuilt: I. C. R. works, the Harquail wood-working establishment, the McLennan machine shops and the W. J. Duncan foundry. There are also good prospects for the building of six saw mills in the town and vicinity in the near future.

Dominion Station, Que.

A hardware manufacturing concern is enquiring for a site for a factory, and may take up certain options upon properties here.

Hamilton, Ont.

The Diamond Glass Company, James and Picton streets, has decided to build a plant here with a capacity double, and perhaps treble, its present capacity. Plans have been approved for a steel and brick building to cost \$150,000. It will be completed early next year, in time to supply the orders of next season.

Londonderry, N.S.

Work on a 200-foot extension to the steel works here will be commenced at once. It is reported that Mr. C. L. Jobb will become general manager.

Merrickville.

The Percival Plough & Stove Company, of Merrickville, whose manufactory was destroyed by fire, will rebuild at once.

Medicine Hat, Alta.

It is stated that the Alberta Iron Rolling Mills Company will expend in the near future about \$10,000 in construction and about \$80,000 in machinery, etc.

Montreal, Que.

The property belonging to Mr. R. Wilson-Smith on Sherbrooke street, it is stated, has been purchased by the Ritz-Carlton Company, London, Eng. William Harris, chairman of hotel circuit.

Tenders are being called for certain alterations to property on St. Paul Street for the Salada Tea Company. Architects, Peden & McLaren, 20 St. Alexis Streets.

The large shed of the Elder-Dempster Line was destroyed by fire on the 6th inst. Estimated loss on building, \$3,000.

It is understood that an additional four storeys will be added to the Jacobs Building in the spring.

The Bank of Toronto will erect a branch bank building at the corner of Lasalle avenue and Ontario street. Architects, Finley & Spence, 46 Beaver Hall Hill.

North Sydney, N.S.

The following suffered loss by fire on the 5th inst.: W. J. Christie, owner of building, McKenzie & Hicky, tailors. F.

H. Budderham, druggist, and Allen & DeWolf. Estimated total damage, \$30,000.

Nelson, B.C.

T. G. Proctor, agent, McGoldrick Lumber Company, advises us that nothing will be done in the meantime with regard to the construction of mill in Fairview.

Neepawa, Man.

The local business men have subscribed \$40,000 towards the establishment of the match factory here. Work on the erection will be started at once. Noted in issue of September 28th.

New Westminster, B.C.

The largest cement works in the world, it is stated, are to be erected on the Chilliwack River. Mr. C. D. McRae, engineer for the capitalists, has presented a highly favourable report and preliminary work is to be started immediately. It is proposed to run the immense plant by electricity generated from falls on the Tomihy and Silica creeks.

Ottawa, Ont.

Publicity Commissioner Baker is agitating for the extension of car line down through Bayswater, in which case, prospects for the location of two or three good industries would be favorable.

Permission was given Mr. Jas. E. Wilson by the city council to establish a mill and lumber yard on Riverdale avenue. It was decided to have a committee of aldermen appointed to consider industrial areas for sites for factory and lumber yards.

Petrolia, Ont.

Messrs. Kemp & Craise will erect a large garage and repair shop here.

Princeston, B.C.

C. R. Briggs, secretary-treasurer, British Columbia Portland Cement Company, Limited, is making preparations for the construction of the large plant contemplated. R. P. McLennan and J. A. Harvey, both of Vancouver and L. E. Shatford, of Hedley, and R. Cross, of Spokane, Wash., are interested.

Peterboro, Ont.

Fire destroyed E. H. Manns & Company's cheese box factory on the 8th inst. The damage is estimated at \$2,000.

Prince Rupert, B.C.

The Canadian Fisheries & Cold Storage Company has secured a valuable site of 74 acres with 3,600 feet water frontage on the Skeena River near here as headquarters for its fishing industry. The company immediately will go ahead with the construction of docks. Capitalization, \$1,000,000. Jas. Carruthers, of Montreal, and Sir Geo. Doughty are behind the scheme.

Quebec, Que.

The dry goods store of Joseph Gilbert, corner of St. Paul and St. Nicholas streets, was gutted by fire on the 4th inst. Loss, about \$15,000.

Rainy River, Ont.

It is reported that the Rat Portage Lumber Company have lost all their plant with 60,000,000 feet by the recent fire. The Rainy River Company suffered the loss of 35,000,000 feet of lumber.

Regina, Sask.

The Myers Fence & Iron Company, it is stated, will locate a branch here. Mr. N. H. Elgar, president.

Strathcona, Alta.

Through the agency of Jas. Gallagher & Company, the Whitworth Confectionery

Company, of Edmonton, has bought a site on the Barber estate for a new factory here.

St. Thomas, Ont.

Negotiations are still in progress for the location here of the knitting factory. In return for a loan of \$30,000 for ten years, etc., a factory, 196 x 50, 3-storey, will be erected at a cost of \$30,000. Committee in charge of the town's interest: Ald. Chant, J. P. Freak, Mayor Guest and W. H. King.

South Vancouver, B.C.

Thos. Houston and George Greensdale are having plans prepared for a fine three-storey structure on the southeast corner of Feris road and Fraser avenue. The building will have a frontage of 90 feet, and will extend back 100 feet. The details have not been worked out and plans are not completed.

Saskatoon, Sask.

W. J. Weedon has announced that he will erect a paint and oil distributing warehouse here, a branch of the New York house. F. M. Selander, commissioner, Board of Trade.

Toronto, Ont.

Permit was issued to Geo. Glendenning for 3-storey brick garage and offices, 18 Bloor street east, \$60,000; also to Canada Cycle & Motor Company, 4-storey brick factory on Weston road, \$45,000.

Uxbridge, Ont.

The Arlington Hotel here was damaged to the extent of \$3,000 on the 5th inst.

Vancouver, B.C.

Mr. W. Owen, representative of a British syndicate, has secured a site for the establishment of the steel plant and iron foundry and smelter.

The Bank of Ottawa has submitted plans and specifications to Building Inspector Jarrett for an eight storey building to be erected at the corner of Hastings and Seymour streets, at a cost of \$250,000.

Welland, Ont.

The Canadian Billings Spencer Works will extend its plant.

Winnipeg, Man.

A new company to be known as the Winnipeg Tanning Company has taken over the Mullins' Tannery, which they will enlarge greatly. President, E. A. James, Winnipeg. H. J. G. Mayes, vice-president and general manager; Mr. Van Dorsser, secretary-treasurer. Capitalization, \$300,000.

Mr. Herbert Burbidge, son of R. Burbidgek, managing director of Harrod's stores in London, and also director of the Hudson Bay Company, has been appointed general manager of the Hudson's Bay Company's stores in Canada. Mr. R. Burbidge, with his son and Mr. Thomas Skinner, the deputy-governor of the company are expected to arrive in Canada this month.

AWARDED.

Brandon, Man.

The contract for the interior woodwork for the new C.N.R. station was let to McDiarmid & Clark. The interior fittings of the main floor of the entire building will be of oak and the fittings on the upper storey of fir.

Balfour, B.C.

The contract for the excavations for the foundations of the C. P. R. Kootenay hotel here, as well as for the concrete and brick work has been awarded to John Burns & Son, Winnipeg.

Fort William, Ont.

Contract for the Canadian Bank of Commerce was awarded to Seaman & Peniman, local contractors.

Halifax, N.S.

The Silliker Car Company has received a contract for construction of 250 freight cars for C.N.R. Amount of contract, about \$250,000.

London, Ont.

Mr. E. W. Hyde, Toronto, was given the contract for preparing part of the Horton street station for the transformers and other machinery for \$1,416, the work to be completed in two weeks.

Mahone Bay, N.S.

The contract for erection of building for Bank of Montreal here has been awarded to Kelly & Kelly, of Halifax. Dumaresq & Cobb, architects, Halifax.

New Liskeard, Ont.

The contract for erection of building for Union Bank of Canada here has been let to Hill & Clark, this place, for about \$9,000, which includes foundations and excavation. J. P. MacLaren, architect, 104 Sparks street, Ottawa, Ont.

Ottawa, Ont.

Canada Foundry has been awarded the contract for the steel work of the Blackburn Building, corner of Metcalf and Sparks. W. E. Noffke, architects.

The excavation contract for the Slinn-Shouldis Company bakery on Catharine street has been awarded to Brooks & Cochrane. The excavation will total about 5,000 cubic yards. Jas. Mather, architect.

Regina, Sask.

The contract for erection of Traders Bank Building for The Times Company, Limited, this city, has been awarded to Smith Bros. & Wilson Regina, at \$18,900.

Toronto, Ont.

The Norcross Bros. Company, Worcester, Mass., has been awarded the contract for construction of the head office for the Bank of Toronto here at about \$1,000,000.

Vancouver, B.C.

The contract for the construction of the proposed Howe street six storey addition to the Hotel Vancouver has been awarded to Mr. J. L. Skene. W. S. Painter, chief architect, C. P. R.

Woodstock, Ont.

The contracts for extension for Canada Furniture Manufacturers, Limited, here have been awarded as follows: Messrs. Johnson & Whitehead, brick work; Cook & Griffin, carpenter work; Mr. Fowler, painting and glazing. Estimated cost, \$12,000.

Power Plants, Electricity and Telephones

Barrie, Ont.

The solicitor for the Monarch Railway has written that the company is ready to start to build as soon as the council settles the franchise.

Calgary, Alta.

Tenders are being called until November 7th by the City Commissioners for supply of equipment, rails, cars and overhead material for extensions to municipal street railway. W. D. Spence, city clerk.

New Westminster, B.C.

See "Business Buildings."

Ottawa, Ont.

The Quebec Railway, Light, Heat & Power Company seeks an extension of its powers and in the Canada Gazette gives notice of application for legislation at the next session for powers "to operate railways throughout Canada."

In regard to the lighting of Sparks street, it is proposed to erect 44 standards each supporting five tungsten lamps of 50 candle power, which would be placed between Sappers bridge and Bank street. The lamps would be located at the edge of the sidewalk 100 feet apart, but as they would alternate from one side to the other the distance between each light would be but 50 feet. The Ottawa Electric Light Company would furnish the lamps, standards, equipment and current, and the work can be done in a month. The residents are being canvassed as to their feeling on the matter.

Prince Albert, Sask.

The by-law to build additional boilers for power house at cost of \$7,000 was carried.

The council have authorized C. H. Mitchell, of Toronto, to prepare plans, etc., for city power development at LaColle Falls. It is planned to develop 10,000 h.p. and to have everything ready to let contracts by May 1st, 1911. Expenditure, about \$1,000,000.

Prince Rupert, B.C.

This municipality contemplates opening negotiations with the G. T. P. for the temporary use of the site at Seal Cove for the civic electric plant.

Quesnel, B.C.

A proposition is on foot to provide for a light and power plant to serve local needs. Leading business men promise support.

Saskatoon, Sask.

The council have under deliberation the establishment of a street railway. Whether under private ownership or municipal is being discussed.

Windsor, Ont.

See "Railroads."

AWARDED.

Almonte, Ont.

The contract for the erection of concrete dams at the outlets of Lakes Gull and Cross, at the headwaters of the Mississippi river, has been given to Messrs. A. C. Gilmore and Geo. Bradford of this town. Mr. J. B. McRae, of Ottawa, is consulting engineer.

Aylmer, Ont.

The tender of the Peninsula Oil & Gas Company for supply of gas was accepted and a franchise granted. Mr. Pattinson, of Chatham, represents the company.

Calgary, Alta.

The city council accepted the offer of R. S. Blome Company to lay the railway ties and rails ready for the paving of Albert street from Dewdney street to 11th avenue, through the subway at actual cost, plus 15 per cent., and to place the extra concrete required at \$8.50 per cubic yard.

Estevan, Sask.

The tender of the Robb Engineering Company of \$8,579 for 1-16 and 22 x 14 Cross compound engine, with complete equipment, erected in Estevan, was accepted. The tender of the Canadian Westinghouse Company, of \$5,083 for one 125 k.w. electric generator, switchboard, switchboard instruments, wiring inside power house, transformers, and arc light equipment as per specification of engineer, all

erected in Estevan, was accepted. The tender of McKenzie & Prevost of \$9,205 for the power house, was accepted.

Toronto, Ont.

Contracts for the construction of equipment were awarded to the following firms: Transformers, Canadian General Electric Company, \$15,800; motor generator sets, Lancashire Dynamo & Motor Company, \$2,262; storage batteries, Chapman & Walker Company, Limited, \$2,870.

Toronto, Ont.

The controllers accepted the tender of the Canada Foundry Company at 4.85 per pound for the iron work of the new civic electric light poles. In the residential districts a light of the lantern design would probably be placed on cement posts. The light would be 9 1-2 feet above ground. The board asked Mr. Sweeney, general manager, civic electrical department, for a report on the limits he would advise for ornamental poles.

Miscellaneous

Hamilton, Ont.

Recent building permits include: W. A. Noble, alterations to dwelling, Bay street, corner Herkimer street, for Dr. Kelly, \$2,000; W. A. Noble, brick Sunday school building, Tom street, corner Sophia street, for St. George's Church, \$8,000; Jas. McNaught, brick dwelling, main street, for Stuart Gardner, \$3,000; Oliver Chilled Plow Co., brick and concrete employment and watchman's office, Gilkinson street, \$2,000; A. W. Peene, brick dwelling, Holton avenue, for R. H. Hooper, \$4,000; Thos. Wren, brick dwelling, Melrose avenue, \$3,000.

Langley Prairie, B.C.

The Lincoln Sawmill Company has the contract to cut and dress 30,000,000 feet of lumber for Michigan capitalists.

Montreal, Que.

Recent building permits include the following: Mde. Charland & Co., 2079 St. James street, house containing two dwellings on Hutchison street, \$2,750; A. Hamelin, 1902a Labelle street, three houses containing six dwellings on St. Hubert street, \$5,000; L. Villemaire, 238 Frontenac street, house containing three dwellings on Galt avenue, \$3,000; C. Chausse, 17 Place d'Armes Hill, two houses containing four dwellings and two stores on Laurier avenue, \$12,000; A. Lamarche, Mance street, house containing three dwellings, \$5,000; A. Charland, 367 Panet street, house containing two dwellings and store, on St. Catherine street east, \$5,000; H. Gaffney, Notre Dame de Grace, six houses containing six dwellings on Oxford avenue, \$24,000; J. H. Picard, 29 Champagne street, a 2-storey house on Marianna street, house containing five dwellings on Dufresne street, \$5,800; H. Quientz, 42 St. Germain street, two houses containing ten dwellings on St. Germain street, \$6,000; J. H. R. Molson, Notre Dame street east, a 3-storey brewery building on Monarque street, \$35,000; T. Renaud, 340a Chambord street, two houses containing six dwellings on Breboeuf street, \$4,000; E. Sauve, 263 Davidson street, three houses containing three dwellings and stores, on Davidson and Marie Ann streets, \$5,000; J. O. Gagnon, 1849 Notre Dame street east, two houses containing six dwellings on Aylwin street, \$4,000; Mde. J. Rozon, 55 Fulford street, house containing three dwellings on Cazalais street, \$3,000; N. Vindure, 2716 St. Lawrence Boulevard, two houses containing four dwellings on Avelyn street.

(Continued on page 28)

Tenders and For Sale Department

Tenders Wanted

Sealed tenders will be received by the undersigned up to 5 o'clock p.m. TUESDAY, NOVEMBER 18TH, 1910, for the construction of about 6,500 yards of Vitriified Brick Pavement with Cement Curb and Gutter in the Town of Petrolia, Ont.

Plans and specifications can be seen at the office of C. A. Jones, Esq., Town Engineer, Petrolia, Ont.

Marked cheque for \$500.00, payable to the Treasurer of the Town of Petrolia, must accompany each tender.

The lowest or any tender not necessarily accepted.

J. McHATTIE,
Town Clerk.

Petrolia, October 10th, 1910. 42

The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Street Railway Material," until the SEVENTH DAY OF NOVEMBER, at 12 o'clock noon, for supplying to the City of Calgary Rails, Cars, Equipment and Overhead Material for extensions to Municipal Street Railway.

Full particulars and specifications may be had on application to the Commissioners, City of Calgary; marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910. 43

The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Erection of Bridges," until the SEVENTH DAY OF NOVEMBER, NEXT, at 12 o'clock noon, for the erection of steel bridges, one across the Elbow River at Twelfth Ave., and the other across the Elbow River at Second Street East.

Full particulars and specifications may be obtained from the Commissioners, City of Calgary, on application.

A marked cheque covering 5 per cent. of the amount of the bid must accompany each tender. The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910. 43

To Building Contractors

Tenders are invited for the erection in Newmarket, Ont., for a large four-storey Factory Building for the Office Specialty Mfg. Co.

Tenders in bulk or separately for concrete work, brick work, carpentry, painting, plumbing, galvanized iron work and gravel roofing, will be received by the architect up to THURSDAY EVENING, OCTOBER 20TH.

Lowest or any tender not necessarily accepted. The plans and specifications are now ready and may be seen at my office, Queen street, Newmarket, also at the office of the Contract Record, 504 Confederation Life Building, Toronto.

O. E. TENCH,
Architect.

Valuable Manufacturing Plant for Sale in Town of Hespeler

Pursuant to the winding-up order made in the matter of The Parkin Elevator Company, Limited, and with the approbation of the Local Master of the High Court of Justice at Berlin, sealed tenders addressed to The London and Western Trusts Company, Limited, London, Ontario, and marked "Tender for Parkin Plant" will be received up till 4 p.m. OF THE 5TH DAY OF NOVEMBER, A.D. 1910, for the purchase of the real estate, buildings, plant, machinery, stock-in-trade and assets belonging to The Parkin Elevator Company, Limited, and situate in the Town of Hespeler, Ontario, of which the following is an inventory:

(a) Real Estate and Buildings ...	\$14,936.00
(b) Plant Equipment	6,633.00
(c) Foundry Equipment	3,165.00
(d) Machinery	9,580.00
(e) Patterns	8,133.00
(f) Patents, Prints and Tracings..	1,200.00
(g) Office Furniture	695.00
(h) Office Supplies	850.00
(i) Tools	875.00
(j) Stock-in-Trade	17,731.66
	\$63,848.66

The real estate and plant will be sold subject to an existing mortgage thereon bearing interest at 4½ per cent. per annum and payable in equal annual instalments.

The buildings are new and modern in every respect and the plant is up-to-date. The Town of Hespeler is admirably situated for manufacturing purposes, having both C.P.R. and G.T.R. connections. Switches adjoin the property. Several very large manufacturing industries are located there, among others, R. Forbes Woollen Mills, Canada Machinery Company, Limited, Jardine Tool Works, Hespeler Furniture Company and W. A. Kribs' large lumber and planing mill plant.

The following is a description of the real estate: Lots numbers five and six on the north side of Sheffield street in the George D. Forbes survey.

The property will be offered subject to a reserved bid and subject to conditions of sale.

Terms: A marked cheque for one thousand dollars payable to the order of the liquidator shall accompany each tender and the balance shall be payable in cash within thirty days from the date of acceptance of tender without interest.

The Local Master will attend at his Chambers, King street, Berlin, on the 11th day of November, A.D. 1910, at four o'clock in the afternoon to consider the tenders.

For further particulars, conditions of sale, form of tender, inspection of inventory or other information apply to The London & Western Trusts Company, Limited, Liquidator, London, Ontario, on the factory premises at Hespeler, or to Melvin A. Secord, Galt, Ontario, Solicitor for the Liquidator.

J. J. A. WEIR,
Local Master at Berlin.

Dated 7th October, 1910.

MELVIN A. SECORD,
Galt, Ont.
Solicitor for the Liquidator.

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Miscellaneous

(Continued from page 27)

\$4,000; N. Forget, 195 Barre street, house containing three dwellings on Lusignan street, \$3,000; O. Thibeault, 863 Laurier avenue, house containing three dwellings on Laurier avenue, \$3,000; A. Landry, 192 Gauthier street, house containing three dwellings on Des Erables street, \$4,500; J. A. Quenneville, 1251 Des Erables street, house containing three dwellings on Parthenais street, \$4,000; J. W. Deziel, 446 La-gauchetiere street east, house containing two dwellings on Church avenue, \$3,000; P. Levasseur, 392 Colonial avenue, two houses containing six dwellings on 7th avenue, \$4,000; G. Pare, 728 Gilford street, house containing three dwellings and store on Resher street, \$3,000; A. Cohen, 36 Prince street, a furniture store building on St. Lawrence Boulevard, \$24,000; H. Corbeil, 138 Garnier street, two houses containing six dwellings on Gilford street, \$7,000; L. Corbeil, 1210 Chabot street, two houses containing three dwellings and two stores on Mount Royal avenue, \$8,000; G. Dansereau, Grenville, Que., two houses containing six dwellings on Park avenue, \$12,000; A. Lemire, 642 Cowan street, two houses containing six dwellings on Hutchison street, \$3,000; E. Masse, Chambly Basin, Que., two houses containing four dwellings on Laurier avenue, \$8,010; R. Genereux, 1340 Des Erables street, house containing four dwellings at 612 Cuvillier street, \$2,500; J. Marsolais, 742 Dorion street, four houses containing twelve dwellings on Dorioa street, \$8,000; H. Cadotte, Zottique and Huntley streets, house containing two dwellings on Huntley street, \$2,700; A. P. Stewart, 2-4-6 McGill College avenue, alterations to property to cost \$16,500.

Nakusp, B.C.

Mr. R. Vipont has the contract for taking all the merchantable timber off land owned by the Natural Resources Securities Company. Contract calls for 2,000,000 feet in saw logs, 100,000 railway ties and 3,000 telegraph poles.

Ottawa, Ont.

The building permits issued recently included: J. P. Band, dwelling, Centre St., R. A. Kemp, builder, \$3,500; Jas. Brownlee, McLeod street, dwelling, \$2,800; Richard M. Kehoe, dwelling, Woodlawn avenue, \$4,000; A. Carpentier, dwelling, Main street, \$7,000; Edward Gaudin, shop and dwelling, St. Patrick street, \$6,000; Olive Blais, dwelling, Parkdale avenue, \$3,000; Thomas Guthrie, 22nd avenue, dwelling, \$2,500; S. B. Caldwell, dwelling, Blackburn avenue, \$2,750; James E. Wilson, factory, Sunnyside avenue, \$3,000; T. J. Somerville, dwelling, Mutchmore street, \$3,000; J. E. Amyot, dwelling, Blackburn avenue, \$2,500.

Toronto, Ont.

Recent building permits include: T. H. Cooper, 3 detached 2-sty. and attic brick dwellings, Russell Hill Drive, \$30,000; H. Gramblatt, pair semi-detached 2-sty. brick dwellings, Nisken avenue, \$4,000; C. B. Hodgson, 3 pair semi-detached 2-sty. brick dwellings, Woodville, \$12,000; John O'Neil, 2-sty. brick laundry and stable, corner of River and Queen, \$46,000; Mabel G. Gee,

Grace street, \$4,000; City of Toronto, 1 storey brick animal shelter, 2 1-2 storey brick dwelling on 454 Riverdale Park, \$5,000; A. G. Love, 3 attached 2-sty. brick dwellings, on Harbord, \$6,000; M. Langmuir Manufacturing Co., 3-sty. brick factory, Niagara, \$10,000; C. Lock, pair semi-detached 2½-sty. brick dwellings, Crawford, \$5,000; Karr & Martin, pair semi-detached 2-sty. brick dwellings, St. Clarens avenue, \$6,000; J. S. A. Whealy, 2-sty. brick stable and storage, Parliament, \$13,500; H. W. Sharp, pair of semi-detached 2-sty. brick dwellings, Palmerston Gardens, \$6,400; H. Milligan, 2 pair semi-detached 2-sty. brick dwellings, Humberside avenue, \$12,000; Robt. D. McLeod, 2-sty. brick dwelling, Walmer road, \$4,000; Thompson & Mitchell, 2 pair semi-detached 2-sty. brick dwellings, Montrose, \$8,000; Thompson & Mitchell, 2 pair semi-detached 2-sty. and attic brick dwellings, west side of Harbord, \$8,000; Johnson & MacKenzie, 2 pair semi-detached 2-sty. rowdcast dwellings, brick fronts, Edean avenue, \$7,000; C. E. Fulford, Ltd., 2-sty. brick office building, on 208 Dupont street, \$13,000; Robt. Simpson Co., 2-sty. steel and concrete addition to wagon shop, on Davenport, Dalhousie, \$16,000; J. J. Walsh, 2-sty. brick apartments, corner Queen and Wilson, \$15,000; Richard Parton, 2-sty. brick addition, east side of Clinton, \$4,000.

Victoria, B.C.

Recent building permits include: A. Johns, dwelling, Manchester street, \$2,500; R. E. Blakeway, dwelling, Grahame street, \$2,400; J. J. Wilson, dwelling, Manchester street, \$2,000; A. Johns, dwelling, Manchester street, \$2,500; Mellor Bros., one-storey business block, View street, \$12,000.

Winnipeg, Man.

The following building permits have recently been issued: Daykin & Scott, three houses, east side of Greenwood Place, between Portage and Wolseley, \$12,000; J. H. LaPlante, house, west side of Arlington, \$4,000; G. Jones, three houses, west side of Horne, \$10,500; J. McCorkell, house, south side of Ross, \$2,000; W. R. Keele, house, north side of Noble, \$2,000; H. Brenton, house, northeast corner of Jubilee and Helen, \$2,800; Lawrie Wagon Company, factory, east side of An, \$3,000.

New Companies

Interurban Telephone Company, Limited, Toronto, Ont., incorporated, capital \$200,000. Incorporators: J. S. Lovell, W. Bain, both of Toronto.

Montreal Concrete Tile, Limited, Montreal, Que., incorporated capital, \$50,000. Incorporators: A. Desjardins, manufacturer, and A. Leblanc, both of Montreal.

Ojaipec Silica-Feldspar, Limited, Toronto, incorporated, capital \$40,000. Incorporators: E. W. J. Owens and W. A. Proudfoot, barristers-at-law, Toronto.

Joliette Steel & Iron Foundry, Limited, Joliette, Que., incorporated capital \$250,000. Incorporators: S. Vessot, manufacturer, and A. Durand, architect, both of Joliette.

Montreal Concrete Tile, Limited, Montreal, Que., capital \$50,000. Incorporators: Anthime Desjardins, manufacturer; Arthur Leblanc, commercial traveller, both of Montreal.

The Ontario Gravel Freighting Company, Limited, Windsor, Ont., incorporated capital, \$50,000. Incorporators: O. E. Fleming, K.C., and Chas. W. Cadwell, manufacturer, both of Windsor.

Canadian Sand Blast Company, Limited, Montreal, Que., incorporated capital \$50,000. Incorporators: A. T. Stewart, manu-

facturer; Joseph E. Colby, manager, and E. C. Colby, superintendent, all of Montreal.

The Foley, Rieger Pulp & Paper Company, Limited, Thorold, Ont., incorporated, capital, \$50,000. Incorporators: E. P. Foley, manufacturer, Thorold, and H. A. Constantine, attorney-at-law, Niagara Falls.

The Imperial Electric Company, Limited, Windsor, Ont., incorporated, capital \$50,000. Incorporators: E. I. Rumsey, electrician, and W. Rumsey, merchant, Detroit, Mich.; C. P. Blachly, Walkerville, electrical engineer.

Canadian Sand Blast Company, Limited, Montreal, Que., capital \$50,000; incorporated to carry on the business of cleaning buildings and materials by the process known as the sand blast process. Incorporators: Andrew T. Stewart, manufacturer; Maurice Alexander, and Darley B. Smith, clerk, all of Montreal.

Canadian Liner Company, Limited, Woodstock, Ont., capital \$160,000, incorporated to manufacture and sell wood and iron working machinery. Incorporators: D. W. Karn, Woodstock; J. A. Billinghamurst, C. C. Billinghamurst, bankers, and M. H. Powell and B. A. Linderman, manufacturers, all of Muskegon, Michigan, U.S.A.

RAPID CONSTRUCTION OF A DEPARTMENT STORE BUILDING

The celerity with which the work of constructing the department store building occupying the block front on Sixth avenue from Thirty-second to Thirty-third streets, New York City, has been the subject of wide-spread attention among contracting builders. The contract was signed April 23rd, 1909, and work was immediately commenced upon the excavation, which occupied a period of five months. The first steel columns were erected in October, this branch of the work being so well handled that 11,000 tons of steel was erected in 400 working hours, a record entirely without precedent. Fireproof tile was delivered and set at the rate of 250 loads a day. The entire steel shell was completed December 6th and the corner stone was laid December 8th, 1909.

The actual erection of the completed structure occupied seven and one-half months, the building being turned over to the owners on June 15th, 1910. The original completion date was August 1st of the present year, and the extended completion date, owing to causes beyond control, was October 1st, so that the contractors were more than 100 days ahead of schedule.

The Gimbel Building is ten storeys in height, with three storeys below grade; contains 37 acres of floor space, and is equipped with 48 elevators and a sprinkler system.

A CONCRETE LINED SHAFT IN LOOSE GROUND.

At the Zollern No. 2 pit the method of filling the waste, by waterborne stuff, has been largely adopted, and to facilitate the introduction of the packing material a shaft has been sunk from the surface to a depth of 24 m. As the only available site was immediately adjoining the washery buildings, and a loose watery stratum was adopted for securing the ground before actually excavating the shaft. The work has been described in "Gluckauf," the source of these notes. An octagonal section was adopted with a clear inside diameter of 5 m, the ground to be occupied by the side walls being excavated on alternate sides of the octagon, with a breadth of excavation of 22 to 24 inches, or sufficient

to allow a man to work conveniently, and a depth of 4½ m. The excavations, when lined with boards packed with hay at the joints, were filled with rammed 1:5 concrete, giving a wall of about 20 inches thick. When sufficiently hardened, usually in about three days, the alternate sides of the octagon were similarly treated, but the ground was taken out to a greater depth, 6½ instead of 4½ m, before concreting, the object of this arrangement being to avoid lines of separation in complete horizontal rings at the different stages. When the concrete was properly hardened, the central pillar of ground was excavated, giving the actual shaft in lengths of about 5 m., and the process was repeated in 5 or 6-m lengths down to 19 m, where the ground was found to be sufficiently firm to allow the sinking to proceed in the ordinary way, the work being finished without danger or special difficulties. The cost for the whole depth of 24 m, including materials and incidental operations, was about \$3,645. The time required, owing to the pauses to allow the concrete to harden, was about three months.

ELECTROLYSIS OF REINFORCED CONCRETE.

Mention has been made in these columns of the discussion that has been going on in this country and in Europe as to the corrosion of steel reinforcement of concrete structures. Little attention has been given as yet to another possible source of danger—electrolysis. Investigations, however, have been carried on by Mr. A. A. Knudson, of New York, and Mr. M. M. Glauber, of Washington University, and these are of great interest. In the tests made by Mr. Knudson there was strong evidence of electrolytic action on the embedded metal, and the concrete showed great deterioration. Large cracks appeared, and the concrete became soft and crumbly, so that in places a pen-knife could easily be thrust into it. The experiments at the Washington University gave much the same results. Cracks appeared, and there was marked loss of weight in the metal reinforcement. Mr. A. S. Langsdorf, who reported on these experiments before the Engineers' Club, of St. Louis, says:—"The cracking of the concrete may possibly be explained by the fact that the layer of rust is of rather loose consistency, so that its density is less and its volume greater than that of the original material, thus giving rise to a bursting force. The fact that the cracks are mainly radial seems to support this hypothesis. The results indicate quite clearly that great caution must be used in the construction of reinforced concrete structure where the conditions are similar to those of the tests; such, for example, as might be found in the case of bridge abutments or concrete sewers in the neighborhood of grounded railway circuits. Further information is needed as to the extent to which the reinforcement of such structures, when buried in damp or wet earth, may become part of the return circuit of trolley lines; and also to determine the insulating effect of waterproofing ingredients in the concrete."—Stone.

The B. C. Gazette gives notice of the incorporation of the following companies: Canadian Mills & Timber, Limited, capital \$1,000,000; Lincoln Sawmills Company, Limited, capital, \$50,000; Irwin, Carver & Company, Limited, capital, \$25,000, incorporated to carry on all or any of the following businesses: builders, contractors, electricians, etc; Standard Lumber Company, Limited.

Wagon Trains Hauling Road Material

The widespread demand for good roads has been resultant of much good in that direction in as far as many miles of road have been let for construction recently. In type of construction these roads do not differ materially from those built in the past as they are mostly stone or gravel roads, placed in the ordinary manner, but there is a decided step on the part of many of the contractors for better and cheaper ways of doing the work, which are of interest.

An interesting piece of work of this nature is going on at the present time in Iroquois County, Illinois, where 13½ miles of stone road is under contract. The work consists essentially in grading the rough paces of the old road, placing thereon six inches of stone, averaging about three inches in size, over a width of nine feet and upon this three inches of stone screenings. No rolling is done on the road as the commissioners rely on the traffic for this.

The grading in this particular instance is done by means of a rooter on account of the compact surface of the old road, after which a road grader is used. The excavated material is banked on either side of the 9-foot roadway and is used to shoulder up the road after the placing of the stone. The force of the grading outfit consists of three men and two teams, alternating between the rooter and the grader. As the grading is very light, consisting practically in only scarifying the surface of the old road, this force was amply sufficient to keep ahead of the stone placing gang.

The problem on this particular piece of work was in getting the stone to the various parts of the road, as it necessitated in parts a haul of six miles. The contractor was unable to secure enough teams to keep the work going, as they were being used largely by the farmers engaged in threshing. As part of his equipment the contractor had a 25-horsepower traction engine, which he used in connection with the six or seven 4-yard road cars, according to the condition of the roads. The experiment proved so successful that the contractor hired another traction engine by the day. This latter was a 25-horsepower engine. Working in this manner, with the addition of from six to seven teams, the progress of the work was about one-fourth of a mile per working day of ten hours, increasing as the hauls became longer and decreasing with the length. Considerable care was used to arrange a schedule for the engines, so that empty wagons for loading were kept at the railroad siding continually, so as to get the maximum efficiency from the loaders. Of the latter the average number employed was from eighteen to twenty. The time required for unloading on the road is about ten minutes, when the engine is ready to return with empties. Eight men are employed levelling down the unloaded stone on the road and building up the shoulder.

The average number of miles traversed by the engines was about twenty-two, making from four to six trips, according to the length of the haul. It was found that when the engines were working on long hauls the coal consumption amounted to about one ton and a quarter, whereas on the shorter hauls one ton proved sufficient for a day. The hired engine was paid on a sliding scale, increasing with each mile of road traversed.

Cost figures showed by comparison that hauling with traction engines a saving of about 35 per cent. was effected, although the cost of loading gangs was increased five cents per yard. This increase was due to the fact that where teams were employed the drivers assisted in loading. This small item was more than compensated for, however, by the practical reduction of one-third by

the whole process. The price per mile for the work was \$2,800.

Other factors which decreased the cost of work as done by the traction engines were the fact that no large camps had to be maintained and the smaller number of men employed made their number more certain, on the average allowing the work to be prosecuted with great regularity and enabling the contractor to take advantage of the good weather.—The Contractor, Chicago.

Design of Reinforced Concrete Beams

The development of reinforced concrete construction has aroused the interest of engineers in certain features of design that were not given much consideration when wood and steel were the only materials of which bridges and buildings were made. 'This is due primarily to the peculiar physical properties of concrete,' says The Engineering Record. The tensile strength of concrete is very low and steel must be used to resist the tensile stresses. If the strength in tension were approximately equal to that in compression, there would probably not have been the great amount of testing of concrete beams, with the accompanying discussion of beam theories, that has marked the introduction of reinforced concrete as a structural material. A few years ago the theory of continuous beams was confined chiefly to structural engineers who had to do with the design of drawbridges, while now it is much more widely understood. At the beginning of reinforced concrete construction steel was placed in the lower portion of the beam only, and it was soon found that the concrete cracked at the top of the beam over the supports. This started a discussion about continuous beams which is resulting in a better understanding of their action, and hence in a more careful distribution of the steel. There is, however, one thing in the underlying principles of the continuous-beam theory that has not been given much place in the discussion. The equation of three-moments is the starting point of the whole theory. In the development of this equation the assumption is made that the moment of inertia of the cross section is constant throughout the length of the beam. This assumption is not true, however, and the influence which it has on the final design of beams should be carefully investigated.

The River Tees Transporter Bridge, between Middlesborough and Port Clarence, England, the foundation for which has recently been laid, will be of the braced cantilever type, and consists of two groups of piers erected on masonry foundations on each bank of the river. The piers will be connected by a pair of open-lattice main trusses of 371-ft. span, the underside of which will be 160 feet above the water level. These trusses will each carry, on their lower flanges, two lines of rails. On the four lines of rails there will be supports for a traveling platform. From this a traveling car will be suspended by means of steel wire ropes. The car which, it is stated in "Engineering," London, will measure 41 x 39 feet, will be fitted on each side with passenger cabins, and its centre will be devoted to a roadway for vehicular traffic. The car will be designed to accommodate 600 people and one street railway car, and will weigh about 50 tons. The ends of the journey will be landing stages at the two sides of the river, and the car will be four feet above high-water level. The car will be electrically lighted, and its motion controlled from a pilot house placed on the car, but it will also be controllable from the power house on shore.

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Desiderata in the Training of the Engineer

We are told that there can be no over-production of properly trained engineers in Canada at this stage of our history. What is meant by "proper training"? Does our conception of it fit a man to go out into the world and make a fair competency? "The engineer," said Mr. G. R. Swain, professor of Civil Engineering at Harvard University, in an address delivered at the Worcester Polytechnic Institute, "should not only be imbued with the scientific spirit but should be possessed of business acumen. The engineer deals not simply with the design of engineering works, but with their execution and their commercial value. His usefulness will be much hampered unless he can intelligently advise not only concerning their design, but as to whether they should be designed at all, and where, and also as to their execution. He must know how to draw up a contract; how to deal with men; how to smooth difficulties; how to arbitrate differences of opinion, and, in many cases, how to manage large financial transactions. Engineering is applied science, and its application is directed, in ninety-nine cases out of a hundred, to just one thing—to making money for somebody. No quality will be found of greater value to the engineer than commercial acumen. The young man who looks upon engineering purely as a science, or as the art of applying science, independent of business principles will very likely remain a drudge all his life, directed by men of far less scientific ability, but of greater business acumen."

The U. S. statement of imports and exports for August, 1910, published recently, is of some significance to Canadian trade, having in view the protective measures that are in force over the border. The foreign goods imported into the United States during

August aggregated \$69,067,953 free of duty and \$69,289,827 dutiable. The total of \$138,357,780 is extremely high compared with \$117,094,080 in August, 1909, and \$91,183,536 in August, 1908. The imports were greater than the exports both in August, 1909 and 1910. This debit balance showing in the country's foreign trade, in contrast to the long record of credit balances, is still more evident in the statistics for the first eight months of 1910, compared with previous years. The excess of exports for the first eight months of 1908 was \$391,369,960; for the period in 1909, \$59,482,289, while the excess of imports over exports in 1910 up to September 1 amounted to \$913,569.

Supervision of Scaffolding

The need for the careful supervision of all scaffolding erected in building work was emphasized again last week by a serious accident at Winnipeg. Quite recently a wall of the Manitoba Clothing Company's building collapsed, owing to the undermining of the foundation of the structure. Last week the scaffolding that had been put up for the rebuilding of this work gave way, and injured, more or less seriously, seven workmen.

Inadequate scaffolding has been a fruitful source of trouble to builders in this country, and it would be superfluous to discuss the matter at any length. The protection of his men should be an instinct with the contractor, and if he runs chances he has only himself to blame for the consequences. The law allows no contributory risk in constructional work, and rightly so. We learn that the Winnipeg bricklayers have been agitating for the appointment of an inspector to examine all scaffolding and pronounce upon its safety. The idea appeals to us as a protective measure, no more for the workman than for the master. In many cases—and possibly in this one—accidents have been absolutely unavoidable so far as the employer has been concerned. It is none too easy, however, to show this in a court of law, where all the arguments seem to veer in the direction of the injured workman or his widow. A systematic inspection by a properly certified inspector might prove to be the remedy.

Good Work of the C.N.A.B.

The Canadian National Association of Builders is proving that there are well defined reasons for its existence. Whatever may be the lethargic condition of some of the local exchanges, the Dominion Association is wide-awake. The developments of recent years have shown the necessity for the organization of master builders and contractors throughout the Dominion. The country is growing, the industry is growing and the labor unions are growing. Why should not the master builders grow in proportion? Why should they not be properly represented so that their interests are duly protected in the case of trade disputes? Why should they not secure an enactment making it compulsory to submit these matters to arbitration? These were doubtless the ideas which occurred to Mr. E. T. Nesbitt, president of the C.N.A.B., when he decided to round up Western Canada in company with Mr. J. H. Lauer, the secretary of the Association. Mr. Nesbitt is bringing the National Association into the limelight, and doing much to solidify the interests of the master builder. The whole-hearted manner in which Mr. Nesbitt is throwing himself into this question during his year of office is suggestive of western enterprise, but it is proof rather that there are a few wise men left in the East.

The City Engineer's Estimate

The Other Side of the Story — Greater Efficiency said to Result from City Supervision

Toronto, Sept. 30, 1910.

Editor, "Contract Record":

In connection with the letter written by Mr. A. W. Godson, published in your last issue, while Mr. Godson may be actuated by the best of motives, I think his view point of the day labor system is a biased one. No credit is apparently given to the engineer for honesty in carrying out day labor work, either in regard to the making of his estimate or in the choice of materials that he uses in carrying out this work.

In regard to Mr. Godson's claim that the work is scamped by the foreman, it may be stated that the foreman as a rule does not know the amount of the bid, nor the unit prices for any portion of the work. He, therefore, has no incentive to scamp the work. Specifications for local improvements are the same whether done by day labor or by contract. Supervision is also the same. Day labor work is also subject to the same criticism by the public as contract work, and as a result the scamping of workmanship or the use of inferior material is a remote possibility. In fact, day labor work is becoming so popular in some cities that the citizens, themselves, are requesting that local improvements be done by day labor instead of by contract, as they have reached the conclusion that day labor work is efficient and absolutely honest.

The engineer is, of course, anxious to do his own construction work, and, with the facilities that can be provided by a city in the way of a plant, he is unquestionably able to compete with the contractor on even terms. The city usually pays more for its supplies and labor than a contractor, but the greater efficiency of its labor under proper supervision, and due to the higher wages, offsets to some extent this handicap.

Bids for work are prepared by the engineer in the same manner as by the contractor. All the contingencies, for which a contractor has to provide, are included in his figures. Therefore, the bid is on even terms. In years of keen competition the engineer will show small profits just as the contractor.

There is no doubt that the engineer, when properly equipped with plant, can successfully compete with contractors, and make money for the municipality. Whether or not the fact that an engineer has made money for a municipality has any effect upon his salary, is a question that need not be discussed; but if reference were made to the remuneration received by the engineers in charge of municipal work, it would be found that their salaries do not compare favorably with those of the managers of some of the large contracting companies.

Yours truly,
G. G. Powell,
Principal Assistant City Engineer.

Significant Discussion at Vancouver

Members of the engineering profession at Vancouver, B.C., are indignant over the suggested appointment of a firm of American civil engineers to supervise the city's bridge work during the next five years. A written protest has been received by the council from Mr. C. Cartwright, of Vancouver, who considers it unfair to give such a position to American engineers without first giving an opportunity to Canadians. Nothing could be said against

the standing of the firm recommended for the post, but as long as the C.P.R. and other Canadian railways, as well as large cities of the Dominion, could meet their demands in the line of bridge engineering by engaging Canadian engineers it was submitted that Vancouver might well follow their example. An American engineer was said to be an expensive luxury at Vancouver, as the engagement meant heavy travelling expenses every time a visit was made to the city, and the works in hand would also suffer because of the absence of constant personal attendance by the engineer in charge. Mention was made that on the line of the C.P.R. in the province, bridges presenting as great difficulties as the structures over False Creek, Vancouver, had recently been constructed by Canadian engineers. In consequence of this protest the matter has been referred back to the Finance Committee.

Plenty of Room for Well Qualified Engineers

Mr. R. W. Leonard, C.E., of St. Catharines, Ont., addressed some 700 science students of the University of Toronto, last week, at the opening meeting of the Engineering Society. Those present included President Falconer and Professor Galbraith, Dean of the Faculty of Applied Science.

Mr. Leonard does not consider that there is any overproduction of civil engineers in Canada at the present time, having in view the practically unlimited resources of the country. The speaker dealt with the subject of engineering in a general way. An engineer, he said, had been defined as a man who could make a dollar do the most work. While this might be true in a sense, still an engineer should recognize the fact that no expense should be spared to make his work thorough.

Are the Immigration Regulations too Stringent ?

The difficulty experienced by contractors in finding sufficient labor to carry on their work is appreciated by City Engineer Rust, of Toronto, who suggests that the Government suspend or abolish the regulation which makes it imperative for every immigrant to be in the possession of twenty-five dollars upon entering the country. Mr. Rust is of the opinion that if this enactment were done away with, labor would flow into the country from Europe, and the various construction under way in all parts of Canada would be greatly benefitted. Opposition to Mr. Rust has been shown by the legislative committee of the Trades Council, who are strongly against importing cheap labor from the United States.

A successful contractor, whose buildings are wonders of rapid erection, begun his improvements by putting himself in the place of his workmen and then he installed just such methods and appliances that cut out all unnecessary lifting or carrying. He also introduced every practical aid that would promptly present the material to the workman in its best condition and most orderly arrangement for use. The plan is not patented and is worth borrowing.

A recent legal decision once more confirms the fact that contractors on public work cannot be held to an agreement to employ none but union labor. Most contractors realize this fact, and doubtless many of them allow such provisions to be placed in contracts on the ground that it does not harm, since it cannot be enforced, and it enables some to feel the better because of its existence. As to private contracts, the matter is different.

A Movable Form for Long Concrete Walls

Methods and Cost of an Interesting Piece of Work on the New York State Canal—Economy of Movable Wall Form

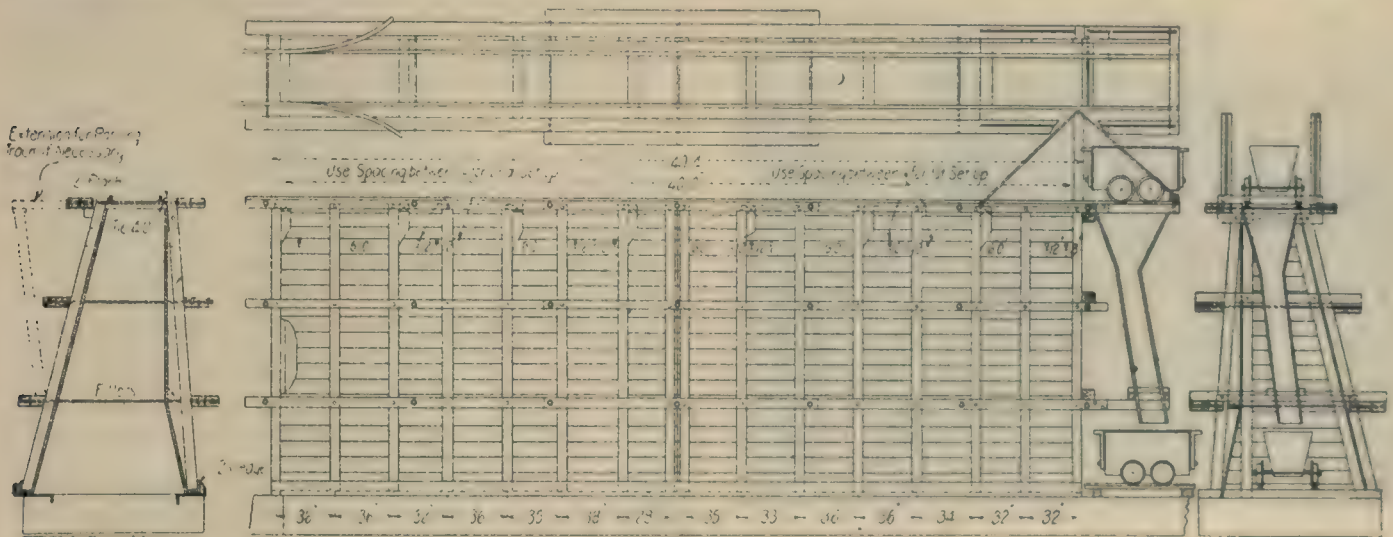
The construction of two heavy concrete walls aggregating some 1,250 linear feet at a cost for form of less than 28 cents per cubic yard, has recently been completed at Lock 9 on the New York State Barge Canal. The accompanying article, which is extracted from Engineering-Contracting, gives interesting details of the work. The low cost was made possible by the use of a movable wall form designed by C. R. Neher, engineer for the contractors, the Atlantic Gulf & Pacific Company, of New York City. The walls constructed were the approach walls to the south end of the lock named; one, the east wall, was 350 feet long and the other on the west side was about 900 feet long.

The form, a drawing of which is shown by Fig. 1, was made of 1 $\frac{1}{4}$ -inch lagging and 4x6-inch studding. Waling timbers, consisting of two 6x8-inch pieces placed

was finally worked out by spacing the studding as shown, and using the three sets of holes, indicated, for placing the bolts.

Another difficulty was found in the fact that at intervals of 50 feet, snubbing posts were required to be placed in the wall. These posts were of such size as to require an offset in the concrete wall in order to provide sufficient anchorage. This difficulty was overcome by leaving out the snubbing posts and by placing a box on the inside of the wall form at the points for the posts, which made enough space in the wall for the snubbing posts to be put in after the wall had been completed.

The length of the form (40 feet), was designed to include enough concrete for two working days of 8 hours. The combined yardage of the base and upper neat work in 40 feet amounted to 134 cubic yards. The first day



1.—Details of Movable Wall Form.

together, were spaced about 5 feet apart, along the sides. The waling timbers were bolted securely to the studding and the front and back forms were tied together through the waling timbers by $\frac{7}{8}$ -inch bolts. As it was necessary to remove these bolts each time the form was moved these a method of preparing them for easy removal was desired. The best scheme proved to be to cover the bolts with heavy Albany grease and to wind them with Neponset paper, a heavy roofing paper. To protect the paper from being torn by falling concrete or from being stepped on by workmen in the forms, a 2x4-inch stick was placed between the form walls directly above the bolt. This acted as a spreader as well as a protection for the paper on the bolt. On top of the form, and fastened to it, were 4-foot ties for the narrow gage track. These were spaced 6 feet on centres to permit room for opening the gates of the bottom dump cars. The form was built high enough to support this track above the finished concrete. This track was joined to that on the finished wall by switch points, coming to the bent ends of the track on the wall. This saved cutting rails. See Fig. 1. One of the difficulties encountered in designing the form was the fact that anchor bolts were to be placed in the face of the wall at certain irregular intervals. This made the problem of arrangement of the studding some what intricate, but it

the concrete was carried to elevation 137. The second day the concrete was placed in the base ahead of the form (containing 24 cubic yards), and then the upper part of the wall was completed, containing 33 cubic yards. This made 57 cubic yards for the second day. This lesser yardage for the second day left time for the men to set molding, anchor bolts for wall fenders, finishing top surface of wall, and keys in the base.

In moving the form, the bolts were removed after the concrete had set, sometimes within 12 hours. The form was then jacked up a few inches and placed on dollies. The concrete surfaces, being battered, caused the form to be clear when raised. At the top the forms were tied together by the bolts through the top waling timbers, which were always above the concrete. The form was pulled ahead with a small block and tackle. The forms were pulled ahead about 6 feet at a time and the bolts were replaced as the holes cleared the end of the concrete. This prevented the forms from spreading. At the beginning of the work it was customary to remove the end bulkhead before moving the forms, but this method was changed later and the bulkhead was allowed to remain on the wall until ready to be reset. This was done because it was found that the corners of green concrete would chip off on pulling the bulkhead; whereas, if left

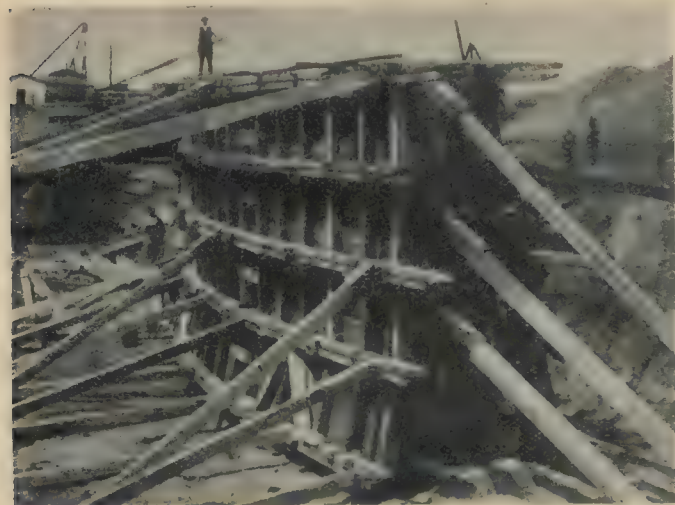
somewhat longer, the concrete would not chip so readily and the bulkhead would protect the corners from being scrubbed by the passing side forms.

The base of the section ahead was concreted, as mentioned above, during the second day's work, so that it was ready to receive the forms on the following day. Figure 3 shows how the concrete car on top was run out over the end of the form on a piece of track supported by a truss, and dumped through a chute to the car below. This car delivered the concrete to the base.

After the forms had been removed from a section, considerable traffic was necessary on top of the green wall and therefore a protection to the concrete was made by placing a layer of roofing paper over the top and covering it with sand. The top of the wall was found to be damp after several days and in excellent condition.

For the curved sections of wall a special 40-foot section of forms was built. This form was handled in the same way as the straight form.

The labor of building each form required 3 days' time for 6 carpenters. Two straight forms were built and one curved form. The cost of these, including labor and material used, was \$525.00. Spruce dressed lumber was used, at \$23 per M. feet B. M. The labor of moving



2.—Curved Wall Form in Place.

was accomplished by 6 men, including the foreman, in from 4 to 6 hours. This labor completed the moving and lining-up ready for concrete. The rate of wages for these men and cost of moving were as follows:

6 hrs.—Foreman at \$3.52 per 8-hour day	\$ 2.64
6 hrs.—2 men at \$3.20 per 8-hour day	4.80
6 hrs.—2 men at \$2.40 per 8-hour day	3.60
6 hrs.—1 man at \$2.00 per 8-hour day	1.50

Total cost of knocking down and setting up\$12.54

The cost per cubic yard of forms and the setting up for the entire work may be estimated as follows:

Cost of material and building of 3 40-foot forms	\$525.00
36 setups at \$12.54	451.44

Total	\$976.44
Total cubic yards + Neatwork	4.370
Cost per cubic yard concrete	\$0.22 3-10

This is a very small cost, and it may be noted also, that the forms on completion of the work were in a very good condition and might have been used for three times as much wall as was built.

This method may be used to best advantage, where walls are parallel and close to gether, by placing the

mixer at one end, working both walls forward at one time, and using one form on each wall. On a single wall the mixer should be set in the centre and the work carried from this point in both directions. This type of form for long walls secures the maximum use of forms with the minimum amount of movement and knocking down, and gives the proper sequence of form setting and placing concrete, using the average day's work of 8 hours to the best advantage.

Integral vs. Bonding Methods of Granolithic Floor Construction

There has been a considerable amount of discussion regarding the advisability of placing finish on concrete floors at the time the concrete is built, some preferring to roughen the under concrete and bond the finish to this. The arrangement in favor of doing this is that the weight of the wet concrete is likely to sag the forms, giving as they soak up water from the concrete and so giving a gradual sag which is likely to show in the upper surface. Beside this, the finish is likely to be scarred by the carpenters coming on to erect the struts for the next floor centres. If then the proper precautions are taken and good finish put down and smoothly troweled and well bonded to the under floor, it is possible to turn out a more finished upper floor surface.

However dry finish that is laid on old concrete bonds but imperfectly even with careful handling. Repeated difficulty has been experienced with finish put on afterwards, both from its becoming dusty and from its peeling off from the old concrete below. It is quite common to use acid to roughen the under concrete and to eat away the particles of cement, which adhere to the surface. Where finish has peeled, it has sometimes appeared as if the top of the concrete was rotted by this acid and that the finish was bonding to particles that were, but imperfectly held into the upper surface of the old concrete. Where the old concrete has been dry, it sucks water away from the bottom of the finish, and accordingly the finish does not get its set sufficiently and breaks away from this weakness.

One construction company, after a very extended experience with both types of construction, has found the integral method, when properly extended, superior to the bonding method. They point out that if the finish is put down at the same time as the structural concrete it is first of all cheaper, as it does away with all the labor of roughening the old concrete. It also is a unit with the rest of the concrete and acts in compression, like any other part of the top. If it is laid separately with an imperfect bond, and it is very difficult as indicated above to get a perfect bond, the inch or more of finish acts merely as a dead weight on top of the construction and necessitates heavier floor slabs. It would seem that the finish put on at the same time as the under construction and protected as carefully as possible, is very much the better practice.

In strengthening the old Lendal bridge over the River Ouse, at York, England, by the insertion of new and much heavier girders, the old girders were allowed to remain in order to retain the graceful outlines of the original structure. The new girders were somewhat higher than the older ones, and were placed between the latter, resting on the original abutments. The roadway was raised slightly in order to accommodate the higher girders, which now carry all the load. In order not to interrupt traffic the work was carried on on half of the structure at a time, the remaining half being used to carry the traffic.

Removal of the Quebec Bridge Wreckage

Resourceful Means Employed in Execution of Unique Contract—Some particulars concerning the use of the Oxy-Acetylene Cutting Apparatus

When the south anchor and cantilever arms, the latter with part of the suspended span, of the Quebec Bridge, weighing altogether about 17,000 tons, collapsed on Aug. 29, 1907, the steel of the cantilever arm was submerged in deep water except a very small portion immediately adjacent to the main pier. But the anchor-arm steel that fell between the main and anchor piers, amounting to about 9,000 tons, was wholly exposed at low tide, and was a mass of twisted and mutilated material forming a pile 70 or 80 feet wide, 500 feet long and from about 10 to 40 feet high.

Many of the heavy steel members were split, torn and ripped apart, without being broken entirely across, although thousands of rivets were sheared off, heavy plates were rolled up like strips of carpet and angles 1 inch thick were torn through like pieces of wet paper. The eye-bars were bent, but not broken or otherwise apparently injured except in one instance, where a bar was sheared through. Nearly all the principal members were still connected at the joints and the confusion and distortion of pieces made it almost impossible to extricate any of them whole from the mass.

A separate contract was awarded for the removal of the anchor-arm steel, including possibly a small portion of the cantilever arm, adjacent to the main pier, and operations were commenced in December, 1909, on the general plan of cutting the most accessible pieces on the top of the debris into easily handled sections, which were separately removed by derricks, cut into smaller pieces and sold for scrap. Work was commenced at the main pier, and to date has accomplished the removal of nearly one-half of the 9,000 tons included in the contract, clearing up nearly all of the material adjacent to the main pier, where the heaviest and largest members were concentrated. So far the members have been cut up and dislodged entirely by the use of the oxy-acetylene torch and by dynamite, and rivets have been cut out of the removed pieces by hand.

The use of dynamite is considered more economical than the torch, but it is also more dangerous and cannot be applied in all cases, so that less work has been done with it than with the torch, although it has been largely used on submerged members. The method of application is very simple and consists substantially in attaching a continuous row of sticks of dynamite to the member on the line in which it is desired to cut it, and then exploding them in the usual manner by a battery.

The dynamite is used in standard sticks $1\frac{1}{4}$ inches in diameter and 8 inches long, weighing about 10 ounces each, which are found generally to have a breaking capacity of $\frac{1}{2}$ inch solid metal. That is, a continuous line of sticks laid end to end across a plate $\frac{1}{2}$ inch thick will just break the plate, but if the plate is 1 inch in thickness a double line of sticks is required, and so on. The sticks are secured either by tying them to a wooden rod, wrapping them in burlap, enclosing them in a length of cheap hose, or in any other convenient way by which they can be attached to the upper or under surface of the metal as may be required. When the blast is fired on dry land the dynamite is covered with a foot or so of earth or with boards, but it is preferable to fire it under water when the water acts as tamping and produces better results from the explosion.

Occasionally the dynamite throws small and moderate size pieces of steel to a great distance. One instance recorded is of a 200-lb. piece of steel thrown to the top of a bank 800 feet away and landed about 200 feet above the point where it was blasted. Small pieces have been blown across the river, about 2,000 feet. As all of the steel thus far handled has been above low water, there was no necessity for the service of a diver and the dynamite was attached to the steel at low tide and the charges were fired at high tide.

In order to break the members into 10-ton pieces within the capacity of the derricks, it was found that about 1 lb. of dynamite was required to 1,000 lbs. of steel and a considerable quantity of dynamite has been stored in a subterranean magazine near the work. The riveted pedestals for the main bearings on the river piers weighed about 80 tons each and were not dislodged by the initial 60-lb. charge of dynamite fired under one of them. The charge was increased to 80-lb., which merely lifted it from its seat, after which a charge of 40-lb. sufficed to separate the bolted sections and additional charges broke it up into pieces within the capacity of the derrick.

Sections of both of the main vertical posts over the river piers, the heaviest members in the bridge, which are supposed to be from 12 to 15 feet long, were driven deep in the ground in the falsework pier holes. Their weight is estimated at about 50 tons, but they are so firmly held in the hard ground that all efforts to dislodge them by dynamite have proved unsuccessful, as has the application of four tackles operated by a hoisting engine. It is planned to make another effort by using a pair of powerful hydraulic jacks engaging the upper ends of the members and reacting against the ground. It is believed that with these pieces can be started and afterwards withdrawn more easily.

Oxy-Acetylene Cutting Apparatus.

A large amount of the steel has been cut up by the oxy-acetylene cutting apparatus supplied by the Linde Air Products Company, of Buffalo, N.Y. A light torch is used, which is easily operated by one man with a helper to handle the oxygen cylinder and its valve. The torch has two nozzles, one for an acetylene flame, which first heats the steel to the required temperature, after which a thin jet of oxygen gas is played on it from the other nozzle and rapidly cuts a slot about $\frac{1}{8}$ inch wide through the steel. The torch is provided with nozzles of two different sizes, and is operated at different pressures for steel up to $1\frac{1}{2}$ to 6 inches thick. It cuts through a 10 x 2-inch eye-bar in 1 minute and 50 seconds using about 8 cubic feet of oxygen. A section made up of several plates riveted together, with a width of 4 feet 6 inches and a thickness of $3\frac{3}{16}$ inches plus a $10\frac{1}{2}$ x $15\frac{1}{16}$ inch angle section, was cut through by the torch in 20 minutes 26 seconds, using 112 cubic feet of oxygen at a pressure of 10 lbs. and costing at the site 3 cents per cubic foot.

The eye-bars, 60 feet long, are cut in two in the middle to facilitate handling. The riveted members are cut in two transversely as required to reduce them to convenient lengths and in some cases, as the bottom chords with four webs, it is found advantageous to cut them

longitudinally through the flange cover plates. In cutting, advantage is taken of open rivet holes to reduce the cross-section, the torch being run from one hole to another. Where the different elements of a member are riveted tight together the joints between them do not cause much difficulty, except in some cases where they have been found filled with wet paint that delayed the operation until it was dried or burned away. The pieces cut in the winter were reduced only to a weight of about 50 tons, which were easily dragged over the snow and ice. It was also found that in cold weather the pieces were much more easily cut, requiring only about one-half as much dynamite as in the summer and showing a noticeable difference between a cold and a very cold day.

The acetylene gas used in the torches is manufactured in a small standard plant installed a few hundred feet from the bridge and piped to the torch in an ordinary $\frac{1}{2}$ -inch rubber hose at 10-lb. pressure. The oxygen gas as imported in cylinders, each containing 100 cubic feet of a nominal pressure of 1,800 lb. About 15 cylinders of

oxygen are required daily for one torch. The oxygen is delivered from the cylinders through a reducing valve intended to maintain a pressure of about 10 lb. per square inch, but notwithstanding this precaution great difficulty has been experienced from leakage and ordinary tubes were not found satisfactory, so the connection to the torch is now made by $\frac{1}{4}$ -inch flexible steel hose.

After being cut up the steel is removed from the wreck and handled in the storage yard by small stiff-leg derricks with interchangeable booms, which command only a small portion of the wreck and are moved from place to place as required. It is estimated that it costs about \$1 per ton to cut out the rivets in the large compression members and reduce them to merchantable scrap, which is said to be sold in Montreal for \$12 per ton.

Charles Koenig & Company are the contractors for removing the steel, and at present employ a force of about 25 men, using one oxy-acetylene torch and three derricks.—Engineering Record.

New Hydraulic Development at Sherbrooke

**An Important Extension of the Sherbrooke Railway & Power Company
—Interesting Details of Construction, Hydraulic and Electric Equipment**

By J. B. WOODWARD, Engineer-in-Charge

Sherbrooke is the third largest city in the Province of Quebec, and is the commercial centre of the Eastern Townships. It has exceptionally good railway facilities, being on the main line of the Grand Trunk Railway; further, it is a divisional point on the Canadian Pacific Railway, the Canadian terminus of the Boston & Maine system, and the headquarters of the Quebec Central Railway Company. It is also the distributing centre for the now rapidly developing asbestos district to the north, the rich farming land of the Eastern Townships to the south and west, and the vast pulpwood limits to the north and east. Since the development of the mineral and timber resources of the district on a large scale, the population of Sherbrooke has increased very rapidly and this fact is made evident by the opening of many new streets and the activity in the building trade. Sit-

uated about two miles to the south of the city is the beautiful residential town of Lennoxville, which is given ready access to the city by a line of the street railway; on which an up to date service is maintained. Lennoxville also has the railway facilities afforded by the four roads mentioned above, and of late years several large industrial concerns have located there. The joint population of the two communities thus served by the Sherbrooke Railway & Power Company is now over twenty thousand.

The Magog river draining Lake Memphremagog, a body of water thirty miles long, enters a deep and narrow gorge, just above Sherbrooke, and flows through the centre of the city, emptying into the St. Francis within the city limits. There is a municipal hydro-electric plant in the gorge, supplying the city with the most efficient lighting service. After passing through the city's plant the waters of the Magog were again utilized at two lower developments to operate the old plant of the Sherbrooke Street Railway, and several industrial concerns situated on its banks. The new Sherbrooke Railway & Power Company, incorporated in 1910, took over the system of the Sherbrooke Street Railway, and acquired the water power rights on the Magog river, between the municipal plant and the St. Francis river, giving a total available head of 63 feet, by which a minimum of 4,000 horse-power can be developed. By means of dams between the lake and the gorge, the water in the lakes can be held back during the flood period, thus producing a magnificent storage by means of which a practically constant flow can be maintained the year around.

Sherbrooke is to the province of Quebec what Hamilton is to Ontario, and it has long been felt that the one thing needed to make it a most important manufacturing centre was a plentiful supply of cheap power. It was with this end in view that the Sherbrooke Railway & Power Company was incorporated. Development was commenced early this summer.

The Development.—The new development will combine the two old developments below the municipal plant and the two old dams will be discarded. A new con-



Reinforced concrete dam in course of construction for the Sherbrooke Railway & Power Company.

crete dam will be erected at the upper level, and the water carried by a large steel penstock, to the new power house, 650 feet below, thus obtaining a working head of 63 feet. Of the 4,000 horse power thus developed, about 800 horse power will be required to operate the street railway with its contemplated extensions, and the remaining 3,200 horse power will be available for industrial purposes. The power house and dam are now being constructed by the Bishop Construction Company, of Montreal, under the supervision of Messrs. Ross & Holgate, consulting engineers, who have had the entire charge of the engineering of the new company since its inception. The whole plant will be in commercial operation by November 1, 1910.

The Dam.—The new dam will be some 300 feet long, and will be built across the rock gorge. The conditions are very favorable, as in the centre of the river at this point is a large island of solid rock. The dam will be built entirely of concrete. About 2,500 cubic yards of concrete will be utilized in its construction. It will be built in three sections, a large spillway section in the centre and bulkhead and stop log sections on the sides. A large steel plate thimble, 18 feet in diameter, will be let into the bulkhead section to convey the water into the penstock.

Penstock.—The penstock will be of steel plate, 9 feet six inches in diameter, carrying the water from the thimble in the dam down stream 650 feet to the distributing section in the power house. The penstock will be carried on reinforced concrete columns of varying heights spaced 16 feet apart and suitably anchored at different points. The penstock will be built in place and shored up, the supporting columns being constructed afterwards.

At the end of the penstock there will be a large steel stand pipe. This will be 18 feet in diameter and 56 feet 6 inches in height, mounted on a solid concrete foundation 22 feet above the tail water level. This will bring the top of the stand pipe 15 feet above the level of the head water, and with its large cubical capacity will reduce the strains on the penstock and water wheel governors to a minimum.

The Power House.—The power house will be built on solid rock just above the point where the Magog river empties into the St. Francis. It will be built of concrete up to the level of the window sills and finished in red brick. The framework for the cranes and roof trusses will

be steel. The main section, comprising the water wheel and generator room, will be 110 feet long by 40 feet wide. To this will be added a gate house over the tail race, a transformer house at the downstream end, and an office section. A 15-ton travelling crane running the whole length of the building will be part of the equipment of the power house.

Hydraulic Equipment.—The three main water wheels will take their water from the distributor in the penstock through 66-inch motor-operated gate valves. They will be of the twin horizontal type, having a rated capacity of 1,325 horse power each with three-quarter gate at a speed of 360 r.p.m. The water will enter at one end of the steel plate casing, and will be discharged into the tail race through a draft tube 22 feet long, inclined at 30° to the vertical. The governing of these units will be effected by Lombard governors of liberal capacity to insure a very close regulation. One of these wheels already completed has just been tested at Holyoke. The results of the test show that a very high efficiency of 85% was obtained at slightly over three-quarter gate.

The two exciter turbines having a capacity of 100 horse power each at 750 r.p.m. will be of the single horizontal scroll-case type. They will take their water from a common feeder opening from the stand pipe through hand-operated gate valves. They will be controlled by Woodward governors.

Electric Equipment.—This part of the installation has been carefully designed to conform with the very best modern standards. The three main units will have a rated capacity of 940 KVR at 2,300 volts, 3-phase, 60 cycles, 360 r.p.m. These generators are of rather special design in order to insure close regulation and absence of hunting. The rotors will have a weight of 24,000 lbs. each, giving a fly-wheel effect of 100,000-foot lbs. The exciters will each have a capacity of 50 K W at 125 volts. The power from the main units will be taken to the switchboard and distributed to the local feeders—railway motor generator sets, and transformers for long distance, transmission lines. The power for the railway will be obtained from two induction motor generator sets, having a capacity of 250 K W. each at 550 volts. As in the case of the main units, these machines are of special design to meet the requirements of the fluctuating load of the railway, without interfering with the voltage regulation of the plant.

The power of transmission will be raised to 22,000



Site on Magog River, showing substructure of new power development for Sherbrooke Railway & Power Company.

volts by means of these single-phase transformers, which have a capacity of 677 K.V.A. each.

The switchboard will consist of 11 marble panels and will be equipped with instruments and protective devices of the most modern type to guarantee against breakdown, and to insure a constant and reliable service with good regulation.

The power house equipment will be protected from lightning troubles by electrolytic lightning arresters.

Transmission Line.—The charter of the company gives it the right to transmit and sell power throughout the St. Francis district. This will open up to the company a large district rich in minerals and timber, which has hitherto been greatly handicapped in its development by reason of a lack of power. A close study of the district has been made, and transmission lines will be run from the power house covering the district within a radius of 30 miles. The transmission will be at 22,000 volts, the lines being carried on wooden poles, spaced 100 feet apart. Already several large contracts have been made for power, and the transmission lines will be pushed forward as rapidly as possible along with the rest of the development where the work has been carried on by both night and day shifts since the spring.

The Railway.—The street railway was built some 12

years ago, and while the traffic has been large and the returns good, it was felt that they could be greatly increased by extensions, and a general reconstruction of the system. The population of the city has more than doubled since the road was constructed. The present system consists of seven miles of track, including the line to Lennoxville. The old system will be entirely relaid, and extensions amounting to six miles will be constructed at the present time. The rails to be used for this work will be of the 70-lb. girder type—60 feet long, 7 inches deep. These will be laid on new ties throughout, and will be held by tie rods, and well bonded. Orders have already been placed for eight new cars. These will be of the pay-as-you-enter single-ended type and will have cross seats. They will be equipped with two 50 horse power motors. There are at present sixteen passenger cars operating on the system. The rolling stock will be further supplemented by the addition of a new snow plough and sweeper.

With this new equipment the service will be much improved. Already the service has been reduced from a 20-minute to a 5-minute one, and this will be further improved when the new equipment is received. To accommodate the new rolling stock, large extensions to the car barns and shops are contemplated.

Notes on the Drainage of Country Roads

Proper Drainage the Fundamental Principle of Road Construction—Satisfactory Systems of Surface and Under-Drainage—The V-drain for sub-soil

By V. M. PEIRCE, Chief Engineer Dept. of Agriculture, Washington

The most important principle involved in road building is that of thorough and proper drainage. The soil upon which the road bed is placed must eventually bear the loads passing over the road. The intensity of the pressure is, of course, not nearly so great on the soil as on the wearing surface of the road, since the severe wheel pressure becomes distributed over a much larger area, the distribution depending on the thickness, character and condition of the roadway materials. But, whatever the distribution, the load is finally transmitted to the soil.

The ability of the earth to sustain a load depends largely upon the absence of moisture in it. Most soils can be so compacted as to form a good firm foundation as long as they are kept dry, but on the entrance of water they become soft and incoherent and largely lose their sustaining power. In cold climates there is the additional damage due to freezing, but frost has no disturbing effect on dry material. Therefore, it is the entrance of water which is to be guarded against in every possible way.

Drainage consists of two kinds; surface and under drainage. Surface drainage is accomplished by using more or less impervious material for the road surface and by having the surface of such form that water falling upon it will quickly run into the gutters or ditches. The great majority of our improved country roads have a cross section which may be said to be formed of two sloping planes with their intersection slightly rounded along the centre line of the road. The side slopes toward the ditches vary from $\frac{3}{8}$ inch to 1 inch to the linear foot. For plain macadam roads having a surfaced width of 12 to 16 feet, $\frac{3}{4}$ to $\frac{1}{2}$ inch to the foot is very commonly

used. The earth shoulders from the stone to the ditch are usually given a slope of 1 inch to $1\frac{1}{2}$ inches to the foot, which has been found to be very satisfactory. Very little has yet been done to determine the most suitable side slope for various grades. The formula

$$W(100-4P)$$

$H = \frac{5,000}{100-4P}$ for the crown of a roadway, where H

equals the crown in feet, W equals the width of road in feet from shoulder to shoulder, and P equals the per cent. of grade of the road, has probably been used more than any other in this country, but it is by no means perfect, and further investigations are needed on this subject.

The ditches and cross drains must be of ample size to care for the largest storm flow, and since the rainfall varies very largely, it is at once plain why the practice is so varied as to the size, shape, and grade of ditches and culverts. Where practicable, however, the grade of the bottom of a ditch should not be less than 6 inches to the 100 feet. On our country roads the gutters, or side ditches, are as a rule unpaved except on steep grades where the velocity and volume of the runoff are sufficient to produce appreciable scour or erosion.

Cross drains or culverts are constructed of wood, earthenware, iron and cement pipes, and concrete both plain and reinforced. Wood as a material for cross drains is rapidly going out of use and should be discarded entirely. For the smaller waterways terra cotta and cement pipes serve fairly well in the warmer climates. In the extremely cold sections the terra cotta and plain cement pipes are very often broken by becoming clogged in time of a thaw, which is followed by a sudden, hard freeze. Iron and reinforced concrete do not seem to

*Extract from paper presented to the Second International Road Congress at Brussels.

be injured in this way, and the latter should be used for the construction of all of the larger culverts.

All culverts which are built with any of these materials should have their ends protected by concrete construction, in order to prevent the washing away of materials adjacent to the ends or of the culvert itself. An illustration of the washing away of a corrugated iron pipe culvert is included, which shows its failure to the lack of being provided with concrete ends.

Under-drainage involves the removal of the ground water to a sufficient depth to prevent it from injuring the road, and this depth should be varied according to the climate and the character of the soil, never being less than 2 feet below the elevation of the road surface. The general method of removing the ground water is by drain tile from 4 to 12 inches in diameter, laid on a true grade, and not less than 3 feet below the crown of the road. There may be a line of such tile on both sides of the road, a single line on one side, or a single line down the middle of the road. When the direction of flow of the ground water is found to be strongly from one side, as is usually the case in side-hill construction, a single line of pipe cutting it off before it reaches the road will be sufficient. In low and swampy land, not having a well defined under flow, and in heavy retentive soils a line of tile on each side will be necessary to properly protect the road. In the latter kind of soils the tile should be laid on about 4 inches of coarse sand or fine gravel and then covered to a depth of at least 1 foot with similar material. This not only insures that the joints and pores of the tile will not become clogged with the almost impervious clay, but it also gives a larger collecting area for the percolating soil water.

One of the later methods employed to drain the subsoil, which has given satisfaction, is the construction of the V-drain. In this work the subgrade should be excavated for the full width of the surfaced roadway and from 6 to 8 inches deeper at the sides and from 12 to 18 inches at the centre than usual, thus producing a flattened V-shaped trench. This extra excavation is made in order to be filled with pebbles and boulders varying in size from $\frac{1}{2}$ to 12 inches in their longest dimensions and having the largest stone placed in the bottom of the trench, which should be graded longitudinally so that the water will run along easily. These stones do not have to be deposited carefully, but should be so placed that they may be compacted with a roller to form a suitable foundation for surfacing. The water drained by such construction should be carried to the outlets provided, through narrow trenches filled with similar sized stones, as should the water drained by all forms of sub-surface drainage be carried to the side ditches, culverts, or open waterways through their own similar forms of construction.

Details of the practice of sub-drainage vary largely in the different sections, but the employment of longitudinally tiled and V-shaped drains to collect and carry off the water is very extensive and rapidly increasing. Road builders are learning more and more from experience that as a rule it is cheaper in the end and more satisfactory to drain than to lay expensive foundations. To keep the earth dry, hard, and unyielding is necessary to secure the low cost of maintenance and long life of a road. Therefore, the water falling on the road must be carried off quickly and effectively and the water from below must be intercepted and removed before it reaches the roadbed where it can do damage.

The discovery of an unlimited quantity of fine silica sand, is reported from St. Anne's Man. Development work will probably be entered upon shortly.

Data on Laying Concrete Base for Streets

A large amount of new street paving is at present being laid at Grand Haven, Mich. Several streets in the vicinity of the Grand Trunk station are being improved with brick with cement filler and pitch joints. There is a total of about 4,300 feet of that work in the locality. The subgrade is sand, the base 6 inches of gravel concrete and the wearing surface paving brick.

Metropolitan Paving Brick Company, of Canton, Ohio.

The subgrade is first rolled compact and smooth with a road roller, and then the concrete gravel and sand are dumped in two parallel windrows near the middle of the street. A continuous concrete mixer is then brought along between the windrows, using the materials from them by direct shovelling and leaving the finished base slab behind. The concrete is distributed with the aid of wheelbarrows, the greatest haul being about 30 feet.

Representative progress and cost data on this work is as follows. A section 285 feet long and 21 feet wide, embracing 665 square yards and containing 11 cubic yards of concrete was laid in a 10-hour day with the following force:

1 Foreman	\$5.00
1 Engineer	2.50
2 Men shovelling gravel	@ \$2.50 5.00
2 Men shovelling gravel	@ 2.00 4.00
4 Men wheeling concrete	@ 2.00 4.00
3 Men spreading concrete	@ 2.00 6.00
2 Men handling cement at mixer	@ 2.00 4.00
$\frac{1}{4}$ Ton coal	1.00
Oil and waste (estimated)	.25

Total \$35.75

The unit cost of mixing and laying, figured on this basis, was \$0.054 per square yard, or \$0.323 per cubic yard. This work was done in July.

On another section, laid in August, where the concrete was shovelled directly from the mixer into place, and therefore no barrows were used, a representative record is as follows: A section 180 feet long and 28 feet wide, embracing 500 square yards and containing 98 $\frac{1}{2}$ cubic yards, was laid in a day of 10 hours. The equipment and methods were the same as above, with the exception of the barrows. The distribution of forces was:

1 Foreman	\$5.00
1 Engineer	2.50
2 Men shovelling gravel	@ \$2.50 5.00
2 Men handling cement at mixer	@ 2.00 4.00
8 Men spreading concrete	@ 2.00 16.00
$\frac{1}{4}$ Ton coal	1.00
Oil and waste (estimated)	.25

Total \$33.75

The unit costs on this basis were \$0.061 per square yard, or \$0.362 per cubic yard.—"The Contractor," Chicago.

In a forcible address delivered recently at St. Peters, C.B., Hon. A. J. McLean, Attorney-General for Nova Scotia, called attention to the importance of the good roads movement and outlined the Government's policy in this regard. He stated that at its next session the Government would introduce legislation looking to the expenditure of a considerable sum of money for permanent improvements to the highways of the province, according to detailed reports to be submitted from each district.

Two Attractive Residences at Chatham, Ont.

We have pleasure in publishing herewith photos of two attractive residences erected at Chatham, Ont., last season in accordance with the designs of Messrs. J. L. Wilson & Son, architects, of that city.

The stone and shingle residence was built with entrance, reception hall and staircase from front to rear, connecting with kitchen, refrigerator room, etc. On entering at front door, through an arch on the left is a living room, 13 feet 4 inches x 27 feet, containing a



Stone and Shingle House built for Mr. A. D. Westman.
Cost \$8,000.

wide fireplace. To the right of entrance and reception hall are the library, also containing a fireplace, and the dining room.

The second floor contains four bedrooms and bath, with stair to maid's room and storage in attic. The basement arrangement includes laundry room, cool room and storage; hot water heating.

The Richardson residence shows how effectively shingles can be used for a frame exterior. The ground floor contains living room, with bay at front, with slide doors into dining room immediately at rear, connected to kitchen, refrigerator room, etc., by means of a serving pantry. On entering there is a reception hall in which is a staircase to second floor appointments. The one-storey annex, on the left side of residence, contains a den with bookcases, window seat, etc. The second floor contains four bedrooms and bathroom, with stairway to attic, which also contains maid's room and storage. The basement arrangement includes laundry room, boiler room, cool room and storage.

The Toronto Board of Control have endorsed Park Commissioner Wilson's scheme for the improvement of University Avenue. No amount has yet been named for carrying out the work, but it is to be hoped that the city council will appreciate sufficiently the opportunities provided by the scheme to make proper provision for doing it ample justice.

The prosperity of the C. P. R. was indicated clearly in Sir Thomas Shaughnessy's presidential address at the 29th annual meeting of the company last week. The gross revenue, exclusive of ocean steamships, shows an increase over the previous year of \$18,600,000, the working expenses, an increase of \$7,700,000, and the earnings an increase of \$10,900,000. In reality the actual result was somewhat better than this, as the directors thought it wise to create at the cost of working expenses an additional fund of \$2,700,000 to provide for main-

tenance works contemplated. Sir Thomas held that these figures furnish conclusive evidence of the growth and progress of the country. The speaker touched in a general way upon the extensive ship-building programme which the company now has under consideration. In this connection an interesting statement may be expected at an early date.

That there is scope for the larger contracting concerns to provide themselves with adequate facilities for handling big work, seems to be indicated by the letting of the contract for the new million-dollar Bank of Toronto, which is to be erected at the corner of King and Bay Streets, Toronto, to Norcross & Co., of Worcester, Mass.

Mr. Eustace Bird, Toronto, representative of Messrs. Carrere & Hastings, of New York, the architects for the proposed building, states that local firms were given an opportunity to do the work, but were unable to take it, owing to the difficulty in handling the marble. Mr. Bird states: "No Canadian firm has ever yet prepared marble for outside work. They have for interiors, but there have never been any mills for the cutting of the big slabs that go to make up the walls. I may say, however, that in this present job such a mill will be installed, and all the marble cut here with local labor."

Commissioner C. F. Roland, of the Winnipeg Development and Industrial Bureau, thinks that there should be no necessity for local manufacturers to deposit certified cheques with municipal tenders. He has laid the matter before the Board of Control at Winnipeg with the



Mr. Thos. Richardson's Shingled Residence built at a cost of \$3,700.

recommendation that established local concerns be not compelled to deposit cheques with their bids.

In regard to Mr. Jacobson's criticism of the unfair manner in which Scandinavian railroad laborers are treated in Canada, Mr. J. W. Stewart, of Messrs. Foley, Welsh & Stewart, deprecates anything that may tend to discourage immigration from this source. He declares that the Swedes and Norwegians are the most desirable of the immigrants to this country from Europe, being steady, industrious and reliable.

Notes on the Qualities of Steel Pipe Lines

Useful Observations from Modern Practice — Relative Merits of Wrought-Iron and Steel Plates—Interesting Discussion on the Subject

Of a number of particularly valuable papers presented at the annual convention of the New England Waterworks Association held at Rochester, N. Y., Sept 21-23, 1910, we think none of the other authors will begrudge giving first place to the paper on steel pipe lines, by Mr. Emil Kuichling, consulting engineer, New York City, says the Engineering News. The impossibility of giving detailed information from this paper in a report of the proceedings of the whole convention will be understood when it is stated that Mr. Kuichling used about an hour in presenting an abstract only of the paper. All that can be attempted here will be to convey a general idea of the contents of the paper and the object of the author in presenting it. Speaking of the object first, it may be said that the author's aim was to make a thorough canvass of what is not known and what remains to be learned regarding steel pipe. On concluding his abstract of his paper, he said that an equally long paper could readily be prepared on the good points of steel pipe lines, but that pleasant task he would leave to others. In the course of his paper Mr. Kuichling gave a quite extensive review of the history and practice of steel pipe line construction. Naturally, the author devoted a considerable amount of time to the wrought-iron and the steel pipe lines at Rochester, with both of which Mr. Kuichling was connected. He also dwelt upon the relative merits of wrought-iron and steel plates as material for riveted pipe, and brought out clearly the evident great superiority of wrought-iron on the point of corrosion resistance. We hardly need remind our readers that comparatively few leaks have developed in the wrought-iron pipe line at Rochester after some 35 years of use, while in comparison the steel line developed many leaks within a few years.

The idea should not be gotten that Mr. Kuichling's paper was devoted wholly to the quality and corrosion resistance of steel pipe. He also discussed deformation. Here also his aim was to call attention to what is not known rather than what is known on the subject.

In discussing the paper, Mr. E. A. Fisher remarked that some people have an idea that the Rochester steel conduit is going to pieces. This is far from the truth. While there has been corrosion and leakage, the corrosion is confined to pitting, and the general strength of the conduit is not affected. Some \$8,000 to \$10,000 a year are spent in repairs consisting generally of uncovering the pipe each way from leaks and recoating it. Altogether, less than three miles have been recoated out of the total length of 26½ miles.

In the course of the discussion Mr. Francis H. Luce, of Woodhaven, N.Y., gave some information regarding the changes in the manufacture of enameled kitchen-ware which he thought explained why steel pipe was so much more readily attacked by rust than wrought-iron. Mr. Luce said that prior to 1890 the old-fashioned charcoal wrought-iron was used for kitchen utensils. Such utensils would last for a great many years. On changing to steel great difficulty was experienced in making the enamel adhere, and special means to that end had to be devised. He thought the lack of adhesion was largely due to the fact that the steel is not nearly so porous as the wrought-iron.

Mr. L. M. Hastings, city engineer, of Cambridge, Mass., stated that the steel pipe which he put in many years ago followed the Rochester specifications in general. The Sabin coating was used at Cambridge (as it also was used on the sections of the Rochester pipe which have corroded least). Mr. Hastings stated that heating the metal before dipping

the pipe to apply the Sabin coating opened the pores so that the coating penetrated better and thus had greater adhesion subsequently. So far as he knew, his pipe line was well preserved.

Mr. W. C. Hawley, of Wilkesburg, Pa., who was formerly located at Atlantic City, told how the steel pipe laid across salt marshes had gone to pieces there. This pipe was laid against the advice of Mr. Hawley and Mr. Kuichling and against the wishes of the water commissioners, the city council setting itself up over all these and not permitting the use of wood stave pipe, as had been recommended by the engineers named. It is interesting to note that a 48-inch pipe line is now being laid, or will soon be laid, across the meadows at Atlantic City. The Atlantic City steel pipe line was laid some nine years ago. The pipe was coated with "mineral rubber," and had burlap wrapped around and pressed into the hot coating in order to afford protection in transportation. Pipe for the first half mile laid was carted across the meadows. Subsequently, the pipe was rolled 600 to 800 feet across the meadows, which were frozen at the time. About a hundred leaks soon occurred in the portion of the pipe line, the pipe for which had been rolled, while only a few leaks occurred on that which had been hauled. This, of course, was explained by damage to the coating caused by rolling the pipe.

Mr. Allen Hazen's Experience

Mr. Allen Hazen* expressed himself strongly in favor of steel pipe. He used it first at Albany a number of years ago. Recently at Springfield, the lowest bids for conduit were at the rate of \$2 per foot for steel pipe, against \$3 for cast-iron pipe. He believed that ultimately steel would be used for all pipe lines larger than 36 inches. As to the use of wrought-iron, Mr. Hazen remarked that there was a difficulty in rolling this in large plates, especially where locked joints were used longitudinally. He understood that the ingot iron can be rolled in as large plates as the steel so that for this and other reasons he considered the ingot iron promising.

Mr. Morris Knowles stated that the considerable amount of steel pipe that had been used in and around Pittsburg had given general satisfaction. Mr. Robert Spurr, Weston, described the open-hearth steel process in its relation to the question under discussion. The large ingots from the furnaces cool in a way similar to the formation of ice in cakes; that is, with the concentration of the impurities at the centre. When the ingots are rolled these impurities are unevenly distributed and thus give rise to unequal electric resistance in different parts of the plates, and consequently to concentration of corrosion since corrosion, as it is now known, is due to electric action. The first requisite of coating, of course, is to keep water from the pipe. The Sabin coating is better than others because it is baked on and in and thus excludes water. Unsatisfactory results sometimes had with Trinidad asphalt are in part due to the fact that this material includes some 25% of non-bituminous matter, which is dissolved by the action of the water, thus leaving the coating porous. The purely bituminous products are therefore more desirable.

According to a statement issued by City Engineer Jones, of Brantford, Ont., the building permits issued in that city to date amount to \$447,760. The total for 1907, the record year, was \$509,945.

* Consulting Engineer to the City of Toronto.

The Constituent Materials of Concrete

An Instructive Article Containing Information of Practical Value to Contractors—Failures not Infrequently Due to Ignorance of Materials

By RUSSELL S. GREENMAN*

Concrete is called artificial stone. There is really no doubt that good concrete is an artificial stone, but it is also something more. It has certain characteristics of a stone, but there are some things so decidedly characteristic about concrete that it differs from stone and assumes an individuality of its own. To make a clear distinction is not an easy task, but as we learn more about concrete, we see more clearly how concrete varies from stone, just as stone varies from brick. To make concrete there are certain essential materials. These are commonly listed as cement, sand and stone. One other material is important—water. For sand and stone there are several substitutes. It is generally acknowledged that the cement for all large works should be subjected to rigid inspection and tests. On very large works the sand and stone also are carefully inspected. On smaller works the cement has sometimes been tested, but the sand and stone have often been given no more than a casual inspection. Invariably the blame for failures has been placed upon the cement. And often these failures have been not only disastrous financially, but have also caused the loss of life. Many failures, doubtless, are due to a lack of proper supervision, but in some cases ignorance of the materials used has permitted the too early removal of the forms and centreing. In one case, known to the writer, shavings and small blocks were swept into the forms; a column collapsed and four lives were the cost of this negligence. A post-mortem examination can not restore life; the best it can do is to suggest some way of using the knowledge gained to prevent future losses. So when concrete fails, a post-mortem examination shows that proper inspection of workmanship and materials would have prevented the failure.

Modern hydraulic cement is of very recent introduction into many of its present uses. Hydraulic cements have been made for nearly a century, but the cement of 50 years ago—yes, of 25 years ago—was not the cement of to-day. The latter-day cement that is most generally used is called Portland. Unless concrete is to be put to some extraordinary use, the cement should have certain characteristic qualities. First of all it should be sound, also it should be ground to a certain degree of fineness; it should not set, or harden, too quickly, and it should show, in tests, a good tensile strength. Generally the smaller users take it for granted that a cement of established reputation will always possess these good qualities and they purchase and accept cement on the name of the brand. Such a practice can hardly be called safe, for mistakes occur in the best regulated families and some times even the best mill may turn out some lots of poor cement. Cement is unsound usually, because it is green, not having had time to cure. After the cement clinker, or the finished cement, has been stored until the free lime has become hydrated, or slaked, the cement generally becomes a safe cement to use. A future cause for failure in this same cement may be from an excess of sulphuric anhydride or any excess of magnesia. An excess of either of these can ultimately destroy what is apparently good concrete.

Upon the fineness of cement depends to a great extent its strength. It is the finer particles that have hydraulic activity. The coarse particles are practically inert and act as so much fine sand. It must not be understood that, of two brands of cement, the finer is necessarily the better, but, of the same

kind of cement, that which is the finer is apt to produce better results. There is, however, a minimum percentage for the different degrees of fineness, above which all cement should be ground.

The setting of cement, as defined and limited in specifications, may or may not be important—with one distinct exception. It may matter little in the majority of cases whether or not the cement takes 30 minutes or four hours to take its initial set, as the large majority of cement users have the concrete well in place within the minimum time allowed, and only in cases where there is some delay does it make a difference. The exception which always does become a matter of importance, however, occurs when the cement takes what is called a flash set—setting hard in a very few minutes. Cement of this nature is decidedly improper and its use should not be allowed.

Setting and Hardening.

There must, too, be a distinction made between the setting of cement and the hardening, for the latter is of much importance in the making and care of concrete. The setting of cement may be considered as being limited to that time when the cement is undergoing the first chemical action, when the cement crystals are being formed; the hardening of cement takes place at that time when the cement crystals are gaining strength and continuing more slowly the chemical action which began in the setting. It is of vital importance for one to know that he may be using a slow strength-getting cement. The removal of forms or centreing, the care of the concrete itself, the time at which it is safe to place a load upon the concrete—all these depend upon the rapidity of the growth in strength.

The first consideration in the selection of sand is generally that of cost. The contractor may be willing to pay a larger price for his cement, in order that he may be reasonably sure of securing a satisfactory product, but the sand must be the cheapest that can be procured. This demand of cost, however, is gradually assuming its proper place, namely, at least partially subservient to those qualities which will produce required results. What these qualities are depend largely upon the use to be made of the concrete, but, as a general rule, the sand must be composed of hard grains; it must be composed of well graded particles. It must not have too large a percentage of voids, and it must not contain too much loam and organic matter. However, it must be admitted that it is practically impossible to secure an ideal natural sand, but some sands are so far from the ideal that their use is impossible.

The character of the sand grains is important. The smaller grains are generally quartz, with occasionally some feldspar. The larger grains are particles from broken down sandstone or are particles of shale. As long as the sandstone grains are not from decaying stone these sands are all right; when, however, they are soft and easily crushed, they will be much weaker than the cement and add no strength to the mortar. Shale grains are apt to be much weaker than the cement, and if exposed to the weather have a tendency to disintegrate, but with a rich mortar each sand grain would thus be protected from the weather. Feldspar should be coated with cement, and the grain also has a tendency to disintegrate and its proportion in sand should not be too great. Such sands as contain much mica do not make good sands for concrete, as the mica greatly reduces the strength.

If sands are well graded the percentages of voids are great-

* Engineer in charge of Illinois State Testing Laboratory.

ly reduced. It is possible by artificial mixture to secure materials with very few voids. For special uses this may be done. For general use it is not practical, but such natural sand should be selected as will show the best graduation in the size of its grains. As an illustration, a mortar of the proportion of one cement to three sand, in which the sand is fine and contains 40 per cent of voids, will have about 7 per cent. of space, filled with only water and air. What then can be expected of some of the lean mortars such as are being used in some modern cement work? It has been generally specified that sand shall be a sharp, clean sand. In very recent years we have come to admit that good cement will adhere to a round surface as well as to a sharp, flat surface. We have just seen that a round-grained sand contains less voids than the sharp sand. The word "sharp" is gradually being stricken from the specifications and the words "well graded" are being inserted in its place.

There is often used as a substitute for sand the finer product of the stone crushed for use in concrete or macadam. This product is called crusher dust, or screening, it often makes a splendid substitute for sand; in fact, it often produces better concrete. This will happen when the particles are well graded, the use of either sandstone or limestone screening proving very satisfactory. It often happens, however, that the screening contains a large percent of very fine dust, and with this there is also a large amount of particles of about one-quarter to one-half inch size, without a proper proportion of the intermediate grades or sizes. The result is, that, when used in concrete, the cement becomes adulterated with the fine dust and the concrete is weakened. It is true that this fine dust will aid in producing an impervious concrete, but it also makes a more tender concrete—one that will not well stand the shock of impact. There has been introduced into some use within the past few years a waste product that makes a very satisfactory substitute for sand, namely, iron ore ailings. As a rule this is well graded material and produces a very satisfactory mortar.

Selection of Stone.

The selection of the stone to be used as the aggregate for concrete should be given very careful consideration. It frequently happens that a gravel can be secured more easily and more cheaply than a satisfactory crushed stone. As a result we have two main classes of concrete—broken stone and gravel. Both have good points in their favor. Another kind—cinder concrete—has a field of its own and is the best concrete that can be used under certain conditions. In the selection of the stone or gravel we have problems similar to those which are presented in the selection of sand. The same question of voids, size, the grading of the stone and the cleanness are all vital considerations. There is also the further question of strength. It is necessary that, since the stone forms by far the larger part of the concrete, it shall have a strength approximately the same as the cement. The kind of stone is the first point to be given consideration, the selection depending somewhat upon the use to be made of the concrete. Good, hard stone is absolutely essential. Hardness and toughness, density and weight help to determine the stone. Trap-rock and granite generally produce the best concrete; hard limestone and gneiss also give good results; sandstones are generally quite as satisfactory, but stones of a shaly nature should be avoided. When gravel is used, it is equally important that it should be composed of good, hard pebbles. Shaly gravel should not be used. All stone or gravel of a soft or decomposed nature should not be permitted in concrete.

The question of cleanness is very important. It is almost sure destruction to concrete if the stone is coated with loam. The coating prevents a proper adhesion of the cement to the stone and with this lack of adhesion the concrete becomes similar to honeycomb—sawdust is then just as useful as stone. One of the arguments made against gravel concrete is that

there is a greater danger of the pebbles being coated with dirt. It is often not only advisable, but necessary to wash the gravel. In this case it might be a better plan to secure crushed stone, as a freshly crushed stone should not be coated with dirt.

Quantity of Water Used.

The question of quantity of water used in mixing concrete is not always a vital one. Where massive concrete work is put in place, large quantities of water are used and the supply naturally will be a satisfactory one. There are times, however, when small structures are to be erected at some point distant from a large supply of water. It is natural that the contractor should then look for the nearest supply. The source of this supply should be examined before its use is permitted. As an illustration: The concrete in a certain culvert failed to set. At first the cement was blamed. Investigation brought out the fact that other culverts in the vicinity had been constructed with the same cement, sand and stone and were perfectly satisfactory. Attention was then given to the water. This water was taken from the creek flowing through the culvert; and when this creek was followed it was found that it flowed past a medicinal laboratory where bark and herbs were largely used. The creek was decidedly affected by the waste from this laboratory. This point well illustrates the effect of organic matter on water and concrete.

Any source of supply that gives very roilly water should not be used while it is in this condition. It is possible to allow the suspended matter to settle, the water may thus be satisfactory. Water that is brackish, or leaves any deposit in the nature of a slime, should not be used.

There are certain conditions in the use of concrete that are interesting and deserve consideration, but they do not really come under the head of this article. However, the question of placing concrete during freezing weather is an important one and, in conclusion, a moment or two may be spared with profit in its discussion. Every one admits that it is better not to do so, but conditions sometimes necessitate doing concrete work in the winter months. If the concrete is not subjected to varying temperatures, that is, if the concrete could be frozen and kept frozen until the winter was over, it could be placed at any time. But in this section of the country we have very variable weather, and since it is not possible to put our concrete in cold storage, we have only the alternatives of not putting it in at all or protecting it against the action of frost. But, as has been said, necessity sometimes demands that the concrete shall be put in. To lessen the harmful influence of the frost, several methods are followed. When the concrete is not to be a decorative feature there is nothing much better than the use of salt. Calcium chloride has also been used in the same way. When it is wished to avoid any possible efflorescence—due to the salts—the aggregates are heated before being used. This latter method becomes effective only when the concrete is protected from the frost until it has acquired a set and has hardened considerably.

Experimental Road Work at Brandon, Man.

The City of Brandon, Man., has been experimenting with a new steam roller on Eighth Street, making roads from the crushed granite, manufactured by the city's crushing plant. The idea is to put to test the durability of macadam pavement. The exact length of the experimental stretch is 520 feet, with an average width of 39 feet, or a total of 2,253 square yards. The material used in its construction was 660 cubic yards of Nos. 2 and 3 granite, at \$1.80, totalling \$1,188; 93 cubic yards of No. 1 granite at \$3.25—\$302.25; labor, \$301.02; use of road roller, \$21.00, a total cost for the entire piece of work of \$1,812.27. The pavement has an average thickness of 11 inches, and has been constructed at a cost of 80½ cents per square yard.

Building up the C. N. A. B.

**President Nesbitt's Successful Tour of Western Canada
—Encouraging Evidences of Support from Leading Cities**

A meeting of the Winnipeg Builders' Exchange was addressed recently by Messrs. Nesbitt and Lauer, of the Canadian National Association of Builders. Mr. H. J. Carter, president of the local exchange, was in the chair. Mr. Nesbitt complimented the Winnipeg builders upon their influential organization and alluded to his aim to consolidate the interests of the builders so that they might have a body similar to the Manufacturers' Association. The speaker pointed out a number of clauses in the statute books which he considered unjust to the builder. He also dealt at some length with the need for a better system of technical education.

Mr. Lauer referred to his dealings with the Minister of Labor, Hon. R. Lemieux, to whom he had pointed out how extraordinary it was that in the Disputes Bill, of 1907, which deals with railways and other industries, the building trade is not included, although the industry represents about ninety million dollars. The speaker also outlined what it would mean to have compulsory arbitration. In view of the recent lockout at Winnipeg this reference was particularly interesting.

Regina Builders' Exchange

The Builders' Exchange held a noteworthy banquet on the 30th ult. Mr. E. H. Nesbitt, of Quebec, president of the Canadian National Association of Builders, and Mr. J. H. Lauer, of Montreal, secretary of the Association, were the guests of the evening.

Ald. R. A. Brocklebank, president of the local exchange, spoke of what had been accomplished since the body had been organized in March last. The membership of the Exchange is now 65. It is well supported and is very optimistic concerning the future. Messrs. E. N. Butler and Jas. MacDonald responded to the toast of "The Architects." Mr. MacDonald is first vice-president of the Alberta Architectural Union.

Mr. E. H. Nesbitt, of Quebec, replying to the toast of "The Builders' Exchanges," emphasized the need for a strong national association and spoke of his desire to see the Calgary exchange affiliated with the C.N.A.B. The membership of the last named institution is at present 1,600, made up of members of the exchanges of six of the largest cities in Canada. Mr. Nesbitt said that it was essential to the interests of the Dominion to bridge the gap between the east and the west. Touching upon the value of organization, he pointed out how the labor body had succeeded in obtaining legislation, and this with practically no opposition from the builders.

Calgary Builders' Exchange

President E. T. Nesbitt and Secretary J. H. Lauer, Montreal, of the Canadian National Association of Builders, were tendered a reception by the Builders' Exchange, of Regina, Sask., upon their recent visit to that city. The subject impressed upon the Regina contractors was the value of a Dominion-wide organization for the master builders. It was arranged to hold a meeting of the exchange to discuss the matter of affiliating with the National Association.

The Civic Improvement Committee of Toronto have appointed a special Plan Committee, the work of which is defined as follows: "It shall be the function of this committee to prepare a comprehensive and general plan for the city and to take into consideration the surrounding district within a reasonable distance. The general scheme will have to do with such matter as street or other traffic, parks, boulevards, drive-ways, squares, play grounds and public buildings. Special attention should be given to the proper laying out and treat-

ment of the area lately brought within the city limits." The members of this committee are Alderman Chisholm, Controllers Spence and Ward, and four well known city architects, Messrs. Burke, Hynes, Langton and Lyle.

A farmer of Lloydminster, Sask., has a barn, probably the most remarkable in the world. It was built about a year ago. He recently discovered that willows which had been used for corner posts and walls, were growing, and that the floor had risen three feet. A year ago last spring the barn was on stilts nine feet high; and he put in another floor, converting it into a two-storey building. The new floor is already a foot above ground, and the farmer is looking forward to when more storeys may be added.

The death occurred last week of Mr. Daniel J. O'Leary, contractor, of Montreal, father of Mr. Jno. O'Leary prominent also in Montreal contracting circles.

Constructional Notes

Work on the provincial parliament buildings at Regina, Sask., has been somewhat delayed by the strike of the Lyall-Mitchell Company's bricklayers. At the present time, however, the company is pushing ahead with characteristic enterprise, and it is expected that the buildings will be far enough advanced to house the legislature at the opening of the next session.

The City of Brandon, Man., is now in possession of a central heating plant, which has been installed by the Brandon Electric Light Company. A test of the system made last week was entirely satisfactory. About a dozen of the largest buildings in the city have been connected with the new system, which it is stated will mean both economy and the lessening of the fire risk.

Over eight miles of new water mains, costing in the neighborhood of \$100,000, have been laid in Calgary the past year, making a new record in the history of the city. This has necessitated extensions of the sewer system as well, and as a result over ten miles of sewers have been laid. The west end of the city has been attacked during the past eight months, and its water difficulties solved. In the course of a few weeks a start will be made on Bridgeland, Riverside and East Calgary extensions. It is possible, the sewer system will be pushed into Sunnyside and Hillhurst this fall or during the early part of the winter. Preparations are being made to construct the trunk sewer north of the Bow river, which will serve these districts as soon as the low water comes.

Mr. Duncan McArthur, who has the contract for the big irrigation canal at Medicine Hat, was in Winnipeg last week. He stated that it would be at least another year before the water can be turned in through the main ditch. One of the cuts on this piece of work is the largest of its kind ever undertaken in Canada. It runs for a mile and three-quarters through a hill which in places is 65 feet in depth. Before the work is done it will be necessary to remove at least a million and a half cubic yards of earth. At the present time there are three two-and-a-half yard steam shovels in operation, but rapid progress is not possible. However, from two or four thousand cubic yards a day are being taken out. The shovels will probably be kept at work for some time after the freeze-up.

Messrs. Quinlan & Robertson, of Montreal, are stated to be making good progress on the aqueduct construction in that city. Over three hundred men are on the job, and, according to a statement submitted on October 1, by Mr. Janin, superintendent of the waterworks, 409,358 cubic yards of earth have been removed. This represents about one-quarter of the contract. Messrs. Quinlan & Robertson have three years to com-

plete the work. A large portion of the excavated material will be used by the town of Verdun in the erection of a flood dyke. The water consumed in the city is now conveyed to the pumps by the large concrete-covered conduit, eight feet in diameter, which runs underground from Lachine to Point St. Charles. It was the completion of this conduit a year ago which enabled the city to draw off the water from the aqueduct and begin the widening and deepening of it.

News of Conventions

A meeting of the Ottawa branch of the Canadian Society of Civil Engineers will be held at 177 Sparks Street, Ottawa, on Oct. 12. Mr. S. J. Chapleau, of the Department of Public Works, is secretary of the branch.

The annual convention of the American Railway Bridge & Building Association will be held at Denver, Colorado, Oct. 18-20. For particulars address the secretary, Mr. C. A. Lichty, Chicago & Northwestern Railway, Chicago, Ill.

The annual convention of the British Columbia Union of Municipalities will be held at Salmon Arm, B.C., in November. The actual date will be announced later. Mr. Bell, Mayor of Vancouver, is president of the Union, and Mayor Planta, of Nanaimo, B.C., vice-president.

Mr. A. A. Dion presided last week at the annual meeting of the Ottawa branch of the Civil Engineers, and the following officers were elected: A. H. Dion, president; H. Victor Brayley, secretary; committee, S. J. Chapleau, John B. McRae, Gordon Grant, James White and J. E. N. Cauchon. The reports of the various officers were most satisfactory.

City Engineer Rust, of Toronto, left the city last week-end to attend the annual convention of the American Society of Municipal Improvements, which is being held at Erie, Pa., Oct. 11-14. Among the papers which are scheduled for this meeting is one entitled, "European Sewage Disposal Works," by Mr. Rudolph Hering, the well-known New York consulting engineer. Of the special committees that will submit reports, Mr. Alcide Chausse, city architect and superintendent of building at Montreal, is chairman of the Fire Protection Committee, and Mr. C. H. Rust, of Toronto, chairman of the committee appointed to consider standard specifications.

At Winnipeg last week a deputation waited upon the Hon. R. Rogers, Minister of Public Works for Manitoba, to discuss the interests of the good roads movement. The Good Roads Association recommend that the government guarantee bonds of municipalities for good roads projects. The deputation was referred to Mr. MacGillivray, good roads commissioner, and it is understood that the matter will come before the Good Roads Association and that a report will be prepared and submitted to the meeting in November of the Manitoba Union of Municipalities. The members of the deputation were: S. R. Henderson, Reeve of Kildonan; Geo. T. Chapmain, Reeve of Assiniboia; John Haddow, Reeve of Rosser; J. M. Smith, Reeve of St. Paul, and I. W. Smith, Reeve of Springfield.

Canadian Railroad Development

Mr. G. G. S. Lindsey, of Toronto, is not at Victoria, B.C., after a northern trip. He says that G. T. P. steel will be laid within two miles of Kitselas Canyon before the end of the present month. Construction camps are well filled, and the men are working on towards Hazelton and Aldermere.

It is believed that the Dominion Government will eventually decide upon Port Nelson as the terminus of the Hudson Bay Railway. Thomas Turnbull, formerly Chief Engineer of the Canadian Northern and now under the employ of the Government, has been over the proposed route and spent considerable time looking over the vicinity of Port Nelson.

Mr. C. O. Foss, resident engineer, who has returned to St. John, N.B., from a trip of inspection over the Transcontinental road in New Brunswick, states that No. 1 section will be ready for acceptance by the end of the month. The section on contract, No. 2, is now ready for operation, but details will not be completed until the end of the season. Contract No. 3 is ready to be taken over any time. The sub-contractors on section No. 4 say that they will be ready this fall. Taken as a whole the line is rapidly nearing completion, and before the end of next season it will be ready for operation from one end to the other.

The Pincher Creek, Cardson & Montana Railway, will apply at the coming session of the Alberta legislature for an extension of the charter, which will permit it to construct the main line through Alberta by way of Calgary and Edmonton, into the Peace River country. There will also be a branch into the Kootenay to tap the coal fields which it is understood the company has secured. Construction has already commenced on the first 100 miles north of the international boundary. Surveys of this portion of the line are nearly completed, and \$3,000 per month has been spent on surveys during the summer. Construction will also be commenced north toward Calgary and Edmonton this fall.

It is believed in Vancouver, B. C., that it is now almost a certainty that the proposed branch of the Grand Trunk Pacific between Fort George and Vancouver will traverse the Lillooet District and strike the Canadian Pacific at or near Agassiz Station. The trial lines run this season from Lillooet on the Fraser to Lytton, where the river is joined by the South Thompson River, are not considered satisfactory, owing to the heavy rock work and the enormous cost involved in construction. An engineering party is now working north from Agassiz. Its objective is Lillooet. It is aimed as a route where very low grades can be secured all the way from Lillooet on the Fraser to Agassiz, whence the line will parallel the Canadian Pacific into Vancouver.

Personal Mention

Messrs. Storey & Van Egmond, architects, of Regina, Sask., were successful in the competition for plans for a new Carnegie library for that city. Mr. F. C. Clemesha, of Regina, was awarded second place.

Mr. Geo. E. Mills, contractor for the masonry and brick work at the registry office at Hamilton, Ont., sustained a compound fracture of the leg last week. The accident was caused by the falling of a large iron gate.

Mr. Tracy LeMay, O.L.S., has been appointed City Surveyor for Toronto at a commencing salary of \$1,500. The appointment is made to fill the vacancy caused by the resignation of Mr. Chas. Unwin, who is 81 years old.

Messrs. Nobbs & Hyde, 157 St. James Street, Montreal, are carrying on business under the above style. The partners are Mr. Percy E. Nobbs, F.R.I.B.A., and Mr. Geo. T. Hyde, B.Sc. Professor Nobbs is well known to the profession by reason of his connection with McGill University.

Mr. Chas. McDonald, of Gananoque, has been appointed to the Quebec Bridge Commission to fill the vacancy caused by the resignation of Mr. Fitzmaurice, of London, Eng. Mr. McDonald is a practical bridge engineer of excellent experience. For years he was head of the American Bridge Company, one of the largest bridge building firms in the United States. He has been living retired at Gananoque for some time.

Mr. R. E. Chadwick, city bridge engineer of Toronto, is stated to have been offered a lucrative position, the acceptance of which will mean his leaving the city. He is doing excellent work at Toronto, and is very popular at the City Hall. It is

understood that, in any case, he will remain until the completion of the Don bridge, now under construction.

Mayor Hopewell, Controller Davidson and Alderman Caron and Brown, of Ottawa, have been appointed by the city council to act with the sub-committee of the Ottawa Improvement Commission in planning for the future extension and improvement of the city. They will confer with Mr. Vivian, the old country expert, who will be in Ottawa at an early date.

Building Returns for September

Winnipeg building permits for September represent a total of \$266,475, an increase of 46 per cent. over the same month last year.

The total value of building permits issued last month at London, Ont., was \$141,623, compared with \$54,890 for September, 1909.

The Montreal building inspector's record shows that for the nine months ending September 30, permits authorizing the construction of buildings valued at \$11,205,000 have been issued. The figure is practically double that of 1909, during the same months.

Building permits issued at Regina, Sask., during September represented a value of \$209,750, as compared with \$53,300 for the corresponding month of last year. For the nine months of 1909 and 1910 the figures were respectively \$639,834 and \$2,032,448. The city will easily make a record year. The prospects for 1911 could not be brighter.

The September building total for Hamilton, Ont., was \$266,475, an increase of \$84,525, or 46½ per cent. over the corresponding month of last year. A local paper, which is particularly enthusiastic over the city's ambitions, points out the fact that in September, 1900, the permits issued were valued at \$42,800, thus giving last month an increase in ten years of over 500 per cent.

It is anticipated that the aggregate value of the building permits issued during the current year at Victoria, B. C., will reach the two million mark, and thus constitute a new record in the history of the city. For the first nine months of the year the permits issued totalled \$1,837,625, compared with \$1,443,295 for the corresponding period during September totalled \$190,686, compared with \$140,935 last year. For the nine months the total number of permits issued was 583, as compared with 456 a year ago.

The Canadian Department of Public Works, Ottawa, is preparing a special report on the storage of waters on the upper Ottawa river by means of dams at Kippewa and Temiskaming. It will show the general effect of such work in the regulation of the flow of the river, the intention being to

conserve high water for seasons of the year when the river is low. An important feature of the report, however, will emphasize the claim that the works in progress and those to be undertaken will be of greater utility when the Georgian Bay canal is constructed. This consideration enters largely into the plans.

An Economical Bridge Contract

An example of economical erection of light trusses is afforded by the highway bridge at Russell, Mass., which crosses the Westfield River with two 125-foot lattice girder spans, weighing about 70 tons each, and supported at a height of about 25 feet above the water on two masonry abutments and a centre pier. The bridge was planned to carry the roadway over the tracks of the Boston & Albany Railroad on the south side, where there are two plate girder spans. The old bridge across the river was carried away by a freshet, and in order to provide ample clearance from high water, the consulting engineer, dropped the floor about 6 feet below the upper chord of the truss, making a half-through bridge with diagonal cross bracing from the floor beam to the lower chord.

The material was unloaded from cars and lifted some 10 feet to the level of the lower chord by a steel jinnywink derrick and 40-foot, 7-ton steel boom, operated by hoist engine. Light falsework, with two-post bents was set up by hand for part of the span and the unloading derrick then erected enough of the end of the truss to form a platform at the roadway level. On this platform a few planks were thrown across the first panel of stringers and at this level a second steel jinnywink derrick was set up. This derrick, operated by the same engine, was moved forward by hand, setting the falsework bents ahead and the steel work and floor system as it moved along.

The material was loaded on a light push car by the first jinnywink derrick and run out on the falsework at the level of the lower chord, the cross-bracing underneath the floor beams being temporarily omitted to allow ample room for handling the long pieces. As soon as the derrick had completed the erection of the first span, three gangs drove the rivets of the main members with pneumatic hammers, and the bridge was swung off. The falsework was removed and was re-erected for the second span, which was assembled in the same manner. The work was done with a force of about 20 men, who also laid the wood floor and did the painting in about six weeks.

The ex-Prime Minister of England, Right Hon. Arthur James Balfour, is bringing action against the contractors for the construction of the Grain Exchange for injury to his building, the Balfour Block, on Rorie Street, which adjoins the Grain Exchange.

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Belleville, Ont.

The city council will advertise its intention to construct a permanent pavement on Front street from Bridge street to Victoria avenue. Cost, about \$1,500.

Biggar, Sask.

The town will expend \$15,000 on fire protection and waterworks.

Brantford, Ont.

The contractors for Market street bridge have instructed the city that the structure will be ready for paving by November 30th.

Fredericton, N.B.

Notices have been issued by the Roads and Streets Department calling for tenders for furnishing 3,000 tons of trap rock for the coming winter. City Clerk, McCready.

Hamilton, Ont.

Tenders addressed to J. L. McLaren, chairman Board of Control, will be received until October 19th for construction of pipe sewers on portions of six streets. Plans, etc., at office of city engineer. S. H. Kent, city clerk.

The announcement that the citizens will be asked to vote on another good roads by-law this year for \$100,000 is causing a lot of discussion. The general feeling is in favor of it. Conditions of the asphalt-ing on Main street east, King street west, John street south and Bay street south is only a part of the scheme.

Kincardine, Ont.

Mr. A. Malcolm, mayor, and W. Hunter, the committee appointed to report on the system of sewers in Wingham, have presented a report favorable to the adoption of a similar system here.

Niagara-on-the-Lake, Ont.

The waterworks debenture by-law was carried.

Orillia, Ont.

The town council has adopted plan providing for municipally owned boathouses along the entire C.P.R. esplanade from Main street to the park. The boathouses are to front on a lagoon, beyond which will be built an ornamental driveway and boulevard to the park. The plans will be turned over to a commission and the work will be done as the conditions warrant. A money by-law will be submitted to the people at once to provide for the boathouses, which will be of fireproof construction.

Ottawa, Ont.

City Engineer Ker estimates the cost of constructing sidewalks around the old Sandy Hill cemetery at \$3,285. The improvements will not probably be completed until next summer.

Penticton, B.C.

The preliminary report on the domestic water system which has been prepared by Mr. F. H. Latimer, was presented at the

meeting of the municipal council. A by-law providing for the raising of the necessary money to undertake the construction work in connection with the water service will be placed before the people.

Renfrew, Ont.

Mr. H. G. Acres a hydro-electric commission engineer of Ontario, Mr. J. R. Stewart, town engineer, and a few others are at present at the upper lakes of the Bonnechere to look into the matter of building dams for the reservation of water.

Rosthern, Sask.

On the 24th October, a debenture by-law to raise \$2,560 for constructing permanent street crossings will be submitted.

Sherbrooke, Que.

It is understood that tenders have been called for a crusher to be used on waterworks reservoir here.

St. Andrews, N.B.

Tenders have been asked from several contractors by C.P.R. Engineer Lumsden for the excavating and laying of the water pipes from Chamcook lake to this town. A 25 h.p. gasoline engine will be used to force the water up (24,000 gallons per hour). Should the town join with the company, another chamber like the one being installed will be constructed.

St. Catharines, Ont.

The Board of Works recommended a bitulithic pavement for Queenston street, average width 35 feet. Probable cost, \$31,000. Work to be done by city engineer's department. Report was adopted.

The citizens will be asked to vote in January on the advisability of providing a second water main from the city reservoirs to the city to meet the increasing demands for fire and domestic purposes.

Sydney Mines, N.S.

At the last meeting of council authority was given to borrow \$14,000 for water extensions and to purchase a steam roller for street purposes.

Toronto, Ont.

The construction of brick and asphalt pavements has been recommended by City Engineer Rust to cost about \$60,000.

The council passed the recommendation of the Committee on Parks and Exhibitions, for the improvement on University avenue, the estimated cost being \$30,000.

A recommendation was brought before the directors of the Canadian National Exhibition for pavements to be constructed on certain of the roads through the grounds before the next Exhibition.

Vancouver, B.C.

The city engineer has prepared an estimate on the cost of lateral sewers which will drain into the trunk sewer at present under construction in West Mount Pleasant, the total cost of which will be approximately \$21,480.

Victoria, B.C.

The city engineer has reported to the streets committee that to widen and pave

Douglas street from Humboldt street to the junction of Douglas street with Superior street with asphalt and lay side-walks, curbs and gutters, will cost \$87,000; \$40,725 of that being for paving.

Walkerville, Ont.

Pending the presentation of a petition by the Walkerville Land Building Company for the construction of a lateral sewer between Devonshire and Argyle roads, etc., the council directed the town engineer to prepare the necessary plans and specifications and to invite tenders for its construction.

Winnipeg, Man.

Tenders addressed to the chairman, Board of Control, were received until October 14th for supply of wrought iron well casing.

At the next civic elections the rates payers will be asked to vote on a ten-million dollar by-law to provide a permanent water supply. Controller Cockburn is interested.

Tenders are to be called for the following works: Sewer in Clifton street, from Livia to Sargent avenue, estimated cost \$49,654; sewer in Sargent avenue from Clifton to Stratheona street, estimated cost \$6,757; sewer in Centre street from the Assiniboine river to Portage avenue, estimated cost \$19,382; sewer in Ash street from the Assiniboine river to Godfrey avenue, estimated cost \$44,495; sewer in Godfrey avenue from Cambridge street to Renfrew street, estimated cost \$56,905; sewer in McPhillips street from Selkirk avenue north to the city limits, estimated cost \$76,400.

AWARDED.

Glace Bay, N.S.

Contracts for the water extensions were awarded as follows by the town council: For laying 6-inch pipe, to S. Nicholson; for 4-inch pipe, to Neil N. McDonald; for 2-inch pipe, to Thomas McLean and R. D. McIntyre.

High River, Alta.

McKibbin Bros., Calgary, have started on contract to construct 3,000 square yds. of cement sidewalk at 9½ cents per sq. foot. The contract for 800 barrels cement was closed at \$3.20 per barrel f.o.b. here.

Qu'Appelle, Sask.

The Western Pavers Company, of Regina, were awarded a contract for half a mile of cement walks.

St. Catharines, Ont.

Mr. Fallahee has been awarded the contract for the bitulithic pavement on Queenston street, \$31,000.

Swift Current, Sask.

Tenders were received as follows for the supply of electrically driven pumps for the waterworks system here: The Canada Producer & Gas Co., Barrie, Ont., (B.), Pneumatic tanks, \$1,950; (G.), \$21,500, extras, \$3,265. Kilmer, Pullen & Burnham, Toronto, Ont., (F.), \$2,800; no outside work. Smart-Turner Machine Co., Hamil-

ton, Ont., (E), \$5,338, without tanks. Canadian Boving Co., Toronto, Ont., complete, without outside work, oil engine \$44,000, gas engines \$41,000. Canadian Westinghouse Co., Hamilton, Ont., (F), \$3,335, no outside work; (G), \$13,975. E. Leonard & Sons, London, Ont., (E), \$3,700, no outside work; (G), \$19,075, extras \$2,370. Canadian General Electric Co., Toronto, Toronto, Ont., (E), complete, \$6,045; (F), \$38,868, \$8,970; (G), \$24,075. Drummond, McCall & Co., Montreal, Que., (E), \$6,100; (G), \$21,600. Chapman & Walker, Toronto, Ont., (E), \$8,650; (F), \$16,650; (G), \$25,000. Allis-Chalmers-Bullock, Montreal, Que., (E), complete, \$7,200; (F), \$46,100, \$10,550; (G), \$28,470. Accepted tender, Chapman & Walker, incorporating Allis-Chalmers-Bullock, complete, \$45,750.

Vancouver, B.C.

Evans, Coleman & Evans were awarded the contract for the supplying of sewer and drain pipe for the city by the board of works at a meeting recently, with the exception of 24-inch storm sewer pipe, which was awarded to the Dominion Glazed Cement Pipe Company.

Victoria, B.C.

The contract for paving on Fort street, between rates street junction and St. Charles street, has been awarded to the Warswick Paving Company, the engineer to give such grades and levels as will enable the widening scheme to be carried out if the owners desire.

Railroads, Bridges and Wharves

Black Point, N.S.

Tenders are called until Nov. 7th for construction of breakwater here. R. C. Desrochers, secretary, Public Works Department, Ottawa.

Duncan's Cove, B.C.

Tenders are called until November 7th for construction of breakwater here. R. C. Desrochers, secretary, Public Works Department, Ottawa.

Gravenhurst, Ont.

Tenders are being received by the Public Works Department until Nov. 8th for construction of wharf here. R. C. Desrochers, secretary.

Hamilton, Ont.

It is rumored that the men who control the charter of the Southern Ontario Pacific Railway intend building a line from Guelph to this city. It is thought that the C.P.R. is behind the move. Application has been made to Ottawa for permission to build the line.

London, Ont.

A deputation composed of Hon. C. S. Hyman, Hon. A. Beck, T. H. Purdom, Mayor Beattie and others, will wait on Minister of Works to ask for improvements on the harbor at Port Stanley.

Levis, Que.

It is understood that the plans and proposals of the Dominion Dry Dock Company for a \$4,000,000 dry dock of the first class have been referred back to the company, after an examination by the engineer of the Public Works Department, Ottawa, and unless the company makes a very great revision of its demand for a subsidy their application for aid is not likely to be approved. It is understood that an examination of the company's plans does not indicate that the cost should be what the company by its proposal appears to anticipate. The application of Vickers Sons & Maxim for subsidy for a first class \$4,000,000 dry dock in Montreal is likely to be favorably received by the

Government. The plans are still under consideration, but are likely to be dealt with finally within a short time.

Maisonneuve, Que.

The Lachine, Jacques Cartier & Maisonneuve Railway will construct a subway on Iberville street between Mount Royal and Rachel streets.

Quebec, Que.

Plans have been completed by the Strauss Bascul Bridge Company, 134 Monroee street, for a steel and concrete bridge 88 feet long to span the Princess Louise docks.

Renfrew, Ont.

The bridge over the creek on Main St., Renfrew, is being renewed.

Stratford, Ont.

By taking over the charter of the St. Mary's & Western Ontario Railway, the Canadian Pacific Railway Company has at last gained entrance to the city of Stratford and the farming district thereabouts. The line from Stratford to the Grand Bend, on Lake Huron, originally intended to be an electric line, will be rushed to completion by the C.P.R. at once, as a steam road, and will run in a southwesterly direction, passing St. Mary's, where the C.P.R. already has a line within about three miles, and through Exeter and other small places to the lake. Another line is projected from Stratford to run in a northwesterly direction to Linwood, a small junction point on the Toronto-Goderich line of the Canadian Pacific.

Three Fathom Harbor, N.S.

Tenders are called until November 7th for construction of beach protection work here. R. C. Desrochers, secretary, Public Works Department, Ottawa.

Tp. of Elgin, Ont.

On November 15th a by-law will be taken into consideration by the county council to issue \$10,000 bridge debentures. K. W. McKay.

Toronto, Ont.

The Dominion Railway Commission has ordered the G.T.R. to have the Brock avenue subway ready within six months after approval of plans. Plans to be submitted to board by October 26th.

City Engineer Rust estimates the cost of constructing a subway on Ashdale avenue, including land damages, at \$45,000.

Union Bay, B.C.

Tenders addressed to H. E. Beasley, superintendent, will be received until November 1st for clearing of the right-of-way of the Comox extension, E. & N. R.R. between Parksville and here. Specifications at office of the divisional engineer, E. & N. Railway, Victoria.

Winnipeg, Man.

Tenders are being called until November 2nd for construction of pile protection pier by Public Works Department. R. C. Desrochers, secretary.

AWARDED.

Beaufort, N.B.

The contract for Elliott Brook bridge in the Parish of Aberdeen, Carleton Co., has been awarded to Mr. John Lee, Sr., of Beaufort, Carleton Co., \$1,000.

Mattawa, Ont.

Stewart & Hewitson, Port Arthur, Ont., have been awarded the contract for the construction for a steel and concrete bridge over the Ottawa river here. The bridge will be 2,700 feet long, and some piers 50 feet high. The total cost will probably run over \$300,000.

Fort William, Ont.

A.C. Stewart & Company Nanton Building, Winnipeg, Man., have been awarded the contract for construction of bridge over McKellar river for the C. P. R. Frank Lee, division engineer. Estimated expenditure, about \$250,000.

Hull, Que.

Joseph Cousineau has been awarded contract for rebuilding the Gatineau river bridge in Hull. The cost will be about \$5,000.

Minto, N.B.

The Commissioners of the New Brunswick Coal & Railway Company have accepted the tender of Paul Lea & Company, Limited, Moncton, for the erection of a new round house at Minto, \$2,750.

Ottawa, Ont.

The Elmitt Lumber Company of this city has been awarded the contract for the timber for the new Government dock at Three Rivers, Que. It is for about \$60,000. Owing to inability to get native timber of the required lengths, at this season of the year, a shipment has been ordered from Florida. This comprises about one-third of the total amount of timber to be used.

Victoria, B.C.

Eight bids for the construction of the sea wall along Dallas road foreshore were received and were as follows: Louis A. Borde, \$140,756, or if any rock race instead of granite, a reduction of \$11,010 will be made; Parfitt Bros., \$110,984; Hugh MacDonald, \$112,588; Moore & Petick, \$94,837; Pacific Coast Construction Company, \$74,389 (accepted); Westholm Lumber Company, \$87,336; W. E. Wilson, \$78,777; City Engineer, \$89,437. Mr. Borde's bid was not accompanied by the necessary cheque.

Public Buildings, Churches, Schools, etc.

Armstrong, B.C.

A new Roman Catholic church is to be erected here.

Boissevain, Man.

\$5,000 will be expended for new heating system, etc., for town hall.

Brandon, Man.

The plans are here for proposed addition to the post office building to cost about \$30,000. When the plans submitted are decided upon, it is likely the contract for the work will be let immediately.

At the regular meeting of the school board a report was received from the collegiate stating that the rooms there are very congested. The board of education will take preliminary steps to erect a school in the east end of the city, at about \$40,000.

The school board has decided to go ahead with the new \$40,000 school in the east end of the city. A by-law to raise the money by the sale of debentures will be submitted.

Tenders were called until October 15th for brick work only of the new city stables and depot. W. A. Elliott, architect; H. Cater, chairman Sanitary Committee, city council.

Belleville, Ont.

The Board of Education decided to purchase for a school site the Taylor property on Pine street, in the north part of the city, where building sites are being rapidly bought by Grand Trunk Railway employees. The Lingham property

on William street, wanted for a school site, will go to arbitration.

Tenders are called until October 20th for reconstruction of meat market for police station. J. G. Lindsay, city engineer.

Bassano, Alta.

The school board have decided to have a \$15,000 school erected.

Calgary, Alta.

A by-law to give \$150,000 towards a university will be submitted to the ratepayers.

Camrose, Alta.

A Scandinavian College is to be erected this fall.

Chatham, Ont.

Wilson & Son, architects, are preparing drawings for a new ventilation system and a more modern fire service in the County House of Refuge. The system will be installed ready for use before winter commences.

Calgary, Alta.

W. Georgeson, G. Tempest, E. A. Daggs and Mr. McElroy have requested the finance committee for a loan from the city's sinking fund to build a new commercial club to be known as the Alberta Club. The matter was referred to the city solicitor.

Estevan, Sask.

Alderman Coffin proposes to build a \$25,000 hospital, and a by-law will be submitted.

Edmonton, Alta.

H. E. S. Davins, of Pittsburg, Pa., representative of Great American Industrial College, capitalized at \$25,000,000, is here with a view of establishing a college to cost about \$3,000,000. The administration buildings will cost \$1,500,000. The college will occupy 1,500 acres. Construction will not start until the spring.

The Y.M.C.A. will inaugurate a campaign to raise \$36,000 for extension purposes and to wipe off the debt on the building.

The Library Committee (K. W. MacKenzie, chairman; E. Ross Palmer, secretary; Mr. Justice Beck, Ald. Lundy, Dr. Riddell and Mr. Louis Madore), will ask the city council for a reasonable annual grant, and make further move towards erection of Carnegie library.

Fort William, Ont.

The original plans for Carnegie library will have to be changed as according to instructions the building must not be a joint club house and library, but a library exclusively. Hood & Scott, architects. As soon as plans are approved work will be commenced on excavation.

A resolution was adopted instructing the special committee on the police station and court house to proceed with the advertisement for tenders under the plans and specifications prepared by Architect Mason.

Grosswerder, Alta.

A school is to be built. Tenders closed on October 17th with John Oberowsky, trustee.

Grandview, Man.

A school and outbuildings are to be erected for Valley River School District. Thos. J. Brown, secretary-treasurer.

Gretna, Man.

The building of the new school has been delayed, owing to the tenders being \$4,000 more than the \$12,000 allowed.

Harriston, Ont.

Mr. Alex. M. Martin, M.P., of Mount Forest, has a letter from the Department of Public Works, Ottawa, stating that pro-

vision is being made for an armory here. The department expects to be able to call for tenders during the present year for this building.

Holden, Alta.

Rev. Father Husson, of Edmonton, was here regarding the building of a new Roman Catholic church.

Kingsville, Ont.

A by-law will likely be submitted to the ratepayers at the January election to raise the required amount (\$5,000) to receive the benefit of the Carnegie Library fund.

London, Ont.

Tenders addressed to A. E. Nutter, city architect, will be received until October 21st for erection of Alexandra school on King and Colborne streets. Plans, etc., at office of city engineer, Dr. A. J. Wyckoff, chairman, Board of Education.

Lethbridge, Alta.

A \$10,000 Roman Catholic church will be erected.

Leslie, Sask.

A public school is to be erected here next spring, the foundation being taken out this fall.

Melville, Sask.

Tenders were taken to October 13th for erection of a hospital building. John Crow, secretary.

Merritt, B.C.

Messrs. W. E. Duncan, M. L. Grimmett and others are on the committee to make a preliminary report regarding the proposed hospital here.

Montreal, Que.

A clubhouse will be erected for the newsboys of Montreal shortly. The proceeds of the recent exhibition and fair held by the Boys' Sunshine Society, will be devoted to this work.

Negotiations are under way for the selling of the Labor Temple. If this deal goes through, the Union will erect an up-to-date, 9-storey office building.

The Industrial Commission will call for tenders for a suitable site for the Exhibition of 1912. Tenders will be opened November 9th.

Moose Jaw, Sask.

Tenders were called until October 24th for excavation of the Saskatchewan College Building. R. G. Bunyard, architect.

Ottawa, Ont.

The recommendation of the Board of Control regarding the Heenan-Froude incinerator did not pass council. Noted in last issue.

Tenders will be called shortly for the Rivermead Golf Club on Aylmer road. Weeks & Keefer are architects.

Outremont, Que.

Messrs. Hutchison, Wood & Miller, architects, Royal Insurance Building, have prepared plans and specifications, tenders for which have been invited for the erection of a municipal building here.

Portage la Prairie, Man.

The Indian School is to be removed to a new site near town. Rev. Thurlow Fraser is interested.

The Young Women's Christian Temperance Union are planning a campaign to arouse interest in the need of a Y.M.C.A. here.

Port Arthur, Ont.

Tenders were wanted for sub-structure of Swedish Lutheran church, to October 14th, by A. Young, 33 Jean street.

Prince Albert, Sask.

The by-law to spend \$2,070 on site for armory here was defeated; that for improvements to city hall was carried. C. O. Davidson, city clerk.

Renfrew, Ont.

Messrs. Ferguson, Barnet & McLaren were appointed on a committee to look into the matter of the erection of a new main building for exhibition purposes.

St. Louis du Mile End, Que.

Tenders are called until October 24th for post office here by Public Works Department, Ottawa. R. C. Desrochers, secretary.

Swift Current, Sask.

The ratepayers will vote on expending \$25,000 for a hospital building.

Three Rivers, Que.

Chas. Laford is the architect in charge of the repairs to the public building here. Estimated cost, \$30,000.

Toronto, Ont.

Plans for an extension to Canadian National Exhibition Art Gallery have been approved. Estimated cost, \$40,000.

The school board of Runnymede school section have decided to erect a 6-room school, Mr. Jackson, chairman.

A permit was issued for the erection of an addition to the Earls court school, on the west side of Dufferin street, near St. Clair avenue, \$36,000; also two-storey brick school on Pine avenue, \$25,000.

Virden, Man.

On October 20th the ratepayers will vote on \$2,500 5 per cent. 20 instalment school debentures for S. D. of Reston. A. P. Power, secretary-treasurer, Virden, Man.

Vancouver, B.C.

At the annual meeting of the King's Daughters it was decided to build a convalescent home in this city. It will in all probability be built in the Capilano district. Mrs. C. S. Battle, chairman; Miss Lucie Cumming, corresponding secretary.

Dakton & Eveleigh, this city, are reported to have prepared plans for an isolation hospital here.

A permit was issued to Rev. S. Sasaki for Buddhist Temple, Albert street, \$15,000.

Grant & Henderson, this city, are the architects for the new rectory and parish hall to be erected for St. Paul's Church here. Estimated cost, \$13,000; size, 32 x 42 and 60 x 60; 3-storey.

Victoria, B.C.

Sanitary Inspector Lancaster, Dr. G. A. R. Hall and Alderman Raymond were appointed to report on plans for improvements on Isolation hospital.

The provincial government, it is stated, has selected the site for the new drill hall, which has been approved by Lieut.-Col. Currie, of Work Point Barracks, representative of the federal government. Work will not likely be undertaken until next season.

Warren, Man.

M. S. Peacock, secretary-treasurer, school board, Hanlan, writes that the contract for school here will not be let this year.

Wallaceburg, Ont.

Tenders are being called until October 24th for the erection of a Methodist church here. Plans, etc., at office of Messrs. Jacques & Williamson, architects, Windsor.

Weston, Ont.

It is probable that a by-law will be submitted in January next to raise funds

for a four-roomed addition to the public school.

Wainwright, Alta.

The Presbyterian Board of Trustees decided to build a church this fall. Rev. Mr. Russell in charge.

Winnipeg, Man.

A permit was granted to J. A. Schuberger for a new moving picture theatre to be erected on Notre Dame, \$24,000.

At the municipal elections in December the public will vote upon two by-laws for hospital buildings. One is to add to the General Hospital and the other to construct a municipal hospital. The sum of each by-law is \$400,000. A third by-law may be submitted for \$350,000, for buildings for the North Winnipeg hospital.

The Methodists and Presbyterians will erect a city church for the Chinese. C. A. Coleman will have charge. Rev. Dr. Baird is chairman.

The Deaf and Dumb Institute and the Children's Home are to be moved to the Agricultural College grounds.

It is stated that a new drill hall is in prospect for this city and that the Government is planning to abandon the present site of Fort Osborne barracks. Large and substantial buildings for the permanent militia will probably be erected on the property acquired for a rifle range west of the city.

AWARDED.

Chatham, Ont.

John McKay has the contract for plumbing and compression tank system for the Dresden school.

Crossfield, Alta.

Geo. Becker, this place, has been awarded the contract for the erection of the 2-storey and basement brick school here, \$13,000; Mitchell & Olding & McKinnon, Calgary, tendered at \$16,475; R. Hunter, Calgary, at \$15,800.

Elkhorn, Man.

The new public school here is being erected by Brockelbank & Talmey, of Melville.

Fort William, Ont.

The contract for fire hall annex was let to M. H. Braden. Mr. Braden submitted an amended tender under which the specifications were modified and the cost, making the amount of tender \$16,698, instead of \$17,300, which would have been the cost under the original specifications.

Peterboro, Ont.

The tender of \$549 from Alexander & Miller for electrical fixtures for the public library was accepted. The architects will be instructed to complete the plumbing and heating without delay.

Sherbrooke, Que.

The contract for the addition to the Seminary St. Charles has been awarded to Mr. C. Beauchesne. Next spring a new wing will be added to the east end of the building.

Scott, Sask.

Mr. Coy, of Saskatoon, secured the contract to erect the new town hall on a bid of \$8,382.

Residences

Cupar, Sask.

A parsonage is to be erected for the Anglican Church. Rev. H. T. Hitchen, pastor.

Montreal, Que.

Mr. Alphonse Piche, architect, Victoria building, is preparing plans and specifications for the erection of an apartment house on Dorchester street for Mrs. H. Faute.

Ottawa, Ont.

Among the recent building permits were: Gandias Lingham, dwelling, Mackay street, J. B. Davis, builder, \$3,000; David Biggs, dwelling, Powell avenue, \$3,000; Camille Leitreille, dwelling, Hamilton avenue, \$3,500; Hon. Sidney Fisher, residence, Laurier avenue east, C. P. Meredith architect, W. G. Adamson and F. McCullough builders, \$16,000; Nimmo and Soper, dwelling, Carling avenue, \$3,500; Thomas Richards, dwelling, Sunnyside avenue, F. A. Wilson builder, \$4,000; F. A. Wilson, dwelling, Gordon street, \$4,500; J. H. Bowman, dwelling, James street, J. W. Stanley builder, \$4,000; Willis Loucks, dwelling, Widson avenue, \$3,000; John Black, dwelling, Archibald street, N. Hollister, \$4,000.

Prince Albert, Sask.

Garnet Coombs will have a brick residence erected to cost \$5,000.

Toronto, Ont.

Permits were given to J. J. Walsh, two-storey brick apartments, Queen and Wilson streets, \$15,000.

The Union Trust Company have sold residential property on Glen Grove avenue to R. C. Bustard, 1558 Yonge street, who will erect houses costing from \$8,000 to \$10,000 each on the land.

Vancouver, B.C.

Permit was issued to Messrs. Dickie & Dogmore covering the erection of a six-storey apartment house at Smythe and Seymour streets. Estimated cost, \$126,000.

Winnipeg, Man.

Chas. F. Pentland, manager of the Quebec Bank, has purchased a site and will build a residence.

J. Chalmers has purchased a site on Nairn avenue, Elmwood, and will build in the spring.

Recent building permits include: Wm. Lyon, brick dwelling, Argue street, between Delaware and Cumberland avenue, to cost \$2,500; C. R. Reed, three brick dwellings, Picton street, corner Catharine street, for John Young, to cost \$6,000; S. S. Chiswell, house, west side of Lipton, between Livinia and Ellice, \$2,000; Ed. Noe, two houses, north side Jessie, between Hugo and John, \$6,000; E. Russell, two houses, east side Aubrey, between Portage and Buell, \$5,500; F. Moses, house, north side of Stella between Aikins and Salter, \$2,200.

AWARDED.

Edmonton, Alta.

Wilson Herrald, architect, awarded contract for Presbyterian manse to Grant & Company.

Business Buildings and Industrial Plants

Amherst, N.S.

The carriage factory of S. Fillmore, Southampton, 20 miles from here, was destroyed by fire on the 11th inst. Estimated loss \$35,000.

Battleford, Sask.

Plans are being prepared by A. E. Brown for a new Albion Hotel for Mr. Angle, proprietor.

Brantford, Ont.

The proprietor of the Kerby House has decided to make additions to the hotel at an outlay of \$5,000.

Ald. J. W. Shepperson is the present secretary-treasurer of Ham & Nott Company and will be sales manager for the Niagara Bedstead Company, Buffalo, mentioned in last week's issue as establishing a branch here. Industrial Commissioner, Mr. Dowling.

Brandon, Man.

Robert Lane has decided not to erect his business block until the spring, owing to tenders being high. Excavation is completed.

It is stated that the C.P.R. has decided to build here next year a handsome new depot and possibly a hotel and that the plans for the station, at least, are now in their preliminary stages. It is also said that the company has bought or has options on property which will be required in the event of the proposed improvements going ahead.

Brampton, Ont.

The flour mills of H. Bracken & Son at Boston Mills, were destroyed by fire on the 10th inst. Estimated total loss, about \$15,000.

Berlin, Ont.

Messrs. Baetz Bros. & Company will not remove their plant to Preston as at first contemplated. A loan of about \$15,000 has been raised by interested citizens. A new furniture factory will shortly replace the one destroyed by fire some months ago.

Chilliwack, B.C.

F. J. Hart & Company effected the sale of the block bounded by Young, Westminster and Alma streets for \$25,000. It is the intention of the purchasers in the spring to erect a solid concrete block.

Calgary, Alta.

T. J. S. Skinner is about to erect a 7-storey building on the northwest corner of Eighth avenue and Second street east.

Carstairs, Alta.

T. E. Driscoll's hotel and Lusk's hall were destroyed by fire on the 9th inst. Estimated loss, \$20,000.

Edmonton, Alta.

Negotiations have been practically concluded whereby a soap company, incorporated at \$200,000, will be established here.

Fort Frances, Ont.

It is reported that Mackenzie and Mann are negotiating with the Hudson's Bay Company for all the unsold land facing the river between Scott street and the cemetery. It is said that this will be a suitable site for a paper mill.

Goderich, Ont.

A. J. Barclay is the architect in charge of the rebuilding of the factory for the Goderich Organ Company Limited. Estimated cost \$20,000; estimated cost of equipment, \$10,000; size (ground floor), 40 x 48 and 48 x 48; 3-storey. A Saunders, manager.

Hamilton, Ont.

The Acme Motor, Carriage & Machinery Company will locate here. The new concern is a merger of the Baynes Carriage Company of this city and the American Good Roads Machinery Company, of Goderich. The plant here will be greatly enlarged. Proposed directors: S. J. Phillips, Kennet Sq., Pa.; F. W. Woods, of Goderich; M. W. Best and D. P. Perry, Detroit, and W. Southam, H. N. Kittson

and P. D. Crerar, K.C., Hamilton, representing the Baynes Carriage Company.

Kingston, Ont.

J. A. Lamsen, Cleveland, Ohio, is to erect a fine hotel at Edgewood Park among the 1,000 islands in the St. Lawrence river. It will accommodate 500 guests.

London, Ont.

Ottawa capitalists are said to be interested in a project to build a new hotel in connection with the C.P.R. plans for improvements in this city.

Ferguson & McAdam's livery on Dundas street was destroyed by fire. Estimated loss, \$30,000.

Milestone, Sask.

Plans are being secured for a hotel building here. Mayor J. R. McKenzie is the principal stock holder.

Maisonneuve, Que.

The Molson's Bank will erect a branch bank building here shortly. Plans, specifications, etc., are being prepared by the architect, Mr. H. C. Stone, 34 St. Francois Xavier street.

Montreal, Bue.

The King's Hall building, St. Catherine street west, was destroyed by fire on the 12th inst. Estimated loss on building, \$70,000.

The Jacobs Building, St. Catherine St. west, is to be increased to the extent of four storeys in the spring. J. A. Jacobs, owner.

Nelson, B.C.

The city council granted free site and exemption from taxation to W. H. Kreysscher as an encouragement towards building a shingle mill and box factory here.

Tenders will be received at the office of the architect, Alexander Carrie, for the erection of a two storey brick building in Fairview for William Hancock.

New Westminster, B.C.

Excavation has commenced for the new Bank of Commerce building on Columbia street at a cost of \$100,000. The structure, which is to be three storeys in height, is to be completed by October 1st, 1911.

North Bay, Ont.

The council received a communication from J. Farrell, chairman of the Industrial Committee of the Board of Trade, asking the council to take action in regard to the proposition of D. A. Leach, of Sunbridge, who offers to establish veneer plant, basket factory, sawmill, stave and hoop mill. Estimated cost, about \$25,000.

Oakville, Ont.

The Merchants Bank building will shortly be torn down and a modern bank building will be erected.

Ottawa, Ont.

Publicity Commissioner, H. W. Baker announces that three industries are about to locate in Ottawa. There will be an automobile factory, a structural steel works, and a factory for the manufacture of fibre boards out of sawmill waste.

The Transcontinental Railway Commission, Ottawa, is calling for tenders to be received up to November 8th, for the construction of freight sheds and storehouses at Lake Superior Junction, Redditt, Man., and Springfield, Man. P. E. Ryan, secretary.

The Ottawa Car Company secured permit for factory, Amert street, \$10,000.

Parry Sound, Ont.

The Canadian Northern will establish a repair plant and shops at Parry Sound,

and proceed next year with erection of an elevator with a capacity of at least 500,000 bushels.

Prince Albert, Sask.

Henderson & Meighen will erect a warehouse for D. W. Adam.

Portage la Prairie, Man.

H. E. Finch, manager Rogers Fruit Company, Grand Forks, N.D., says his firm will build here.

C. H. Mounsey, architect, states that the Hart-Parr Company will not build until next year. Plans are completed.

Port Arthur, Ont.

The Ironclad Enamel Company, of New York, will have a large plant erected here.

Rivers, Man.

Philip Cook, of Portage la Prairie, has decided to have a hotel built here.

Red Deer, Alta.

The Bank of Commerce are letting sub-contracts for new building. W. Hewson & Son secured excavation.

Regina, Sask.

The Western Trust Company has plans for the erection of an office building.

J. M. Young reports that a linseed oil mill may be erected shortly in this city.

Brown & Vallance, Montreal, are preparing plans for John Lang's warehouse and office building.

Saskatoon, Sask.

The Saskatoon Investment & Trust Company will have a large hotel erected here to cost over \$100,000. Brown & Vallance, architects, Montreal, have plans in hand.

Shawinigan Falls, Que.

It is thought that the decision of the management of the Shawinigan Cotton Company will favor the construction of another big mill in the vicinity of the old. J. N. Greenshields, K.C., president.

St. Thomas, Ont.

A by-law will be submitted to the ratepayers on November 7th to authorize the loan of \$30,000 without interest, etc., to the Monarch Knitting Company. In return for which the company promise to erect a factory, not less than 50 x 190 ft., and instal \$30,000 worth of machinery.

St. John's, Que.

The by-law regarding the establishment of the Cluett-Peabody Shirt Company, of Troy, N.Y., was approved at a meeting of the ratepayers.

Toronto, Ont.

The Toronto Electric Light Company has received a permit to erect a five-storey brick storehouse on Esplanade street, between Scott and Yonge streets, \$140,000.

Vancouver, B.C.

Early in the new year the Canadian Financiers, Limited, will award the contract for the construction of a modern fireproof structural steel office building, seven or eight storeys high, on its two vacant lots on the south side of Pender street, between Homer and Richards street. Mr. P. Donnelly, president and general manager.

The Liberals of British Columbia intend to erect in Vancouver a party headquarters for the province, in the shape of a skyscraper. Their intention is to combine a business proposition with a Liberal monument. It is stated the site is selected. J. W. Weart is organizer.

Plans for a business block, corner of Homer and Pender and 12 storeys high, which will cost \$500,000, were presented to Building Inspector Jarrett by Donnellan & Donnellan.

Wadena, Sask.

The British North American Elevator Company will build an elevator at Wadena, Sask.

Winnipeg, Man.

J. J. O'Flaherty, of Quebec, will start a boot and shoe factory in this city, to be located on Maple street, next fire hall.

The Bawlf Company are having an elevator built at Stornaway, Man.

Thomas Donley, late proprietor of the Grand Central Hotel, St. Thomas, Ont., has purchased the Empire Hotel here. The hotel will be remodelled and 50 bedrooms added. Mr. Donley will take the Empire over in November.

AWARDED.

Brandon, Man.

The contract was let for the addition of one storey to the Royal George hotel, to Alex McDonald.

The contract let for the proposed new structure for the Empire Brewing Company has been let to C. W. Hall.

Cornwall, Ont.

Mr. Henry Barnhart has been awarded the contract for the excavation of the ground for the proposed new building to be erected at the Ives Modern Bedstead Factory.

Calgary, Alta.

William Garson, of Winnipeg, has the contract to build a hotel here at a cost of \$140,000. Burroughs & Richards, of Calgary, are the architects.

Guelph, Ont.

The tenders for the heating plant for Morlock factory were recommended as follows: Cowan & Walker, for the carpentry work and painting, \$347; Jos. Shaw, for the masonry, \$672; Stevenson & Malcolm, heating, \$2,250.

London, Ont.

Hamilton & Stott, of St. Thomas, have the contract for the installation for the Helena Costume Company of a central heating plant. The system to be installed is the Johns-Manville Tile Conduit System, the same as that installed in the city heating plant here. Contract price is \$6,000.

Ottawa, Ont.

McKinley & Northwood, of Ottawa, have been awarded the contract for plumbing, heating and ventilation of the Hope building. W. E. Noffke, architect.

Otis-Fensom Company has been awarded the contract for the elevator of the Rosenthal building. Weeks & Keefer, architects.

Saskatoon, Sask.

The Leonard Construction Company, of Chicago, have started on erection of the John Deere Company's building, to cost \$100,000. The Ontario Building Company, Saskatoon, will supply quarter million brick, and the Saskatoon Hardware Company secured the heating and plumbing contract.

Toronto, Ont.

The Norcross Bros. Co. have a permit for erection of brick marble work mill, Atlantic and Pacific, \$7,500.

Vancouver, B.C.

McDonald & Wilson were the successful tenderers for erection of branch building for the Bank of Ottawa here. The building will be 8 storeys and basement. W. Marbury Somervell, this city, is architect.

(Continued on page 30)

Tenders and For Sale Department

Tenders Wanted

Sealed tenders will be received by the undersigned up to 5 o'clock p.m. TUESDAY, NOVEMBER 1ST, 1910, for the construction of about 6,500 yards of Vitrified Brick Pavement with Cement Curb and Gutter in the Town of Petrolia, Ont.

Plans and specifications can be seen at the office of C. A. Jones, Esq., Town Engineer, Petrolia, Ont.

Marked cheque for \$500.00, payable to the Treasurer of the Town of Petrolia, must accompany each tender.

The lowest or any tender not necessarily accepted.

J. McHATTIE,
Town Clerk.

Petrolia, October 10th, 1910. 42

The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Street Railway Material," until the SEVENTH DAY OF NOVEMBER, at 12 o'clock noon, for supplying to the City of Calgary Rails, Cars, Equipment and Overhead Material for extensions to Municipal Street Railway.

Full particulars and specifications may be had on application to the Commissioners, City of Calgary; marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

Specifications are also on file at the office of the Contract Record, 504 Confederation Life Building, Toronto.

The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910. 43

The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Erection of Bridges," until the SEVENTH DAY OF NOVEMBER NEXT, at 12 o'clock noon, for the erection of steel bridges, one across the Elbow River at Twelfth Ave., and the other across the Elbow River at Second Street East.

Full particulars and specifications may be obtained from the Commissioners, City of Calgary, on application.

A marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910. 43

Debentures for Sale

Offers will be received by the undersigned up to the FIRST DAY OF NOVEMBER NEXT, for the purchase of the following debentures, viz.:

(1) \$4,250 payable in 30 equal annual instalments with interest at 5 per cent.

(2) \$12,900 payable in 30 equal annual instalments with interest at 5 per cent.

(3) \$13,250 (Local Improvements) payable in 30 equal annual instalments with interest at 5 per cent.

H. HARTMAN,
Clerk.

New Liskeard, Ont., Oct. 12, 1910. 43

Notice to Contractors

Tenders are being called on a Methodist Church for Wallaceburg, Ont., according to plans and specifications prepared by Jacques & Williamson, architects, Windsor, Ont.

Tenders will be accepted on the complete or separate portions of work up till 12 o'clock noon, OCTOBER 24TH, 1910.

Plans and specifications can be received from the architects. 42

Debentures for Sale

Sealed tenders addressed to the undersigned, marked "Tenders for Debentures," will be received up to 8 o'clock p.m. NOVEMBER the FIRST, 1910, for \$30,000 School Debentures for the Town of Dunnville, Ont., interest at the rate of four and one-half per cent. per annum, payable at the Canadian Bank of Commerce, Dunnville, in annual instalments of both principal and interest. No tender necessarily accepted.

J. W. HOLMES,
Town Clerk.

Dunnville, Ont., Oct. 13, 1910. 43

To Contractors

Tenders addressed to the undersigned, and endorsed "Tenders for Ventilation, Parliament Buildings," will be received at this Department until noon on TUESDAY, OCTOBER 25TH, for the ventilation of the Parliament Buildings. Plans and specifications can be seen at this Department.

An accepted bank cheque payable to the order of the Hon. J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tender and the bona fide signature and addresses of two Sureties, or the Bond of a Guarantee Company, approved by this Department, must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance.

The Department will not be bound to accept the lowest or any tender.

By order,
H. P. McNAUGHTEN,
Secretary Public Works Department.

Department of Public Works, Ontario,
Toronto, October 14th, 1910.

Newspapers publishing this advertisement without authority will not be paid for it. 42

Price Bros. & Company, lumber, etc., Quebec, Que., have changed style to Price Brothers, Limited; capital increased to \$5,000,000.

Hill Manufacturing Company, planing mill, etc., Saskatoon, Sask., are stated to be selling out to the Saskatoon Lumber Company.

H. T. Milne, sawmill proprietor Brown's Corners, Ont., are stated to be giving up business.

The B. C. Gazette gives notice of the following incorporations: Standard Lumber Company, Limited; Irwin, Carver & Company, Limited, incorporated to carry on the business of contractors, etc., capital, \$25,000; Columbia Bitulithic, Limited, capital \$150,000.

Power Plants, Electricity and Telephones

(Continued from page 27)

Calgary, Alta.

City Engineer Child has returned from a trip of inspection to the power site on the Eubow river, where the city has made application for the right to develop power. His report is favorable to its development for power.

Fort William, Ont.

The surveys for the Rainy River Radial Railway have been made and some plans completed. It is understood that construction may start in the spring.

Halifax, N.S.

The East Pubnico Amusement Company, recently granted a charter, is planning to construct and operate an electric railway from Halifax to the amusement park, at East Pubnico, four miles in length, for which surveys have been made and rights of way secured. The company, it is said, will erect a power house on Grafton street and a substation on Albemarle street. It is understood that work will begin at once on construction of the road. Daniel Hawksmarrh is president and G. C. McClure chief engineer, both of Halifax.

Melville, Sask.

E. J. Winger, electrical engineer, of Montreal, wants to build electric light and steam heating plant here.

North Bay, Ont.

The Cobalt Hydraulic Power Company have been granted permission by the Crown Lands Department to place dams at each outlet of the Temagami lake to raise the water for storage purposes to a height of 18 inches above low water mark, for the purpose of ensuring a permanent flow of water for the power plant supplying Cobalt. Hon. Frank Cochrane has informed the objectors to the proposition that the dams will not interfere with the interests of Sturgeon Falls.

Niagara Falls, Ont.

Mr. F. J. Roberts, superintendent of the Symmes Construction Company, this city, will shortly undertake the building of a power plant in the Porcupine district. Mr. Roberts states the plant will generate from 6,000 to 8,000 horse power, and will be at Sandy Falls, on the Migozoni river.

Nanton, Alta.

On November 15th tenders will be received for \$7,500 5 per cent. 20 year electric light and fire protection debentures. W. Robertson, secretary-treasurer.

New Westminster, B.C.

The construction of an electric inter-urban railway between New Westminster and Ladner, B.C., is reported to be under consideration by the Boards of Trade of this city and of Ladner.

Ottawa, Ont.

An extension of the Ottawa Electric Railway will be made into the Bayswater district if the city will put the roads over which the tracks would have to be laid into good condition and remove a sidewalk. The company agreed to build extensions through Ottawa South as soon as a high level bridge is constructed over the Rideau Canal at Bank street. Thos.

Ahearn, president, Ottawa Electric R.R.

The Minister of Railways has approved the application of the Toronto & Eastern Railway Company for approval of its route map from Oshawa to Cobourg and also to Lindsay and Port Perry.

Peterborough, Ont.

Mr. Monds, of the firm of Clarke & Monds, Limited, Toronto, contractors, has arrived in the city to take charge of the general construction work of the new power development house near Auburn. The work consists of a new canal on the west bank of the river, and a new power house just above the railroad bridge on the Lakeneld branch.

St. Vital, Man.

The Rural Railway Company (Jos. Bernier, Secretary, Manitoba), is stated to have applied to the municipal council for a franchise to build a five mile electric railway from either Winnipeg or St. Boniface to St. Vital. Chas. E. Lewis, Minneapolis, Minn., president.

Toronto, Ont.

See "Business Buildings."

The Hydro-Electric Power Commission has decided upon further development and has applied to the Electric Power Company interests which control the power production of the Trent Valley for power to be supplied in Cobourg, Whitby and other towns in the Midland district.

Victoria, B.C.

Additional street lights as recommended by the electric light commissioners have been approved by the city council.

A. T. Goward, local manager of the B. C. Electric Railway Company, announces that a location line of the proposed Saanich extension will be run at once.

Winnipeg, Man.

Tenders addressed to M. Peterson, secretary, Board of Control, will be received until October 20th for construction of concrete foundation on the site of substation No. 1 on King street. Details, etc., at office of power engineers, Smith, Kerry & Chace.

The Provincial Government may be approached as to the advisability of undertaking the electric power question and evolving a scheme similar to that of the Hydro-Electric Commission of Ontario.

AWARDED.

Tillsonburg, Ont.

Tenders for erection of hydro-electric power house were received from Tillson Company, for \$1,200 (accepted); W. Ferguson and Thos. Fern, \$1,325.

Winnipeg, Man.

The tenders for excavations for the power substation on King street have been let to George W. Vincent at \$1,584, work to be commenced at once.

Miscellaneous

Brandon, Man.

Recent building permits include: A. Harrison frame residence on 11th street, \$2,200; M. H. Cook, frame residence on 12th street, \$2,000; H. G. Fletcher, frame residence on 13th street, \$2,200; J. Van Frieber, addition to hotel on 6th street, \$3,000.

Hamilton, Ont.

The following building permits have been issued: W. H. Northcott, brick dwelling, Mount Royal avenue, near Orchard Hill, \$2,500; M. Levy, six veneered dwellings, Sherman avenue, near Gilkinson

street, \$12,000; A. J. Fadyen, three frame dwellings, Beechwood avenue, east of Sherman avenue, \$2,600; F. H. Hall, cement block drug store building, and doctor's office, King and Arthur avenue, for Dr. A. Davis, \$2,500; William Sparks, brick dwellings, Fairleigh avenue, between Delaware and Cumberland avenues, \$2,500; Robt. Chochey, brick store and apartment building, Barton street, corner James street, for M. Cummings, \$8,000.

Montreal, Que.

O. Marin, 149 Ontario street east, three houses containing nine dwellings on Cuvillier street, \$7,500; O. Briere, 686 Le-tourneau street, house containing nine dwellings on Esplanade avenue, \$3,000; A. Lafleur, 233 Papineau avenue house containing four dwellings on Christopher Colomb street, \$3,000; L. Sauve, 109 La Salle avenue, two houses containing four dwellings on Leber street, \$6,000; H. Dufresne, 368 Clark street, two houses containing six dwellings on St. Dominique street, \$9,000; M. Tessier, Cedars, two houses containing six dwellings on Parc G. E. Cartier, \$6,000; W. Pitre, 211 Bourbonniere street, three houses containing nine dwellings on Stadacona street, \$6,600; S. Contin, 1170 Dufferin street, two houses containing four dwellings on Cham-bord street, \$3,000; Perreault & Audy Co., Ltd., 992 St. Urbain street, two two-storey houses on Roy street, \$5,000; Miss Mac-Phearson, Esplanade avenue, a two-storey house on Hutchison St., \$4,900; C. E. Lamoureux, 171 Marquette St., house containing six dwellings on Parthenais St., \$5,000; G. Gregoire, 1011 Cadieux street, house containing three dwellings in Cadieux street, \$3,000; Mayrand & Mayrand, 44 St. Vincent street, house containing four dwellings on Duquette street, \$3,500; Melle. Y. Clement, 176 Laval avenue, house containing store and dwelling on Roy street, \$3,000; D. Biopel, 527 Rachel street, two house containing six dwellings on Colonial avenue, \$7,000; Los. Deslauriers, 2nd avenue, Emard Ward, two houses containing six dwellings on 2nd avenue, \$6,000; Marie E. Belanger, 1 Boulevard St. Joseph, a two-storey house on St. Joseph Boulevard, \$2,500; L. Gill, 646 Casgrain street, house containing three dwellings on Casgrain street, \$2,500; Jos. Gareau, 531 Fullum street, house containing six dwellings on Parthenais street, \$4,000; Wong You Ark, 50 Lagachetiere street west, alterations to property to cost \$6,000; H. Deguise, 2029 Ontario street east, house containing four dwellings at 408 St. Germain street, \$3,000; A. Carriere, 131 Cuvillier street, house containing four dwellings on Cuvillier street, \$3,000; Montreal & Southern Counties Railway, Canadian Express Building, a depot McGill and Youville streets, \$3,000.

Toronto, Ont.

Recent building permits include: Dr. Clarkson, three two-storey and attic brick dwellings, near Concesvalles, on north side Constance, \$7,600; W. N. McEachren & Son, one pair semi-detached two-storey brick dwellings, at 46-48 Wineva, \$4,000; John Beers, one pair semi-detached two-storey brick dwellings, near Defoe, on east side Walnut, \$4,000; W. W. Hiltz, five detached two-storey brick dwellings, on northeast corner Carlaw and Dingwall, \$10,000; Reinhardt Salvador Brewery Co., three attached two and one-half storey brick dwellings, near Mark street, on east side River, \$12,000; Mrs. Elizabeth Dickey, two-storey and attic brick dwelling, near Geoffrey, on west side Sunnyside, \$4,500; F. Waite, three attached two-storey brick dwellings, near Sheridan, on south side Moutray, \$5,600; Wm. Priest, two-storey

brick store and dwelling, southeast corner Royce and Lymington, \$4,000; F. N. Mac-Queen, one pair semi-detached two and one-half storey brick dwellings, on Manning avenue and Palmerston Gardens, \$4,600; N. J. Craig, three attached two-storey brick dwellings, near C. P. R., on west side Albany, \$5,600; Lurie & Alexander, one pair semi-detached two-storey brick dwellings, near Dundas, on west side Norfolk, \$4,000; F. G. McBrien, one pair semi-detached two-storey brick dwellings, near Kingsley, on Loughton avenue, \$4,000; J. Lavine one pair semi-detached two-storey and attic brick dwellings, on 353-355 Bathurst street, \$6,000; J. W. Walker, four attached three-storey brick stores and dwellings, northwest corner Bloor and Concord, \$12,000; Geo. Sparrow, four pairs semi-detached two-storey brick dwellings, near Queen street, on Empress crescent, \$16,000; Sharp & Urquhart, one pair semi-detached two-storey brick dwellings, on 47-49 Perth, \$5,600; Miss Birch, two-storey and attic brick dwelling, on Wychwood Park, \$6,000; E. J. Cannon & Sons, one pair semi-detached two-storey brick dwellings, on 360-2 Margueretta, \$4,400; John Waller, one pair semi-detached two-storey and attic brick dwellings, near Conduit, on east side Sinclair, \$4,600; Moore Bros., four detached two-storey brick dwellings, near Vaughan road, on Ellsworth avenue, \$8,000; F. Campbell & Co., one pair semi-detached two-storey brick dwellings, on 1055 Shaw, \$4,000; Johnston & Zinke, two detached two and one-half storey brick dwellings, near Medland, on south side Humbert, \$6,000; N. J. Craig, two pairs semi-detached two-storey brick dwellings, near Dupont, on west side Albany, \$8,000; G. H. Gooderham, two-storey brick garage, on 204 St. George street, \$9,000; Ontario Wind, Engine & Pump Co., two-storey boiler and paint room, southwest corner Liberty and Atlanta, \$6,000.

Winnipeg, Man.

Tenders addressed to the Chairman. Board of Control, will be received until October 21st for supply of 600 feet of 2½ inch double jacketed cotton rubber-lined hose in 50 foot lengths. Specifications at office of city engineer. M. Peterson secretary.

AWARDED.

London, Ont.

Tenders for supply of water meters were received from the following: Hersey Company, the Trident Company, the Thompson Meter Company, the National Meter Company, and the Neptune Company, all American firms. The meters were all quoted the same, from \$8.40 to \$50 each. One hundred ½-inch meters, 50 ¾-inch, 25 1-inch and 12 2-inch meters were required. The order was divided between the National Company and the Trident.

Toronto, Ont.

President George H. Gooderham has let the contract for the new fountain he is presenting to the Canadian National Exhibition to a London, Eng., firm. The fountain is to be made of Carrera marble, and will be a replica of the famous fountain designed by Michael Angelo, now in front of the Church of St. Peter's, at Rome. The contract calls for the work to be completed by July 1 next year. The cost will be in the neighborhood of \$8,000.

Vancouver, B.C.

At a sum approximating \$80,000, the contract for nearly seven miles of dyke that will reclaim a large portion of Dowsney and the Matzie slough, has been awarded to Mr. Geo. H. Webster, engineer and contractor, of this city. Work is to be completed by 1st March, 1911.

Whitewash for Concrete Surfaces

Common whitewash has been used on concrete surfaces, particularly of residences and small buildings, in order to give a white, rather than the gray, cement tone. It is frequently lacking in durability, however, and the "Cement Age" therefore suggests that better results where greater adhesion is desired may be obtained with the whitewash used by the Government on its lighthouses. The following formulas for whitewash and cement wash have been furnished to the above journal by the Department of Commerce and Labor. The formula for whitewash, the Department states, has been found by experience to answer on wood, brick and stone nearly as well as oil paint, and is much cheaper.

Whitewash.—Slake half a bushel of unslaked lime with boiling water, keeping it covered during the process. Strain it and add a peck of salt, dissolved in warm water; three pounds of ground rice put in boiling water, and boiled to a thin paste; half a pound of powdered Spanish whiting, and a pound of clear glue, dissolved in warm water; mix these well together and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible with painters' or whitewash brushes.

Cement wash for the outside of lighthouse towers.—Take of fresh cement 3 parts, clear sand 1 part, and mix them thoroughly with fresh water. This will give a gray or granite color, dark or light, according to the color of the cement. If a brick color is desired, add enough Venetian red to mixture to produce that color. The cement, sand and coloring matter must be mixed together. If white is desired the walls, when new, should receive two coats of cement wash and then whitewash. After the work has received the first coat a single coat every three or four years will be sufficient. It is best to thoroughly dampen the wall with clean, fresh water, and follow immediately after with the cement wash. This course will prevent the bricks from absorbing the water from the wash too quickly and will give time for the cement to set. Care must be taken to keep all the ingredients of the cement wash well stirred during the application of it. The mixture must be made as thick as it will admit of to be conveniently put on with a whitewash brush.

Paint and Waterproofing for Concrete

Some analyses have been made on a series of compounds widely advertised for use in waterproofing, strengthening, or decorating concrete. Among the materials contained were stearic acid compounds, gums, waxes, soaps, mineral chlorides, inert pigments, and asphalt derivatives. Much interesting information is given regarding the composition of such compounds, although the names of the particular compounds are not given.

The possibility of ultimate deleterious effects on concrete from the use of these internal waterproofing materials is a subject for joint study by engineers and paint chemists. In addition to proving the advantages of such materials as water excludes, it should be determined whether they may corrode the steel used in reinforcing concrete, and whether they may affect the set and tensile strength of the cement itself.

It is particularly the province of the paint chemist to study the subject of paint coatings for concrete. Oil coatings have been found to be badly affected by the free lime present, which causes saponification and subsequent solution of the saponified coating. The porosity of cement or concrete surfaces causes an absorption or suction effect that renders it necessary to apply to a given area three or four times as much paint as would cover an equivalent area of wood. Two very important lines of investigation are therefore suggested, the neutralization of the free lime in the cement of the pores

of the concrete in order to prevent the suction of any paint that may be applied later.

One suggestion that promises to be of great importance in both of these lines has been made by Charles Macnichol, a master painter, of Washington, D. C. Macnichol suggests that a solution of zinc sulphate and water mixed in equal parts by weight (8 pounds zinc sulphate to 1 gallon of water), be used as a priming coat. When applied to concrete surfaces a reaction between the zinc sulphate and the free lime takes place, in so far as the material penetrates the concrete. The products of this reaction are calcium sulphate and zinc hydroxide. There is thus precipitated between the pores of the concrete two practically insoluble pigments, both natural, and these tend to fill the voids and pores and thus to lessen the suction properties of the concrete, besides having neutralized the free lime in the cement. After the application of this priming coat, oil coatings may probably be applied with good results, although whether an excess of zinc sulphate in this treatment may do any harm has not yet been determined. Other treatments have been suggested, but most of them have been found defective or else too expensive.

An annual increase of from \$35,000 to \$40,000 in the wages of laborers in all branches of the Works Department is predicted by City Engineer Rust, of Toronto, in a letter to the controllers, recommending that the men in the waterworks branch be raised from \$2 to \$2.25 per day. He intimates that if this is done a general increase in all other branches should naturally follow.

For the first nine months of the year the aggregate value of buildings erected at Victoria, B. C., was \$1,837,625, compared with \$1,443,295 for the corresponding period last year. The total for the whole twelve months last year was \$1,673,425, which means that the present year establishes a new record in building figures. The total value of buildings for which permits were issued during September was \$199,686, compared with \$140,935 for the same month a year ago.

Construction has commenced at Woodstock, Ont., on the new plant of the Canadian Linderman Company. The company have a capital of \$160,000. They will manufacture the Linderman Automatic Dovetail Glue Jointer. This machine is one of the most interesting inventions that has ever been made in connection with the woodworking industry. An instructive booklet may be obtained on application to the Linderman Machine Company, of Muskegon, Mich.

A firm of English contractors recently made a proposition to rebuild Messina, Italy, according to plans which had been approved by the government, to clear the streets and to negotiate a loan of \$120,000,000 to the municipality at 3½ per cent. interest. The reconstruction of the city, it was estimated, would take five years' time. The proposal was later on referred to the municipal authorities, who rejected it. A representative of the English firm was summoned to Messina, and had an interview with two influential citizens, who informed him that if the firm was willing to pay them, the citizens, they would have the proposal accepted. The agent asked them what sum they wanted. One said he was willing to accept \$20,000, but the other insisted upon a 2 per cent. of the value of the contract. The agent returned to Rome, and asked the Minister of Public Works whether it was the custom in Sicily to bribe the officials. The Minister was highly indignant, and the case will be brought up in Parliament. Meanwhile, however, the two citizens are suing the agent of the English firm for slander. The ruins still remain as they were on the day of the great earthquake.

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Is Day Labor Increasing in Popularity?

For some little time a discussion has been carried on in these columns relative to the city engineer's estimate. There have been a number of good points made by writers on both sides of the question. The contractors claim that if the city engineer is to bid against them he should be compelled to figure under the same restrictions as they. Further, it has been said that work carried out by day labor is unsatisfactory on account of less stringent supervision and the opportunities favoring the engineer or his foreman. It is also claimed that the patronage evil is developed under this system.

On the other hand a well known municipal engineer of wide experience and an unsullied reputation in contracting circles, writing in our last issue, contends that all these views are biased and that scamped work or the use of inferior material by the city are remote possibilities. The impression is made that the day labor system is *increasing in popularity*. "There is no doubt," says the writer, "that the engineer, when properly equipped with plant, can successfully compete with contractors, and make money for the municipality."

For our own part, we do not doubt the integrity of the city engineer or his good intentions by the city, but the increase in popularity of day labor is news to us and we certainly think that in ninety-nine cases out of a hundred the efficient and economical carrying out of a project is better in the hands of an experienced contractor. The day labor system is generally far more expensive, owing to the fact that nobody in particular is concerned with seeing that the work is carried out upon the most strictly economical lines; and as to supervision, it cannot be as strict under the day labor as under the

contract system, for it is opposed to the weakness of human nature to expect the same care to be taken of the city's funds as of one's own.

Then there is another aspect of the case which favors the contractor. The latter has a reputation to make and it is in his interests to do his best by the work, so that should a larger contract be among the possibilities it might be said that he had carried out his previous work satisfactorily and economically. Reputation is a part of the contractor's stock-in-trade. One not infrequently hears of a contractor, who has carried out satisfactorily a large work for a municipal body, being given another contract even though his tender be slightly in excess of his competitors.

Again, the men employed by a contractor are generally trustworthy and competent. Frequently they remain with the one employer for a long period and become conversant with all the details of his work. Municipal authorities are not situated so favorably. They are not so closely in touch with the men as the contractor and they have to take greater chances on incompetence.

These are only a few phases of a subject which is somewhat familiar, but its vital importance to contractors is not lessened by its familiarity. If there are any fresh aspects from which the case may be viewed or any further arguments or suggestions that have not yet been propounded it will be instructive to discuss them. A number of interesting letters that we have already received in this connection are held over for our next issue.

Arrangements for Next Season's Work

The folly of postponing until the last minute the arrangements for municipal work contemplated for the season is admitted, and yet, year after year, the same mistake is made in many sections of the country. It is a frequent thing for a couple of months of good working weather to be wasted through the dilatory procedure of the municipal authorities. This sort of thing is directly opposed to the best interests of the town or city and renders impossible in most cases for the contractor to do ample justice to the work. All preliminaries should be settled in the fall so that construction can start at the first opportunity. It is well to make good headway early in the season, not only in the interests of construction, but also for the reputation of all concerned. The City of Montreal is setting a good example in this connection. The authorities there are determined not to have a repetition of what occurred this season. The contracts for permanent works to be undertaken in 1910 were not passed by the Montreal city council until May 19. A spell of rainy days following this date it was impossible to do much until the middle of June. In the case of the present season, this was a clear waste of three months' good working weather. Last week the Montreal Board of Control adopted the following resolution, which should commend itself strongly to Canadian municipalities generally:

"Resolved, that the secretary be authorized to write at once to all the aldermen, asking them to submit in writing before November 15, a summary of all the improvements and permanent works they think are necessary in the public interest, and particularly in the interest of their respective wards, so that the board shall be in a position to prepare its programme for next year, it being the intention of the board to prepare all formalities necessary and submit to the council for its approbation, the contracts for permanent works in the months of December and January, so as to be in a position to begin these works at once upon the opening of the season."

The Engineer as Sole Arbitrator

Edmonton, Alta., Oct. 12, 1910.

Editor, "Contract Record":

Referring to your editorial on the above subject, published on page 35 of your issue of Sept. 28th, I agree that a specification should be definite and exact. It should define and specify as exactly as possible the quality of the work that will be required. It should, as far as it is possible to do so, eliminate all features of uncertainty.

It is doubtful whether any person not occupying a neutral or judicial position should be empowered to make a final decision from which there is no appeal. The right of appeal is one of the essential features of British justice and this clause in the engineer's specifications is now very frequently replaced by one such that in case the contractor is dissatisfied with the engineer's decision, he may appeal, in which case the engineer has the right to appoint one arbitrator, and the contractor one, these two appointing a third, the decision of such body to be binding on both parties.

Although I believe in a fair and reasonable specification, yet I think that it should place sufficient power in the hands of the engineer to obtain a good job or at least such class of work as the plan and specifications obviously call for. More cannot reasonably be accepted and less should not be accepted. I am strongly of the opinion that the gambling feature should be eliminated, as far as possible, from a contract, as where this factor is present the contractor may receive more for his work than he should, or he may receive less than he should. In either case it is wrong. For example there may be work where the character and quantity is uncertain and it is wrong to ask for a lump sum bid on the work. It should be a unit price bid, the work being so classified that the contractor may tender so as to obtain a fair and reasonable price for the work done. This is fair to both parties. It has been said that the best bargain is one in which both parties are satisfied. In like manner the contract is best where it is fair to both parties.

Yours truly,

A. J. Latonnell,
City Engineer.

American Plans for Canadian Work

Commenting upon the above subject the American Architect says:

Whether there is any connection between the reports in the Canadian newspapers that a heavy import duty is to be placed on the services of American architects (not merely on their drawings, as at present), and the reported seizing, by the customs authorities of Montreal, of the drawings of a firm of American architects having a large field of operations in Canada cannot, of course, be surmised, but the fact remains of a free intercourse between the Dominion and the United States, its application, as far as the architectural profession is concerned, appears to work out too much to our advantage to meet professional approval in the Dominion. While Canadian architects may practice without restraint in all States except where a license is required of all architects, they do not avail themselves, to any extent, of the privilege, while the Americans have recently had a very fair share of the important Canadian work other than that of the Government, where their chances are not equal to those of English and of local practitioners. The situation is interesting and its outcome will be awaited with interest by the profession at large and with special concern by those whose interests are directly involved. It is, of course,

surprising that the Canadian architectural bodies should invoke the special protection of the Government instead of being willing to remain on even terms with their American brethren, allowing the law of the survival of the fittest to govern.

An Estimating Class at Toronto

A class in estimating is again being formed at the technical High School, Toronto.

Expressions made at various conventions of architects and contractors point very forcibly to the fact that for the benefit of all concerned it is necessary to improve in some way the present system of tendering.

The contractor of the present day has in many instances spent many years of his life in acquiring experience, which can be secured at the school in a comparatively short period.

Previous to taking up the exercises in estimating, students should take up the studies of the other classes which will enable them to grasp readily the reading of plans, building construction, etc., and give them a knowledge of the necessary mathematics.

It is noteworthy that other bodies of commercial men look well into the product of the Technical School and it is to be hoped that the business section of the building will do the same. We feel sure that Mr. Kirkland, who is in charge of the Arts Department, will be very pleased to receive suggestions from parties interested in the success of the class.

The Belgian Association of Contractors for Masonry and Reinforced Concrete Works advises its members to stipulate that payments be made in cash on account as to the work advances; that no complaint be entertained after a fortnight from sending in the invoice; that interest at 6 per cent. be charged on all payments in arrear; and that no orders be given to workmen or sub-contractors by the person for whom a contract is being carried out during its execution.

It is possible that the greatest campaign for good roads ever organized in the Dominion will be inaugurated shortly in Manitoba. The executive of the Manitoba Good Roads Association will ask the Government to set aside \$500,000 to aid in the work. Upon the basis that the Government is to bear one-third of the expense of road construction, this means that the amount will cover the expenditure of \$1,500,000 for road improvements throughout the province.

Considerable dissatisfaction has been expressed at Victoria, B. C., over the city's practice of awarding contracts on alternative tenders after calling for bids on a standard specification. The unfairness of this is emphasized by the representative of the Bitulithic Paving Company, who wishes to figure on the city work, but is unable to ascertain what are the specifications for asphalt. A discussion anent this matter was closed by the mayor, who stated that the city would not be exploited by patent paving concerns. This is all very well, but "patent paving concerns" are not to be discriminated against. They are entitled to the same chance in the contracting field as their competitor, and certainly to be acquainted with the conditions of entry and the necessary information for figuring.

Attention has very properly been directed to the fact that the Ottawa Improvement Commission is laboring under a great disadvantage by carrying on its work

without having a definite plan that will insure this work being properly correlated to that which will be done twenty years hence. Montreal and Toronto can also profit in this connection. It is ridiculous to spend an eternity of time in discussing improvements if the objective is not the appointment of experts to work in conjunction with a properly constituted commission.

Mr. Henry Vivian, M. P., on Civic Improvement

Mr. Henry Vivian, M.P., for Birkenhead, England, addressed a meeting of the Canadian Club at Toronto, on the 13th inst. The speaker made a plea for the establishment of a central body to regulate the work of improving the city, having in mind the conditions that will obtain fifty years hence. He gave it as his opinion that mistakes made in development work at Toronto and Montreal will eventually cost the cities many millions of dollars. Mr. Vivian said that the west had a comparatively clean slate in this respect, but on one city, where in twenty years there will be a population of 100,000, the main street is only 66 feet wide. The speaker denounced the system of electing councils for one year, as it gives the members no continuous opportunity to study the development problem.

On the evening of Oct. 13th, Mr. Vivian addressed a large audience in the Physics Building at the University of Toronto. This meeting was presided over by Sir Edmund Walker. Mr. Vivian showed a number of interesting views and spoke of what England had accomplished in the establishment of "garden cities." The tendency in the United States had been to substitute the tenement for the home. This, the speaker contended, was putting the home life of the workman on a factory basis and would crush out much of the best of the Anglo-Saxon character.

Ontario's First Delivery of Hydro-Electric Power

Tuesday, Oct. 11th, marked the first delivery of electrical energy generated at Niagara Falls, at the municipal power plant at Berlin. Details of the opening by Sir James Whitney and Hon. Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, will be familiar. The transmission line is now practically ready to serve thirty-four municipalities and there is a probability that it will be further extended to Windsor. Its cost, which was estimated at \$3,500,000, will be about \$3,300,000. Of this sum the principal items will be: Transmission line, \$1,270,000; right of way, \$400,000; transformer stations, \$1,200,000; distributing lines, \$150,000; insulators, \$160,000. Two-thirds of the towers are now in place, the sub-stations are all practically completed, and the municipal systems are all in course of construction.

The Commission made a contract in November, 1908, with the McGuigan Construction Company, for the erection of a transmission system at a cost of \$1,270,000. The chief engineer of the Commission is Mr. P. W. Sothman, under whose supervision the whole work is being carried out. We understand that a very complete description of the whole system will be published in the November issue of the Canadian Electrical News.

One of the features of the Provincial Fair, held recently at Halifax, was an exhibit of road-making machinery made by the Provincial Road Department. Various kinds of piping, etc., were also shown, as well as a number of plans and drawings illustrating standard forms of roadways. Further interest was stimulated by a practi-

cal demonstration of the construction of improved macadam, gravel and clay roads. The importance of ditching and crowning was emphasized. Painting materials used in preserving the steel bridges of the province were shown.

Bonding New Concrete to Old

In discussing the question of bonding new concrete to old, a writer presents the following suggestions:

Clean off with clear water and stiff broom the surface of the old concrete. Mix one part commercial muriatic acid or hydrochloric acid and four parts water, make several applications one after another with a brush containing little or no metal. This will not injure the concrete, as the acid does not sink to a sufficient depth before it is neutralized.

After applying the acid, wash the surface with clear water, scrubbing with a stiff broom or brush, removing all the dead particles. While the surface is still wet (and it should be thoroughly wet), apply the new concrete. Protect this new concrete by keeping it damp for at least a week. Do not let it dry out at any time during the first week.

It will be found that the new concrete will bond to the old as strongly as if both had been mixed at the same time.

Freezing Process of Tunnelling

In giving a most interesting description of the methods adopted for the crossing of the River Seine by line No. 4 of the Chemin de Fer Metropolitain in Paris, an engineering correspondent of The Times goes on to speak of tunnelling by the freezing process.

The most hazardous part of the work was that in front of and beneath the Bas-Port of the Quai St. Michel and under the station of the Orleans Railway. Owing to the proximity of the river bed, the water-bearing nature of the soil, and the risk of disturbing the foundations of the Bas-Port and the railway station, it was decided to construct this portion of the tunnel by the freezing process. It should be mentioned that before the beginning of the tunnel the Orleans Railway station had been very securely underpinned by foundation walls sunk to such a depth as to render the structure independent of any possible disturbance caused by the operations about to be undertaken by the Metropolitain Railway.

The area to be frozen beneath the river was enclosed by a timber cofferdam backed with clay, the object of this structure being to check currents which would have made thorough congelation of the soil very difficult. The heterogeneous material to be traversed comprised 1.80 metres of mud, 3.70 metres of quicksand, 2.29 metres of marl, and 2 metres of solid rock, the mean temperature being 10° C. The volume of earth to be frozen was about 2,150 cubic metres, one-third of this being estimated to consist of water. For the reception of the circulation pipes sixty holes, 17 metres deep, were bored, fifty-one inside the cofferdam and nine along the Bas-Port. The freezing circuits were formed of flanged pipe at 134 mm. internal diameter, with an inner tube of 35 mm. internal diameter, this tube being open at the lower end and constituting the flow pipe. The brine, consisting of calcium chloride solution with a density of 1.25, flowed through the inner pipes at the velocity of 70 cm. per second, and through the outer pipes at the velocity of 49 cm. per second.

Cold brine was supplied from two freezing installations, the plant in each case including ammonia freezing

machines on the Linde system. The average temperature of the brine was -24° C. in the flow pipe and from -20° to -22° C. in the return pipes.

Soon after the plant was set to work all exposed pipes were rapidly covered with ice to the thickness of 10 cm. by the freezing of moisture condensed from the air, this layer acting as an excellent insulating medium. At the expiration of some forty days the earth was found to be thoroughly frozen, and a large area round the consolidated mass was reduced in temperature from 10° to 5° C. Excavation of the frozen soil was performed by means of ordinary picks. The masonry and cast-iron lining were constructed as in an ordinary tunnel, and on completion those of the circulation pipes which passed through the subway were withdrawn and the holes filled up with concrete.

An exceptionally severe test was imposed upon the freezing installation by an unexpected current of water

which found its way across the old foundations of the Orleans Railway station, under the footings of the Bas-Port, and into the river. The effect of this irruption was to wash away large quantities of earth from behind the frozen mass, and to pour an enormous volume of water into the partly-completed tunnel. The quantity of water to be dealt with was far beyond the capacity of the pumps at command, and it became necessary to construct a special cofferdam to cut off the flow. While this was being done, and during the subsequent pumping to clear the works, the freezing plant was kept at work continuously in order to prevent the large flow of comparatively warm water from thawing the earth. The danger of such a result was by no means remote, and the consequences would have been most serious; and it is therefore gratifying that the freezing plant proved capable of withstanding the test in a perfectly satisfactory manner.

Design and Erection of Wilton Ave. Bridge

Noteworthy Structure over the Don River now under construction for the City of Toronto—Details of Sub-Structure

By R. E. CHADWICK, Engineer of Bridges and Docks, Toronto

The city of Toronto extends along the shore of Lake Ontario for a distance of about ten miles, from the Humber river, at the west, to a point about three and three-quarter miles east of the Don river at the east. For many years there has been a constant demand for additional bridges crossing the River Don. There are in all five highway bridges crossing the Don, only two of which carry street railway traffic. These bridges are the only means of communication from that portion of the city east of the river. Prior to the year 1908 this district had an area of about three and one-fifth square miles, but during 1908 and 1909 two and one-third square miles were annexed, rendering additional accommodation necessary.

Accordingly, on January 1st, 1909, the sum of \$215,000 was voted for the extension of Wilton Avenue across the Don from River street to Munroe street, a distance of 1,300 feet. The Don Valley at this point was about 800 feet wide, the natural ground level being about 25 feet below the grade of the proposed street. From comparative estimates it was found economical to fill

as much of this as possible. The surplus excavation from the trunk sewer could be placed on the site very cheaply and there was sufficient of this to almost complete the fill. Thus the length of the bridge was cut to the minimum required to span the river, and the roadways and railroad properties on each side.

The profile of the ground and the natural conditions were all favorable for the economical construction of a bridge of excellent proportions and graceful lines. The bridge has a total length of 380 feet on a skew of 87 degrees 12 minutes, and a width of 54 feet, providing for a 42-foot roadway and two six-foot sidewalks. The river span is a three-hinged ribbed arch, 124 feet centre to centre of skewback pins, with a rise of 26 feet. On each side of the river there are two deck plate girder approach spans of 70 feet 6 inches and 49 feet 6 inches respectively. The two river piers, and the abutments, are of massive concrete construction reinforced for temperature only. It was the original intention to support the approach spans on small concrete piers, but these were replaced by rocker bents so as to give more clear-



Wilton Avenue Bridge.—General View of Construction from West Approach.

ance for the railway tracks. The entire bridge will be floored with reinforced concrete and paved with asphalt.

The conditions of the subsoil were peculiar. On the west side of the river, shale was found about seven feet below mean low water level, which provided an excellent foundation for the west river pier and the intermediate pedestal. The west abutment is carried down to hard blue clay, eight feet above mean low water level, except along the line of the south wing wall, where a soft spot was encountered, which made it necessary to carry the concrete about seven feet deeper.

On the east side of the river, borings were carried to a depth of 63 feet below mean water level through fine sand, but no bottom could be found. Accordingly the east river pier, the east abutment and the intermediate pedestals are carried on wooden piles cut off one foot below mean low water. The piles on the land side of the river pier, and under the toe of the abutment, averaged about 50 feet in length and were driven to a minimum resistance of 36 blows for the last foot under a 4,500 pound steam hammer, with a 40-inch stroke. This was considered ample for a load of 25 tons per pile under full live and dead load. Figured on the "Engineering News" formula, these piles should sustain a load of 70 tons each.

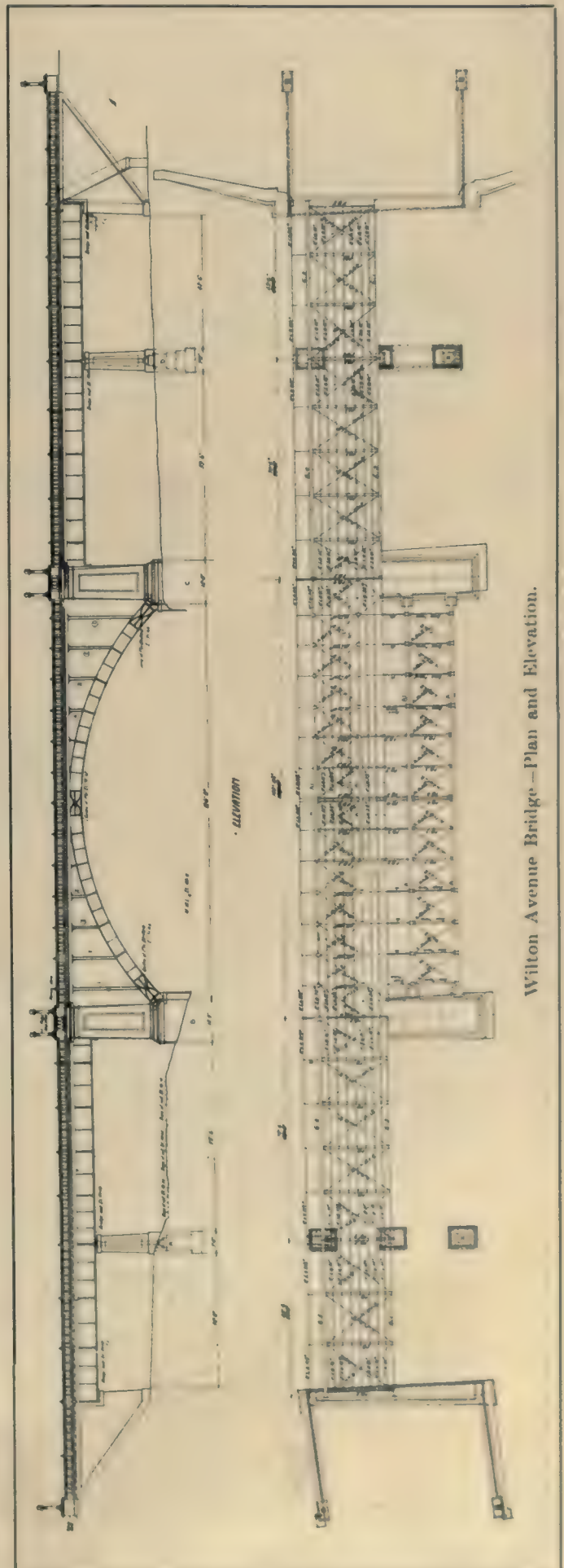
Work on the substructure was commenced on November 24th, 1909, by the city, it being considered advisable to complete everything to water level by day labor on account of the uncertainty of the subsoil. The piling and sheeting for the cofferdams for the river piers was driven by Mr. George Arbuckle under a sub-contract. "Lacawanna" steel sheet piling was used for the cofferdam for the west river pier and was driven to rock. Sixteen foot "Wakefield" sheet piling was used for the cofferdam for the east river pier. Both cofferdams were puddled on the outside with the material removed and no serious leakage occurred.

The contract for the substructure above water level was let to Wells & Gray, Limited, Confederation Life Building, Toronto. Work was commenced on May 3rd, and completed ready for the erection of steel by the latter part of August. The contractors were greatly hampered by the failure of the railways to make deliveries on materials during the Grank Trunk Railway strike, but in spite of this they made excellent progress and completed the work to the satisfaction of all concerned.

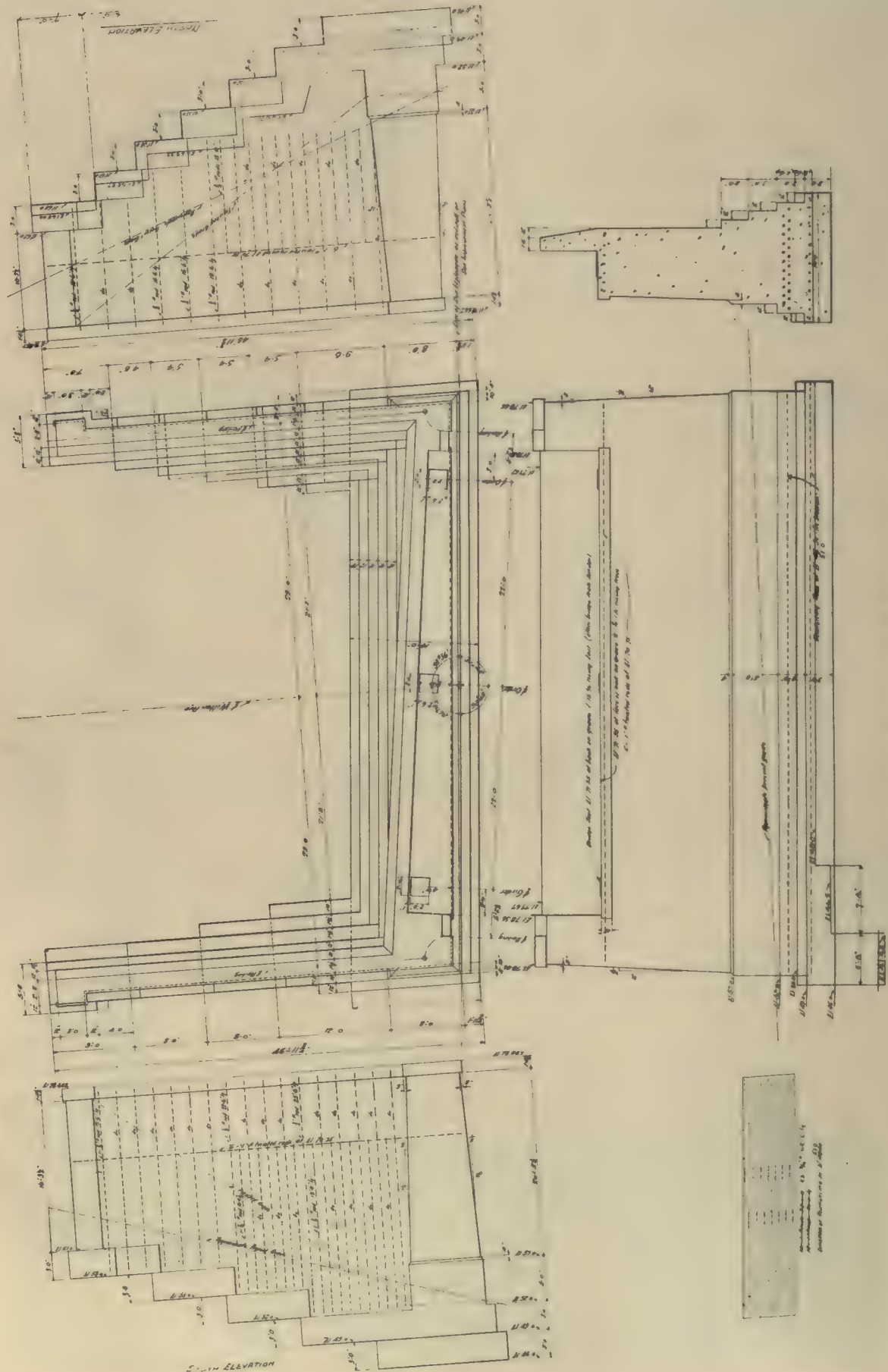
The following are the approximate total quantities of work involved:

	Cub. yds.
West abutment.—Below Elev. 46	—
Above Elev. 46	712
	712
East abutment.—Below Elev. 46	754
Above Elev. 46	681
	1,435
River piers.—Below Elev. 46	458
Above Elev. 46	600
	1,058
Pedestals.—West side of river	41
East side of river	124
	Piles driven.
Piles.—East river pier	129
East abutment	223
East pedestals	33
Total	385

The contract for the superstructure has been let to the Dickson Bridge Works Company, of Campbellford, On-



Wilton Avenue Bridge—Plan and Elevation.



Wilton Avenue Bridge—Details of West Abutment.



Wilton Avenue Bridge—Detail of East Abutment.

tario. At the date of writing about half of the steel is erected.

The bridge was designed and constructed by the City Engineer's Department under the supervision of the writer with Mr. G. F. Taylor, as resident engineer on the substructure, Mr. Arthur Birks, superintendent on the substructure below water, and Mr. G. Bernard, inspector on the superstructure and on the substructure above water. Mr. Gray, of Wells & Gray, Limited, superintended the construction of the substructure above water level.

Details of the superstructure will be given in a later issue of the Contract Record.

Fire Resistance of Cinder Concrete

The cinder concrete walls of the buildings used in subjecting floor constructions to fire tests at Columbia University were erected two years ago and have been subjected to five fire tests of 4 hours each, during which the average temperature has been 1,700 degrees Fahr. At the end of each four-hour test a stream of water at 60-pound nozzle pressure was played back and forth over

the ceiling for 10 minutes while the ceiling walls were red hot. After this severe treatment, Prof. Ira H. Woolson states the walls were practically as good to-day as they were when new, except that the rear wall has been scored by the water to a depth of from $\frac{1}{2}$ to 1 inch for 2 or 3 feet near the top. This wall gets the direct stream for a portion of the time and always receives the deflected stream from the ceiling.

A duplicate of this building torn down some years ago sustained seven four-hour tests at 1,700 degrees before its removal. At that time the walls were as good as those in the present structure. Professor Woolson is of the opinion that within reasonable limits the percentage of coal and the amount of fine material in such cinders have very little if any effect upon their fire resisting qualities. He believes that sifting and washing the cinders would be a useless expense and injurious to the cinders as aggregate for concrete. The pieces of coal which came next to the surface of these walls have been burned to an ash, but remain in place and act as a non-conductor of heat. Plenty of particles of pure coal can be found in the walls less than 2 inches beneath the surface.



Wilton Avenue Bridge.—Detail of River Pier.

Constructing and Water-proofing a Circular Reinforced Concrete Watertank

The city of New Ulm, Mich., has just completed a reinforced concrete reservoir of 1,000,000 gallons capacity, a cylindrical structure 75 feet in diameter, with the walls 30 feet high, and covered with a conical concrete roof. The ground on which the reservoir is built consists of hard clay, well drained by natural drainage, and upon this clay was spread a layer of stone with an average thickness of 12 inches, the voids of which were filled with a wet, fine-grained concrete poured in. This formed the foundation for the floor, which is 10 inches thick, and reinforced near the surface with expanded metal of No. 16 gauge thickness and 3-inch mesh. The floor is bound to the walls by means of 1-inch round steel rods 8 feet long, bent so as to extend 4 feet into the floor and 4 feet up into the walls. These were placed 12 inches apart throughout the circumference. The walls are 20 inches thick at the bottom and taper to 15 inches at the top, with the batter on the outside. They are reinforced with 123 $1\frac{1}{8}$ -inch and 40 1-inch round steel rods rolled to the required radius and placed horizontally, and by 20 upright supports made of steel angles with lacing bars, which served as supports for the horizontal rods during the time of construction, as well as vertical reinforcement in the walls. The horizontal reinforcement is sufficient to take all the stress without assuming tension in the concrete, or counting on the support of the earth embankment on the outside.

The roof consists of a conical concrete slab 3 inches thick and reinforced with No. 12 gauge, 3-inch mesh expanded metal, and is supported by eight trusses radiating to the wall from the centre pillar. The trusses are bound together with steel I-beams as purlins 5 feet apart. The steel trusses are 6 feet high from c to c of chord at the ends which rest on the centre pillar, and taper down to 3 feet at the ends resting on the walls. Since it was of the utmost importance that the walls and the floor should be watertight, special care was taken during the construction to grade the aggregate for the concrete. It has been found by experiments that the densest concrete can be made when rounded pebbles, varying in size from about $\frac{1}{4}$ -inch to about $2\frac{1}{2}$ inches, are used instead of broken stone, on account of the ease with which such pebbles will move about in a quaking mixture while it is being worked in place, and adjust their positions so as to form the least amount of voids. For this reason pebbles were screened from a gravel bank and used instead of crushed stone for the walls and upper part of the floor, and the sand used was a mixture of very coarse and ordinary fine sand.

To reduce the permeability of the concrete to a minimum, 20-lb. of hydrated lime was used to every barrel of cement, and after the forms were removed the walls were brushed and cleaned with steel brushes, and two coats of cement plastering were applied on the inside. The mortar for the plastering consisted of one part cement, two parts sand, hydrated lime to the extent of 10 per cent., and Medusa waterproofing compound to the extent of 3 per cent. of the cement used. The proportion used for the concrete in the walls and the upper 4 inches of the floor was 1:2:4, and this proportion of concrete, together with the plastering, has apparently made the walls water-tight, as no leakage has been noticed up to this time, except a small leak in the bottom shortly after the reservoir was filled, which was due to an imperfect bond at one point, between old and new concrete. This, however, did not cause serious trouble.

The forms for the walls were made in sections about 12 feet long by $2\frac{1}{2}$ feet high, and the inside and outside

parts were bound together by means of $\frac{1}{2}$ -inch rods extending through the walls, which were removed after the concrete had acquired its initial set. The holes formed by the rods were afterwards filled with a strong cement mortar. Only one round of form was used, as the contractor found that he could work most economically filling the forms in one day and removing them the next, and set them up for the pouring of concrete again on the third day. When it was necessary to build scaffolding two days were taken to remove and set up the form and build scaffolds. The bond between old and new concrete was made by brushing the old concrete thoroughly clean and pouring on a neat cement grout just before pouring on the new cement.

Cantilever Bridge Trusses

Although bridge trusses for long spans have undergone considerable simplification during the past decade, it is by no means true that a universal understanding exists among structural engineers as to what constitutes the best form of truss for spans so long as to require cantilever construction, says the Engineering Record. The most notable, as well as the most commendable, change that has taken place in cantilever bridge trusses is the substitution of determinate systems for the indeterminate forms which were more commonly used in the earlier stages of long-span truss construction.

In the United States the only large cantilever structure recently completed, which is statically indeterminate is the Queensborough Bridge in New York and in this bridge, as in all others in which the forces cannot be found by means of simple statics alone, it is necessary to make some assumptions regarding the action of the structure before the reactions can be ascertained for a given load upon the truss. This New York cantilever is indeterminate only as far as the reactions are concerned, and, when the reactions are once determined the stresses within the truss members may be readily found by the usual simple methods of statics. In all such statically indeterminate trusses it is uncertain whether the conditions assumed in the design really exist in the finished structure, and in view of this, the use of an indeterminate truss system is seldom if ever warranted. It is therefore gratifying that, in America, at least, there is a marked tendency to adopt simple forms.

The most recent example of this simplified construction appears in the design made by the board of engineers for the new Quebec Bridge. Even though there is the possibility that an alternate plan may be submitted by one of the bidders and adopted by the board of engineers, it is interesting to observe that the board's design is simple and determinate; reactions and stresses being readily computed by the simplest methods. The arrangement of the web members is unlike that of any other large cantilever bridge of recent design in that it is of the single Warren type, that is, both the tension and the compression diagonals are inclined, while in most of these structures the web systems are of the Pratt type with alternate vertical and inclined members. Both the Forth and the Memphis bridges have Warren web arrangements, but they are of the double-system type. The Warren system has the advantage that, inasmuch as all principal web members are inclined, a load in any position on the bridge is carried more directly to the supports than is the case where a combination of diagonal and vertical members is used. A comparison between the new and the old Quebec Bridge designs shows that in the new design both the cantilever and the anchor arms have been lengthened, and the suspended span has been shortened, until these various sections are now of

equal lengths. The top and the bottom chords are now straight instead of curved, as in the former design, and while this is, no doubt, a change towards simplicity of construction it does not produce such a pleasing appearance as that obtained by the use of the curved outline.

Dust Laying at Owen Sound, Ont.

The sandy lake shore soil, upon which Owen Sound is located, results in very dusty streets. No matter how much rain falls, or how much water is sprinkled on the streets, in an hour thereafter the dust becomes a nuisance and a menace to health. To overcome this, the municipal authorities, early in the spring, experimented with oil, which proved such a success that now all the principal streets in the centre of the town are oiled. These thoroughfares are macadamized and, as a preparation for oiling, are first swept clean and the oil put on immediately after with the sprinkler.

The objection at first was that the odor from the crude oil was offensive, but in a day or two this disappeared, and the change for the better to dustless streets was recognized by all. The first application of oil lasted six weeks, and the second application was put on the other day, and what were some of the dustiest streets are now perfectly dustless.

The town officials state that it will be an annual saving of \$2,000 over the old water system, and at the same time give much better results.

Some Experiences on Tests of Pipe

The above subject was the title of a interesting paper read by Mr. W. R. Conrad, of Burlington, N. J., at the recent annual convention of the Central States Waterworks Association. Last spring, according to Mr. Conrad, two separate corporations wishing to put in some pipe lines that would be absolutely tight when laid and in service, ordered from two separate manufacturers a quantity of cast-iron pipe, each purchaser specifying in addition to the usual hydrostatic test that each pipe be carefully tested with air, at 50 lbs. per square inch pressure, and that while under this pressure soap and water suds be applied so as to reveal open or porous iron or defects which the hydraulic test had not developed. Because of this additional test it was determined by the manufacturers to use nothing but the best grades of iron that would give a close and uniform texture. The results were that in one case where there were 4,954 pipes tested either hydrostatically or pneumatically 27 leaked under hydraulic pressure and 272 leaked under pneumatic pressure having already passed the hydraulic test. This makes a percentage of leaks of the whole quantity tested 0.545 of 1 per cent. for the hydraulic and approximately 5.5 per cent. for the pneumatic, or slightly over 6 per cent. for the two tests. In the other case there were 2,737 pipes tested, of which 14 leaked under hydraulic and 186 leaked under pneumatic pressure, the percentage being 0.511 of 1 per cent. for the hydraulic and approximately 6.8 per cent. for the pneumatic, or about 7.3 per cent. for both. The percentage of hydraulic leaks to the total number was but about 6.2 per cent of the total number of leaks, taking both jobs together. This proportion, however, would undoubtedly have been more evenly divided had the hydraulic pressure in testing been maintained for a longer period of time per pipe, for Mr. Conrad points out that air compressed will find its way through open or porous metal more rapidly than water compressed, but in view of the fact that all of the pipe were to be subjected to an air test subsequent to the hydraulic both manufacturers de-

pended more on developing leaks with the air than with the water. While both lots of pipe were laid for the purpose of carrying gas, Mr. Conrad believes such tests might be advantageous in the case of water mains.

Hints on Estimating for the Building Contractor

Don't forget that rates of wages are lowest in dull times and in winter, and highest in boom times and in summer.

Remember that an allowance for discounts is not operative when payment is delayed beyond the time limit.

Repairs on bargain-counter plant may be three times as great as on first-class new equipment.

Depreciation is affected by a multitude of conditions, and estimates of the amount for this item should not assume too high a figure for scrap value.

The interest on plant goes on whether the plant is working or not.

If the non-paying part of a job has to be done first, interest on the loss will run to the end of the contract.

In estimating the cost of transportation, give special attention to the character of available roads, the direction of the proposed traffic, and the time of year.

Insurance against accidents depends upon the riskiness, not to the plant, but to the men.

After making an estimate in detail, lay it aside a day or two if possible, forget the figures and then go over them again critically.

If someone else is going to carry on the work, take his personality into account in making an estimate of how much his work is going to cost.

Check up an estimate against average contract prices, selecting particularly contracts where the conditions are well known, and selecting the contract bids from firms of experience in the line of work in question.

Check over the bidding sheet to see that it compares with the estimate.

A long and big job can be estimated on more safely than a short and small one, since the accidental conditions on big work are more likely to balance themselves.

It is not wise for the contractor to figure on making money out of lawsuits as he can generally make a good deal more money by doing construction work on a square basis than he can by providing a job for his lawyer.

For trench machine work, from \$7.00 to \$10.00 a day should ordinarily be added for rental. Also add the cost of the sheeting, plank and pumping. In estimating the cost of trenching work, look out for boulders.

The worst estimate made upon even assumed data is generally a good deal better than guess.

To estimate the quantity of sheeting or of shiplap, calculate the exact surface to be covered, deducting openings; then add the following percentage:

For floors	1/7, or 15%	1/6, or 17%
For sidewalks	1/6, or 17%	1/5, or 20%
For roofs	1/5, or 20%	1/4, or 25%

The cost of materials will vary from year to year. A study should be made of the characteristic fluctuations in prices, when figuring closely, in order that proper prices of materials can be determined for some time in advance.

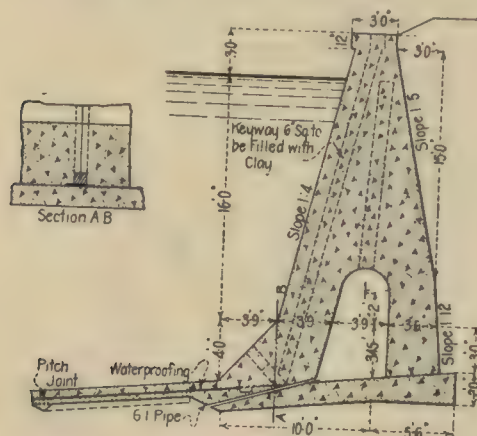
Port Mann, B.C., like Prince Rupert, has been laid out by expert landscape architects. The foresight shown at these places should offer a suggestion to older communities. It is never too late to start improvement work.

Novel Form of Concrete Reservoir Wall

Details of Construction and Design—Particulars of Tests made during Progress of Work — Material and Equipment Used

The construction of a novel form of reservoir wall for the Cobbs Hill Reservoir of the Rochester, N. Y., water works was described by Mr. John F. Skinner, principal assistant city engineer, in a paper read at the recent convention of the New England Waterworks Association. Though this structure was completed some three years ago, its design is so uncommon that details are of interest.

The reservoir is about 1,500 feet long by 600 to 700 feet wide and is a sort of irregular ellipse in shape. It was lined with concrete throughout. The bottom consisted of a 3-inch course of concrete laid continuously in long strips for convenience about 14 feet wide. To this the waterproofing was applied, which consisted of six moopings of hot coal tar pitch and five layers of single-ply coal tar felt. Above this came the top layer of concrete six inches thick, laid in 12-foot squares with pitch joints. In anticipation of the crack-



Section of Reservoir Wall.

ing of the lower layer of concrete directly beneath the joints in the upper layer (due to change of temperature in the water, which might result in a fault and a rupture of the waterproofing layer, the lower layer of concrete was thickened to 6 inches beneath the joints in the upper layer, and steel reinforcement was placed transversely to the line of the joint in this thickened portion. An interesting laboratory experiment extending over a long period with the temperatures changed artificially indicated this method of treatment.

The reservoir wall, constructed in separate blocks of mass concrete 20 feet in length, rests upon a foundation course about 18 inches in depth laid in blocks 10 feet long. The transverse joint between the foundation blocks was offsetted 6 inches from the joint between the wall blocks, so that a reduction in the length of a wall block, due to contraction, would not crack the foundation block beneath the joint. The waterproofing of the bottom of the reservoir was carried under the toe of the wall for 2 feet. At the joints between the wall blocks it was carried 3.5 feet further to connect with the stop-water or key-way between the wall blocks.

This key-way consisted in a channel 8 inches square, set diamond-wise, 1 foot from the face of the wall, half in one block and half in the next. This opening was filled with clay and sand, rammed with a light pile driver specially constructed for the purpose.

These 20-foot wall blocks contained 106 cubic yards of concrete. A central passage was left through the wall which saved about 1 cubic yard per linear foot. This passage is for

inspection, the wall being 3.5 feet in thickness both in front and back of the opening. A tell-tale pipe 1 inch in diameter was built into the foundation weather amounts to about 20,000 gallons per day; in warm weather, it is scarcely appreciable. Recent gagings show less than 1 gallon per minute for the 3,600 linear feet of wall.

It was originally intended to make a concrete of screened sand and gravel, but early blocks every 20 feet said pipe at one end, opening into the sand and gravel beneath the toe of the foundation block, the purpose being to indicate by a jet of water into the tunnel if a break occurred in the lining near the foot of the wall. Up to the present time no indication of this kind has been recorded. This tunnel is 7 feet high, and is lighted by electricity. The leakage through the joints in cold in the work, this was changed to run-of-bank, the latter being uniformly good. Volumetric measurements of voids in the material were made daily during the construction of concrete and it was found that 1 bag of cement to 6 cubic feet of sand and gravel produced a concrete a trifle denser than an artificial mixture of 1 cement, 2½ sand and 5 clean gravel. The wall blocks were generally built in two shifts, no stop being allowed until 2 feet above top of the tunnel. Some blocks were made in a single shift. They were built alternately, the intermediate blocks being constructed after the first forms had been removed. The concrete was prepared in a Hains' mixer, dumped into yard buckets on cars hauled by locomotives and then handled by a McMyler crane. Ten forms were built for the wall blocks and used repeatedly, as 180 blocks were constructed. The material was brought to the mixer on a belt conveyor and the concrete for the bottom was hauled on an industrial track by a home-made gasoline motor.

The area of the water surface in the reservoir, when filled, is 18.6 acres, and the maximum depth of water is 25 feet. Its contents is about 144,000,000 gallons.

Purification Plant of the Rochester and Lake Ontario Water Company

The company's plant is 1¼ miles west of Charlotte, on Lake Ontario, and the supply is taken from a point 4,000 feet from shore where the water is 40 feet deep. The average pumpage is now over 4,000,000 gallon daily.

The filter plant consists of eight pressure filters, each 8 feet in diameter and 25 feet long, having a sand area of 200 square feet each. There is a pressure of 235 lbs. on the filters. They are washed when they show a frictional resistance of 15 lbs. About 2½ per cent. of the water filtered is used in washing the filters. When the filters are cleaned the frictional resistance is about 4½ lbs., when operating at the rate of 81,000,000 gallons per acre per day, and about 7 lbs. at 148,000,000 gallons. The sand in the filters is about 3 feet in depth, has an effective size of 0.46 mm., a uniformity coefficient of 1.51, and 60 per cent. is finer than 0.74 mm.

When the lake became turbid from a storm it was impossible to remove the turbidity by the filters, although the bacterial efficiency was satisfactory, as the coagulant did not have sufficient time to entangle the finer particles which made up the turbidity. To overcome this condition a coagulation basin was placed in operation in the autumn of 1907, since which time no trouble has arisen from turbidity of the filtered water. The basin, which is of wood, is 6 x 48 x 201 feet, and contains about 430,000 gallons. The installa-

tion of the basin has resulted in the saving of water used for washing filters, while the total bacterial efficiency of the plant is somewhat higher.

Sulphate of alumina is used as a coagulant, and at times calcium hypochlorite is also used. The use of the latter has greatly reduced the cost of operation, while at the same time the high bacterial efficiency is maintained. The average amount of sulphate of alumina used is about 0.7 grain per gallon. The average amount of calcium hypochlorite used is 0.48 grain per gallon. The coagulants are dissolved in wooden tanks, 5 feet in diameter and 15 feet high, and are applied to the raw water through gravity orifice feed boxes.

Some trouble, due to the odor and taste produced by algae in the raw water, has been encountered in the operation of the plant. The algae gave trouble during the winter months on two occasions. To relieve the trouble, copper sulphate has been good success.

At the time of the algae trouble of February, 1910, an attempt was made to treat the growth with calcium hypochlorite, but the results were not satisfactory. Sufficient hypochlorite was used so that the treated water gave the reaction for free chlorine.

Corrosion of Steel Pipe

Corrosion of a 48-inch steel pipe of the water supply system of Newark, N. J., caused a leak in August, 1909, which led to an inspection of this and a second pipe line, both laid across the Pacanac Swamp. In the last annual report of Mr. Morris Sherrerd, chief engineer of public works, it is stated that the pipe most badly corroded was laid in 1891 and the other in 1896.

The two steel pipes at the point most affected were laid in a swamp of peaty material to such an elevation that about one-third of the pipe was above the original surface of the swamp; a filling of light-colored earth, taken from burrow-pits adjacent to the swamp, was then made to such an elevation as to make a fair roadway over the pipe.

The decomposition of the pipe takes place in spots, and while the larger number of spots were in the vicinity of the line between the original surface of the swamp and the earth fill, there were still some affected spots both in the peaty soil as well as the earth fill.

Samples of the peaty soil as well as the earth fill showed a slight acid reaction, probably produced by the decomposing vegetable matter during the formation of peat, but when extracted with water, the liquor is distinctly alkaline, which would show that the small amount of lime and other elements present were sufficient to neutralize the acid in the presence of sufficient water.

It was found that the nodules of decomposed steel are the result of an electrical current flowing between the pipe and the surrounding earth, possibly enforced by some weak acid existing in the earth as shown by the slight acid reaction of the latter.

Examinations were made to ascertain to what extent the steel pipe lines were carrying electric currents. This survey did not show that the corrosion of the pipes could have been caused by any electric current carried on the pipes themselves, and since the deterioration of the pipe lines seems to be confined to this particular swamp, it must be concluded that something in the soil had produced the corrosion, either from its nature or by producing local electrolytic action.

After repairs the outside of the pipe was thoroughly painted and the fill around the pipe was made with gravel instead of the peaty soil, removed. Further inspection will be made of the particular section of this pipe across this swamp.

"Rat-proof" construction is a new term in the building world. It is in vogue at San Francisco, where special measures are being taken with a view to exterminating the rodents.

Clear Water as a Municipal Asset

An interesting paper on the above subject was read last month before the Central States Waterworks Association by Mr. Geo. C. Whipple, of Hazen & Whipple, consulting engineers, New York City.

After discussing the physical, chemical and bacterial standards of purity Mr. Whipple stated that during the last few years chloride of lime has been much used for disinfecting water supplies. This germicide has won for itself a place in water purification from which it will not be soon dislodged. That calcium hypochlorite will kill the colon and typhoid bacteria must be admitted, yet it does not completely disinfect. For example, it is doubtful if it will destroy spore-forming bacteria to any great extent. Although the bacteria are thought to be killed by an oxidizing process, the use of bleaching powder in the quantities used for killing bacteria has, according to Mr. Whipple, no appreciable oxidizing action on the organic matter present in the water. It does not improve the appearance of water, nor its taste, nor odor. As an adjunct to filtration the use of calcium hypochlorite in the future is likely to be large, as it offers an additional safeguard and supplements the work of the sedimentation basin and the sand bed. It sometimes enables higher rates of filtration with this coagulant to be used and thus reduce cost. The hypochlorite treatment, Mr. Whipple believed, will assume an important place in the field of water purification, but one subsidiary to the long established methods of obtaining clean water.

The use of hard water entails serious losses to the consumers, and such losses may vary all the way from 0 to \$30 or even \$50 per 1,000,000 gallon, according to the hardness of the water. Water softening is more expensive than ordinary filtration, and therefore the balance in favor of this process is less, and in many cases the cost of water softening is perhaps not justified on economic grounds. Where, however, the hardness of the supply exceeds 250 parts per 1,000,000, and perhaps in some cases where it is even less than this, softening may be a good business venture, according to Mr. Whipple.

Repairing a 16-inch Main*

In March, 1910, a leak developed in the 16-inch main line of the water supply system of Delaware, Ohio. Upon investigation it was found that the pipe had a vertical crack from the bottom extending to nearly the top on one side of the main. An attempt was made to repair it with a wrought iron band 4 inches wide, in two sections, but it was impossible to shut off the water, as one 16-inch, one 12-inch, one 8-inch and three 6-inch gates were to be closed, and they leaked so that a trench pump was required to keep the water down so that work could be done. It was soon found that the repair could not be made in this way, as the leak was too great; a Kellogg repair sleeve 36 inches long and weighing about 900 lbs. was tried. Three 2-inch holes with plugs were placed in the bottom to care for the water leaking through the gates while connecting and leading. The sleeve was in two halves and was connected along the sides with rubber gaskets and secured by about thirty bolts and nuts to make the side joints; the ends were then leaded and caulked as is usual with new pipe. One hard day's work was required to make this connection, and when all was tight it was believed that the work was successful, but in about six weeks a leak developed again in the same place; fortunately the street in which the pipe was laid was not paved. After opening up the trench again it was found that a crack about 4 inches long had developed at one corner of the top plate flange; examination showed that no caulking would repair it, and the work had to be done over again. A new top plate was ordered and when it arrived the

*Extracted from paper read before the Central States Waterworks Association by Mr. C. W. Miles, Delaware, O.

gates were again closed as well as possible, the trench pump set at work and the old sleeve taken off and replaced with the new top half bolted up and again leaded and caulked in one day. The leak was effectually stopped by this sleeve.

Copper sulphate to prevent algæ was used in four of the reservoirs of the Albany waterworks during 1909 before the commencement of warm weather. Two of the basins were treated four times during the season, another three times, and

another twice. The maximum amount of copper sulphate used during any one application was 0.32 parts per million and the minimum quantity 0.1 parts per million. The early start made with this treatment and the constant watching for the development of aquatic growths are the reasons given by Mr. H. J. Deutschbein, superintendent of the Bureau of Water, to account for the fact that no complaints regarding the algæ were received during the year. The reservoirs are supplied with filtered water from the Hudson River.

Some Causes of Failure in Street Paving

Inefficient Sub-Drainage and Excessive Flushing among the most Common Sources of Injury—Interesting Practical Notes on Constructional Methods

The deterioration of street pavements by water is ascribed by Mr. George C. Warren in a paper presented before the recent convention of the American Society of Engineering Contractors to the following causes: Improper sub-drainage; excessive sprinkling or flushing; lack of efficient cleaning; sub-drainage, due to the absence of pavements, or to their improper construction, between and around railroad tracks; too flat crown or grade to provide proper surface drainage.

The successful elimination of water, both from the upper and under surfaces of the pavements in a city in central New York, is accomplished, according to Mr. Warren, by an efficient system of sub-drainage and by thorough dry cleaning and entire absence of wetting down the dirt by excessive street sprinkling and flushing. The system of sub-drainage in this case, which was adopted in the year 1886, and has been strictly adhered to since, is as follows:

A trench 1 foot wide is excavated under the curb to a depth of 3 feet below the top, or 18 inches below the bottom of the curb. In the bottom of the trench is placed a narrow culled hemlock board for which other cheap lumber may be substituted, and the pavement side of the trench is boarded up with the same material, up to the bottom of the curb, to prevent the earth under the pavement, as it dries, from falling into the drain. On the board in the bottom of the trench is placed a line of 3-inch half round porous tile open at the bottom and with open joints.

Over the tile the trench is filled to within 2 inches of the bottom of the curb with hand placed field or cobble stone, over which is spread a thin course of finely crushed stone, slate shale, or slag, fine enough to fill the chinks in the field stone at the surface, but coarse enough not to run into and fill the spaces between the pieces of field stone. Over this is spread about 1 inch of loam or clay (not gravel or sand), which, when dry, will hold together and not sift into the drain. The curb is set in the usual way; if the curb is of stone it is bedded in either gravel or concrete; and if the curb or gutter is of Wainwright or other Portland cement, it is laid directly over the drain. Of course, the drains are connected with catch basins. This method of construction is the best and most economical system of sub-drainage Mr. Warren has known. No cross drains have been necessary, although the natural drainage conditions are very poor.

System of surface drainage of which Mr. Warren disapproves, either because of inefficiency or unnecessary expense, are those that include too shallow drains at the curb and trenches filled with crushed stone in the centre of the road with similar cross drains at intervals. The cross drains, he states, tend to attract water from outside the roadway and carry it under and to the centre of the pavement, where it percolates into the otherwise dry sub-soil. With any of the modern, nearly waterproof forms of pavement, the sub-soil under the pavement will be practically bone-dry if no water is

allowed to percolate from back of the curb. To prevent this a drain having a depth of 3 feet below the curb is all that is necessary.

Inefficient Drainage.

The most frequent causes of failure in pavement construction Mr. Warren believes to be inefficient drainage, improper back-filling of trenches, insufficient crown and gutter grade to carry off water and prevent pools standing near the centre and in the gutters of the roadway, lack of cleanliness, excessive flushing or sprinkling of streets, inadequate pavements, or none at all, between and along railroad tracks.

The efforts of some street cleaning interests are directed toward keeping the streets wet by various forms of sprinkling and flushing machines, without properly cleaning the surface of the pavements. Still other interests engaged in street cleaning advocate dry cleaning and are developing methods to accomplish their purpose. Their objects are feasible, but pending the advent of machines that will efficiently and economically do the work, all municipalities, Mr. Warren, states, should take a middle ground and follow one of the following courses.

(a) Thoroughly wash the pavements nightly, without pressure, using either a washing machine or fire hose, and immediately follow the washing with hand squeegees to remove all excess of water from the gutters and slight depressions. (b) Sweep nightly with machines, lightly sprinkling the pavement in advance of the sweeper, and using enough water to lay the dust, but not enough to convert it into mud—exactly as a dirty floor is cleaned by light sprinkling and had sweeping.

Railroad beds improperly constructed, or tracks poorly laid, are common sources of injury to pavements, and the damage will extend not for only a few feet from the rails, but sometimes across the entire width of road bed. The same undesirable results are often produced by faulty construction in the pavement itself between and along the rails. If the rails or the ties are not so securely laid as to prevent vibration the pavement, whatever may be its construction or the material used, will be sure to break and allow water to work its way through and settle beneath the pavement.

Mr. Allan Hazen, consulting engineer, of New York, the expert engaged to investigate Ottawa's water supply, presented his report to the City Council last week. He reported that the present source of supply from the Ottawa River was contaminated by sewage, and that eighty per cent. of the water pumped was lost through leakage. He recommended McGregor's lake, in the Gatineau river district north of the city, as a permanent source of supply, or else the installation of a complete filtration plant. He stated that the cost of the McGregor's lake proposal was \$2,400,000. The filtration plant would be \$100,000 less. Council postponed action on the report.

Roadway Construction and Maintenance

English Practice Appertaining Chiefly to the Work of Large Towns — Instructive Notes on Waterproofing and Tar Treatment

By R. E. CROMPTON, M. INST. C.E., London, Eng.

It will be found convenient to divide the roadways of our towns into three classes, the first consisting of the widely used macadamized roads which form the chief part of the roadways of villages and small towns, and a very large proportion of the roadways of the larger towns; the second class being the improved roadways usually covered with wood or asphalt pavement which have been so largely adopted in all the large cities and in many of those of moderate size; and thirdly the granite set pavements that are used wherever the traffic is exceptionally heavy, such as that on the roadways in the immediate vicinities of docks, quays, railway depots or similar places where the traffic tonnage per square meter is consequently exceptionally heavy.

Taking these in order, at the present time we find in England that the improvement of the first class, namely of macadamized roadways, is of paramount importance. These roads are chiefly found in the residential districts, whether these be old or new, in which the residents live in order to obtain comparative quiet and freedom from the nuisance caused by traffic. The roadways should be formed so as to possess certain characteristics, the principal ones being that they should allow the traffic to pass over them as noiselessly as possible; they should be free from dust in summer and from mud in winter, should be easily cleansed and should be economical in the cost of maintenance.

Up to a few years ago these conditions could not be satisfactorily met by any existing form of macadamized road, but since waterproofing the road surface by tar treatment has become general, at any rate in England, the author thinks that this problem of treating town roads can be solved in a satisfactory manner. The development of tar treatment, the practical commencement of which dates only three years ago, has been so great that in the residential districts in London in which these roads have been already so treated, it has proved to be of exceptional benefit and comfort to the inhabitants who live in the houses adjoining these roads. The success of the treatment depends on a thorough study of the materials used, the selection of the tar or bituminous binder being of great importance. This selection is again dependent on the nature of the stone used and on the extent to which this can be dried previous to impregnation.

Choice of Material.

Another matter requiring much skill and experience is the correct choice of the available granites, basalts and other roadway materials, the tar imbibing properties of which differ considerably. Again it is important that attention should be paid to the heat radiating properties of these materials, as otherwise there is a tendency for hoar frost to be deposited on the tarred surfaces which renders them slippery and likely to give bad foothold to horses or insufficient adhesion to the rubber-covered driving wheels of mechanically propelled vehicles.

Another secret of success is that the tar or bituminous binder should be applied in minimum quantity, only just sufficient to render the road waterproof, for any excess of tar which remains fluid within the road after the traffic is turned on it is liable to remain within this condition for a long time, so that the individual stones forming the road surface instead of being held firmly in position, are allowed by the

lubricating action of the still fluid tar to move among themselves and hence are ground up by mutual attrition and destroyed as was the case with water bound macadam roads during very wet weather or after frost.

Methods of Applying Bituminous Binder.

There are two distinct methods of applying a bituminous binder to the roads, the first being a surface method, generally called tar spraying, which may be carried out either by hand or by machinery, and which under favorable circumstances binds the surface to a depth of about 20 mm. By favorable conditions is meant that the tar is applied when the roadways are thoroughly dry and the existing dust thoroughly cleansed from them before the tar is applied. In wet seasons it is difficult to obtain these conditions, and the penetration of the tar below the surface and its durability are thereby much reduced, but under the most favorable circumstances this surface application of tar can only be expected to bind the surface for one season, so that it is evident that the more complete method of impregnating the whole of the road material to a depth of 80 mm. from the surface line must be eventually carried out. Whenever this has to be done to existing roads the material must be removed to the full depth of 80 mm. and replaced by a layer of tarred aggregate, rolled down to the same thickness, this aggregate consisting of impregnated angular pieces of granite or basalt of such size that they will pass through a 60 mm. ring, combined with sufficient smaller particles to fill up the interstitial spaces so that the tar previously applied to the large and the small material fills up the remaining spaces and renders the road non-porous and hence prevents the surface water, either the rain or that from artificial watering, from penetrating it.

A roadway so formed becomes so waterproof and so durable that it can be laid with a crossfall or camber which need in no case exceed 1 in 50, and in many cases will yield satisfactory results with the smaller crossfall of 1 in 60. It is important that this top material should be rolled with comparatively light rollers which must never exceed 10,000 kilos in weight, for it has been found a great mistake to use rollers exceeding this weight, as they are liable to crush the new material exposing new untarred surfaces and hence preventing satisfactory waterproofing. The cost of such waterproof coatings has been found in England not to exceed Frs. 2.30 per square meter on the average. From experience already obtained it is believed that for ordinary traffic this coating will last from six to ten years without renewal, but to obtain the best results it is advisable to make certain that the surface remains waterproof by giving it a light waterproofing coating of tar by spraying every year, or every alternate year.

Roads so prepared and so treated possess in a maximum degree the qualities of noiselessness, cleanliness and ease of scavenging and require little or no artificial watering during dry season. The author considers that the use of this class of road will become universal for all the light traffic streets of our large towns and for all the streets of our small towns, and that it will in many cases be found to advantageously take the place of the more expensive pavements which have been used in the second class of streets, which carry heavier traffic.

* Paper presented at the Second International Road Congress, Brussels.

The author proposes to leave to others the discussion of the

best methods of constructing the wood or asphalt paved streets of the second class and of the granite paved streets of the third class.

Summarizing, the author believes that the improved water-proofed macadam herein indicated is a satisfactory solution of the problem of dealing with the roadways of the majority of our streets of all our towns, and that the other problems of dealing with the second and third classes of roads are already satisfactorily met by the wood and granite pavements already so largely in use.

Adhesion Tests of Steel and Concrete in Beams

The strength of reinforced concrete beams depends not only on the amount, kind and position of the steel, but upon the adhesion existing between the steel and the concrete. In most structures where adhesion plays such an important part the rods are placed horizontally as in beams, and the tamping is done at right angles to the length of the rods. In columns, however, where adhesion is of relatively less importance, since safety would seldom if ever depend entirely upon it, the tamping is parallel to the rods. It is quite evident that the bond of union would be different in the two types of structures, namely, those in which tamping of the concrete is carried on at right angles to the rods, and those in which it is parallel thereto. It seems proper, therefore, that in making laboratory experiments to determine working values of the bond of union, this should be taken into account by preparing some specimens in one way and some in the other. Most experiments thus far recorded have been made by determining the amount of pull necessary to withdraw an embedded rod from a block of concrete, and from this the adhesion per square inch is computed; the assumption being made that the adhesion is uniform over that part of the rod's surface in contact with the concrete. In the reports of these experiments it is not generally stated whether the concrete is tamped parallel with, or at right angles to the rod, but in most cases where this information has been given the tamping was parallel to the rod. From tests recently made, but not yet published it seems that the adhesion from tamping at right angles is only about one-half that for parallel tamping. Recent tests to determine the adhesion by means of short beams are along the right direction for it is not good engineering to obtain data from tests, and then apply them to designs where the conditions are entirely different. If rods are to be used horizontally in a beam then by all means let them be placed in a similar position in the tests which determine the adhesive values that are used as a basis on which the beam is designed.—Engineering Record.

Use of Reinforced Concrete Poles

The following information concerning the use of reinforced concrete poles by the Fort Wayne & Wabash Valley Traction Company was given at a recent meeting of the New York State Street Railway Association.

The company built a couple of these poles about two years ago. The experience with them was so satisfactory that others were made until about 125 are now in use and it is expected about 60 more will be added shortly. They are employed mainly in city line work on straight track, but a few are in use experimentally at corners. They are spaced from 100 to 125 feet apart and given the same rake as wooden poles.

The company has a large gravel bed on the same lot as its power house, and up to the present time all of its poles have been made by a contractor on this lot at prices ranging from 20 to 25 cents a foot, or \$7.50 for a 30-foot pole, depending upon the price of the reinforcing steel. A mixture of one part cement and four parts gravel is used, the gravel being of such a grade that the actual mixture is about one part cement, two parts sand and two parts fine

stone. The reinforcing rods are $\frac{1}{2}$ -inch twisted bars, 30 feet long, eight to a pole. The forms are made from three 30-foot 2-inch hard pine planks, cleated across for the prevention of checking, with chamfering strips nailed on the sides of the form. A complete form thus consists of three planks and two blocks for the ends. The forms are held together by ordinary bench clamps.

The method of casting the poles is as follows: The forms are assembled on several blocks or sills to give a firm level bearing and 1 inch of concrete is placed on the bottom of the form throughout the length. Then three reinforcing rods properly spaced are laid on this concrete and more concrete is filled in until the forms are half full. Two more bars are now placed each 1 inch from the sides of the forms and concrete is filled to within 1 inch of the top of the forms, when the last three bars are placed. The remaining space is then filled with concrete and the top smoothed off with a float. As the form is filled the concrete is carefully troweled and spaded, but no other ramming is done and no surface finish is used. The holes for cross-arm and other bolts are made by iron rods which are run through the forms at the proper points and are taken out when the forms are removed. The pole is taken out of the forms three or four days after casting and is allowed to dry out for two weeks, after which it is ready for use.

By using a gin pole and a gin wagon the Fort Wayne Company erects its 30-foot concrete poles at a labor cost of \$1 62, bringing the total cost of delivery and erection to \$3.25, which compares very favorably with the cost for setting wooden poles.

The success of these poles has led the Utica & Mohawk Valley Railway Company to construct two poles of the same kind. In making this pole a mixture consisting of one part cement and two parts sand and two parts crushed stone was used. The length of this pole is 35 feet and its calculated weight was about 3,000 lbs. In this connection it might be said that a 35-foot iron pole weighs 1,421 lbs. when made of 8-inch, 7-inch and 6-inch extra heavy pipe.

As only two poles were built by the Utica & Mohawk Valley Company, the cost was higher than for construction of a larger number. The cost of the latter in detail, based on a pole 35 feet long, 6 inches square at the top, 11 inches square at the base and 10 inches square 8 feet from the base, is estimated, per pole, as follows:

Cement, $5\frac{1}{2}$ cubic feet, at \$1.60 per bbl	\$2.13
Sand, $10\frac{1}{2}$ cubic feet, at .75 per cubic yard	.28
Stone, $10\frac{1}{2}$ cubic feet, at \$1.00 per cubic yard	.39
Steel, 237 lbs. at \$0.16 per lb.	4.60

Total material	\$7.40
Labor	1.14

Total cost	\$8.54
Or $24\frac{1}{2}$ cents per foot.	

The company has found that these poles may be transported in the same manner as wooden or iron poles. It is necessary only to take care to avoid chipping of the corners. In future poles one of the reinforcing rods is to run out of the bottom and top of the pole to act as lightning, ground and protector.

The Utica & Mohawk Valley Company has not built any more concrete poles than the two originally constructed, but is contemplating manufacturing about 50 of them soon. A few will first be made and given a thorough test. If these tests prove satisfactory the company will complete the order for the 50 poles.

Reports from Prince Rupert are to the effect that the labor supply in that part of the province is now fully equal to the demand.

Vancouver and Coast Correspondence

Building in Vancouver During 1910 will Represent Value of \$12,000,000 —Provincial Government and Asiatic Labor—C. P. R.'s Extensive Plans

Office of The Contract Record,
Vancouver, Oct. 13, 1910.

Unprecedented building activity is still the feature of business in this city. There is every probability that 1910 will close with a record of \$12,000,000. This will exceed by \$3,000,000 the total of last year, while it will be actually \$10,000,000 more than 1904.

The permits issued during September aggregated \$119,500, bringing the total for the year to approximately \$9,000,000. October is expected to be a good month and fair returns are expected from November and December, the climatic conditions being favorable to construction at this time.

Within the last few weeks the city has been visited by groups of financiers and investors affiliated with the Morgans, the Goulds, the Rockefellers and other capitalists. There is now in the province a group of industrial titans whose personal wealth as well as that of the rich clients they represent, will run to almost untold figures, and the tone of all the interviews they have given out is to the effect that British Columbia is the coming province for rapid development and that Vancouver is the most progressive and prosperous city on the Coast.

Excavation has commenced on Hastings Street for the erection of a fine eight-storey block for the Bank of Ottawa. The proposed structure will cost \$250,000 and will be finished, it is hoped, by next May. The plans call for a building 52 feet by 120 feet, the base to be of concrete and stone with brick and stone trimmings above. The entrance to the vestibule and lobby will be executed in marble. The building will be replete with every modern improvement.

No Asiatic Labor on B. C. Railroad Work

The British Columbia Government has refused to grant an order-in-council permitting the Grand Trunk Pacific to employ Asiatic labor on their construction.

It is urged that such is the labor situation and so acute the feeling against the utilization of other than white labor that it has been found impossible to carry on the construction in British Columbia beyond the completion of the present contract to a point 238 miles of Prince Rupert. The contractors had declined to take on any more work from British Columbia. They state that owing to present conditions they are losing hundreds of dollars daily under their contract.

It was urged, that under the contract between the company and this province relating to the exclusive employment of white labor in construction, an agreement was made by which the Government might sanction an abrogation of the white labor clause in the event of a sufficiency of labor not being found available.

President Hayes stated that if permission were accorded for the employment of Asiatic labor he would enter into an undertaking not to employ such labor while white labor was available, and, further, to give employment to all the white labor offering for construction work at the current rate of wages.

Premier McBride pointed out that railway construction in adjacent states being at present at a standstill, there must naturally be a considerable number of workmen in that territory, who would be glad to come to British Columbia for profitable railway construction work, and who would very probably remain as permanent citizens.

The Canadian Pacific Railway Company has announced that it will build twelve hotels across the continent during the

next year. The one to be erected in Vancouver which will be up-to-date in every respect, will be built one section at a time, so as not to interfere with the travelling public any more than can be helped. Mr. Painter, chief architect of the company, was in the city recently. The foundations for the first addition to the Vancouver hotel have been completed for some time, and the active construction of the building may be looked forward to at an early date. What the cost of the new hotel will be is not yet known, but it is expected that the total cost involved will be in the neighborhood of \$350,000.

The Palmer Land & Investment Company have given notice of an application to the Dominion authorities for the approval under the navigable Waters Protection Act of a large wharf on False Creek, on the west side of Westminster Avenue. The plan shows a wharf covering the full frontage of 100 feet, owned by the company on the avenue, extending into the creek 293 feet on the north side and 325 feet on the south.

The report that the Canadian Pacific Railway will establish car building shops at Westminster is denied by Superintendent Busted. The report probably originated from the fact that the company are enlarging the yards at that point.

Messrs. Bullen, of the B. C. Marine Railway Company, at Esquimalt, have submitted plans to the minister of public works at Ottawa for a graving dock to be built at Esquimalt at an approximate cost of \$3,000,000.

It is expected that final work will be commenced on the new cement wharf at the foot of Lonsdale Avenue, North Vancouver, in about a week, the large pontoons which are being constructed by the McDougall-Jenkins engineers in this city are about completed and it is the intention to finish the contract as rapidly as possible.

Engineers are now at work making surveys in connection with the project of the Canadian Collieries, Limited, for the development of \$50,000 horse-power on the Partridge river in the centre of the Comox coal field. Within a few weeks hundreds of men will be engaged in building a dam across the river and erecting a power plant. About a year will be occupied in completing the big undertaking. The proposed improvements will cost \$1,000,000. The electrical energy to be developed will be utilized in operating a system of compressed air haulage in the mines and running various plants as well as fourteen miles of railway connecting the collieries with ore bunkers at Union Bay.

A recent visitor to Vancouver, B. C., was Mr. R. E. Palmer, formerly assistant city engineer there. Mr. Palmer is now manager of the Rio Tinto mines in Spain, one of the largest copper mines in the world. The company, which is a British one, employs in the neighborhood of 12,000 hands and is the direct source of support of about 50,000 people in Spain. There are five towns for workmen on the property and the port of Huelva, from which all the shipping of the ore is done, has a population of about 25,000.

According to a despatch from Phoenix, B. C., we learn that construction is commencing on the Kettle Valley Railway. J. G. McLean & Co., the contractors for the work, have arrived at Phoenix with a large plant and will do as much work as possible before the snow flies. Their headquarters will be at Midway for the present. They have awarded a number of sub-contracts and hope to proceed with construction all the winter. The Kettle Valley Company will make a divisional point at Penticton.

City Streets and Boulevards

At the annual convention of the National Good Roads Association, held at St. Louis, Sept. 28-30, Mr. J. C. Travilla, street commissioner of St. Louis, read a paper on the above subject, in which special reference was made to the practice in St. Louis. Asphalt and bitulithic pavements he considered specially adapted to residential streets and boulevards, without street car tracks, and where heavy hauling is not excessive. On narrow streets with car tracks, traffic is confined to the space between the outer rail and the curb line, and if not sufficiently distributed, the wagon tires invariably form a groove in the pavement. Paving the space between the street car rails with these materials is not recommended. Wood block pavement he considered well suited to high-grade residential streets and boulevards and for streets in the retail business districts where there is much mixed traffic and a demand on the part of the merchants for a noiseless pavement. Its objectionable feature is its smoothness, causing it to become slippery under certain weather conditions. This may be overcome, however, by the use of sand. It has been the practice of the department here to use oiled sand applied late in the fall and early spring. By the use of oil, the sand is held in place on the surface of the pavement and not blown to the curb line. The use of brick, in his opinion, should be limited to streets having car tracks and the less important residential streets. Granite blocks alone meet traffic conditions in the railroad and warehouse districts of the city.

The use of macadam he considered well adapted to city streets where property values are low and where there is a demand for a temporary paving, pending the construction of sewers and the laying of water mains, and on boulevards and roads carrying light traffic.

Street sprinkling in St. Louis is done by contract, and costs from \$450 to \$500 per mile per annum. More than 500 miles are included in this contract, which costs the property owners about 4 cents per front foot.

Four grades of oil for surface treatment, having specific gravities of 30 degrees, 20 degrees, 16 degrees and 12 degrees. Beaume, respectively, are used. Each has its place, according to Mr. Travilla. The first, second and third are residuum oils and the 12 degrees grade an oil-asphalt compound. No. 1 is for cinder roads and those that have had a previous treatment with a heavier material; No. 2 is recommended for park roads; No. 3 on main thoroughfares, and No. 4 on any type of road, since it simply forms a binder for the mineral matter which actually bears the traffic. When traffic and road conditions have been ideal, surface treatments in St. Louis last through two summers, with every indication of at least a year or more of wear without attention other than the maintenance. This condition, however, will not exist on the average highway, and Mr. Travilla does not expect a road with such a wearing surface to have a long life.

It costs from \$450 to \$700 per mile per annum to properly sprinkle a road with waters, exclusive of maintenance. Oil treatment will cost from \$400 to \$800 or \$1,000 per mile, depending upon the width of the roadway, the time spent in its preparation and the grade of the oil used, as well as the amount of mineral matter required for covering. The maintenance of a road that has been oiled instead of watered will be reduced to a minimum.

Long and heavy timbers can still be obtained, although at a heavy price. A lot of 30 x 30-inch timbers in long lengths was recently received at Quebec by Messrs. Davis, the contractors for the substructure of the new Quebec Bridge, who use them for the solid cutting edges of large pneumatic caissons which are being used in the construction of the bridge piers. Some unusually long sticks of Oregon fir for derrick timbers were recently received by Mr. W. J. Haskins, of New York City, among which were pieces 120

feet long, tapering from about 28 to 32 inches and running very straight and sound. As they are kept constantly in water they do not deteriorate by storage. Some contractors who use both wood and steel derricks prefer the former for loads up to 15 or 20 tons, because they are considered less liable to injury by minor accidents and because they give timely warning of over loads. They are, however, much more difficult to ship, and cannot be made of so great capacity as steel derricks.

Canadian Society to Meet in Winnipeg

At a council meeting of the Canadian Society of Civil Engineers held recently in Montreal, and presided over by Col. H. N. Ruttan, city engineer of Winnipeg and president of the society, it was decided to accept the invitation of the Manitoba branch of the society to hold the next annual convention at Winnipeg. Professor C. H. McLeod informs us that the meeting will take place during the last week in January. In addition to those mentioned, the following were present: G. A. Mountain, chief engineer of the Railway Commission, Ottawa, a past president of the society; W. F. Tye, of Toronto, and R. W. Leonard, of St. Catharines, vice-presidents; and Messrs. C. R. Coutlee, Ottawa; R. J. Durley, J. M. R. Fairbairn, W. J. Francis, L. H. Herdt, Phelps Johnson, C. N. Monsarrat, J. M. Shanley and C. H. McLeod, Montreal.

The membership roll of the society is now about three thousand.

Personal Items and Notes

Following a visit from Mr. E. T. Nesbitt, of Quebec, president of the Canadian National Association of Builders, the Edmonton Builders' Exchange passed a unanimous resolution in favor of affiliating with the larger body.

Mr. A. J. Matheson, C. E., left Temiskaming last week for British Columbia. Upon his departure the engineers of the Georgian Bay and Ottawa water storage survey presented him with an address and a gold watch and chain.

The 5th annual convention of the Union of New Brunswick Municipalities will be held at Woodstock, N. B., Oct. 19-20. Particulars may be obtained upon application to the secretary, Mr. J. W. McCready, Fredericton, N. B.

Permits issued at Winnipeg, Man., up to the end of September, totalled \$13,132,800, compared with \$8,369,750 for the nine months of 1909. 2,799 and 2,112 permits were issued in these periods respectively. The total for the month of September was \$804,400, compared with \$802,950 for September, 1909.

Building activity is reported from Owen Sound, Ont. The Corbet Foundry & Machinery Company are erecting a new building, the North American Furniture Company are starting a new factory and Wm. Kennedy & Sons, manufacturers of iron and steel castings, turbine water wheels, etc., are making important extensions.

The Ontario Motor League suggests that a tax of fifty cents per horse power be imposed on all automobiles in the province, the proceeds therefrom to be appropriated towards the Government grant for good roads, which would raise it from one-third to one-half. A deputation from the league will consult with Mr. W. A. McLean, Provincial Engineer of Highways.

Building permits issued at Moose Jaw, Sask., up to September 20, 1910, represent a total value of \$990,790, as compared with \$467,390 for the corresponding period of 1909, an increase of more than 100 per cent. Civic improvements at Moose Jaw this season include \$395,000 for sewage disposal works, \$20,000 for street railways, \$140,000 for new telephone system, \$40,000 for sidewalks, \$20,000 for water main extensions, and \$10,000 for improvements at the Exhibition grounds.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Belleville, Ont.

The council decided to put asphalt pavement on Front street and a sewer on Front between Victoria avenue and Dundas streets.

Biggar, Sask.

It is proposed to expend about \$15,000 for waterworks improvements. J. Lukey, city, secretary-treasurer.

Brandon, Man.

The ratepayers will vote at an early date upon a waterworks by-law to issue \$50,000.

Chilliwack, B.C.

Immediate steps will be taken towards the acquiring of water rights on Ford creek. On the granting of this, a company will be organized to install a system of waterworks to provide Rosedale with water for domestic and fire purposes.

Esquimalt, B.C.

It is announced that Mr. James Duns-muir will advance the money on bonds, thus giving this district the opportunity to install a sewerage system. J. A. Mohun, Messrs. J. Jardine, M.P.P., and H. Pooley waited on the government.

Fort William, Ont.

The Board of Works authorized the city engineer to pave the roadway in front of the C.P.E. station. Estimated cost, \$7,000, will be borne by the company.

Hull, Que.

The addition to the Hull pump house is nearly completed and the set of pumps, with the capacity of 7 million gallons a day, will be installed this fall. They are being furnished by William Hamilton Co., of Peterboro.

Ladysmith, B.C.

The awarding of contract for cement sidewalk was laid over for another week. The Worswick Paving Company, the Pacific Coast Construction Company and Parfitt Bros., of Victoria, have tendered.

New Westminster, B.C.

The by-law authorizing the raising of \$70,000 for building sidewalks throughout the municipality of Burnaby was carried. Work will commence at once and separate tenders called for the construction.

New Glasgow, N.S.

Contract will probably not be let until spring for the proposed waterworks. J. Roy, town clerk.

North Vancouver, B.C.

Tenders addressed to G. S. Hanes, city engineer, will be received until October 31st for supplying and delivering a 15-ton road roller.

Tenders were called until October 24th for supplying 1,400 lin. feet of 18 inch vitrified clay sewer pipe, 1,350 lin. feet of 15 inch vitrified clay sewer pipe, 14 junc-

tions of 18 inch and 16 junctions of 15 inch. G. S. Hanes, city engineer.

Ottawa, Ont.

The first summer under the good roads system, the County of Carleton has graded and gravelled about 25 miles and macadamized about 4 miles. R. W. Farley is engineer. The work this summer will cost about \$20,000.

Petrolia, Ont.

Bids will be received until Nov. 1 by J. McHattie, town clerk, for constructing about 6,500 square yards vitrified brick pavement with cement curb and gutter. C. A. Jones, town engineer, Petrolia.

St. Catharines, Ont.

Tenders were called until October 24th for construction of bitulithic pavements here. J. A. Pay, city clerk.

A by-law will be voted on in January by the ratepayers to issue \$75,000 waterworks debentures.

Toronto, Ont.

Tenders for asphalt and bitulithic pavements, concrete curb, and walks and sewers on various streets are called until Nov. 1st. R. G. Geary, chairman Board of Control.

Vancouver, B.C.

See "Business Buildings."

Victoria, B.C.

The plan of the Douglas street widening from Humboldt street through to Beacon Hill Park has been approved of by the Streets Committee. Noted in last issue.

Extensive additions to the city's sewerage system were recommended by the city engineer in his report. The extensions are estimated to cost in the neighborhood of \$235,000, the chief portion of the work being the extensions in that part of the city north of Edmonton road and east of Cedar Hill, where no sewer system is at present installed. \$88,000 will be required to build sewers in this locality within the city limits, and \$12,000 for an outlet in Oak Bay municipality, and for the construction of a septic tank near the sea. There will also be required extensions to the old system, principally in the Cook street and Fairfield section, amounting to \$41,300, and in the section in the vicinity of Hillside and Blackwood streets, amounting to \$47,000. There will also be required additional extensions in Hollywood Park, amounting to \$11,500. In the vicinity of Douglas street and Burnside road sewers will be required and a septic tank needed, the cost amounting to \$21,600. There should be \$9,400 spent in Victoria West and \$3,800 in James Bay, in all \$235,000. This scheme is exclusive of the \$46,400 to be immediately used for sewerage extensions which have been authorized.

Tenders for paving Vancouver street between Pandora avenue and Burdette avenue were as follows: Worswick Paving Company, on standard specifications prepared by the city engineer, \$2.25 per sq.

yard for pavement and 65 cents per yard for removing material, a total of \$42,820. Alternative bids for a pavement according to the company's own specifications were submitted of \$1.70 and \$1.40 per square yard, the total figures being \$33,630 and \$28,590 respectively. The city engineer's tender was on his standard specification at a cost of \$1.90 per yard and 80 cents for removing material, a total cost of \$38,160. Westrumits, Limited, bid on the standard specification at \$2.25 per square yard and 60 to 70 cents for removing material, a total cost of \$42,680, and submitted also an alternative bid of \$1.68 per yard for pavement and 60 to 70 cents for removing material, a total of \$32,604; and a second alternative bid of \$1.46 per yard, a total of \$18,064. The tenders were referred to the city engineer.

AWARDED.

Blairmore, B.C.

The Dominion Wood Pipe Company, Limited, New Westminster, are supplying the wire wound wood pipe required for the installation of waterworks here.

Montreal, Que.

The contract for installation of filtration plant for the Montreal Water & Power Company is in the hands of Messrs. Laurin & Leitch, Montreal.

Ottawa, Ont.

The Ottawa Construction Company were awarded contract for asphalt pavements on Wellington street, Flora street and Melgund avenue, at \$15,586, \$20,560 and \$4,395 respectively. The Barber Asphalt Company got the contract for Anne street, \$1,900. N. H. H. Lett, secretary, Board of Control.

Oshawa, Ont.

Tenders for extension of outfall sewer were received as follows: W. T. Gibson, Port Hope, Ont., \$5,300 (accepted); T. Reid, Brantford, \$6,100; McKnight Construction Company, Toronto, \$6,216; J. W. Rittton, Kingston, Ont., \$6,350; J. Hartnett, Toronto, \$5,737. Frank Chappell, engineer in charge.

St. Andrews, N.B.

The contract for the excavation and laying of the water pipes from Chamecock lake to this place has been awarded to Joseph McVey & Son, St. Stephen.

Walkerville, Ont.

Tenders were opened for the construction of a lateral sewer between Argyle and Devonshire roads, and the contract given to Mr. Thomas Chick, Windsor.

Railroads, Bridges and Wharves

Annapolis Royal, N.S.

Tenders are being called until November 8th for construction of two ice piers here by the Public Works Department. R. C. Desrochers, secretary.

Belleville, Ont.

The council will leave the matter of decision to the Board of Railway Commis-

sioners regarding the number of piers for the proposed new bridge to be built over the river by the C.N.R.

County of Ontario, Ont.

On November 29th a by-law will be voted on to issue \$20,000 4 per cent. 20 year bridge debentures.

Cobourg, Ont.

Instead of the proposed union subway of the C.N.R. and G.T.R., the former railway company has decided to build its own subway, and its request has been acceded to by the Railway Commission. The subways will be where the railways cross Division street, and about 600 feet apart.

Fredericton, N.B.

It is expected that the report of the survey and estimates of cost of construction for the St. John River Valley Survey will be presented to the Provincial Government by the end of the year.

Hull, Que.

Joseph Cousineau, of Gatineau Point, according to a 3-year old agreement with the City Council, will spend the sum of \$5,000 on repairs to the Gatineau bridge.

Moose Jaw, Sask.

The finance committee brought in a recommendation that, pursuant to the order of the Railway Commissioners, the city engineer prepare necessary plans and specifications for a subway under the C.P.R. tracks, to provide for not more than five tracks side by side as closely as they can be constructed safely, at the point known as the Eleventh avenue crossing.

North Sydney, N.S.

It is stated that tenders for construction of wharf at the ballast heap will be called soon. Estimated expenditure, \$50,000. Plans will be prepared for breakwater at Point Aconi. Estimated expenditure, \$20,000. Mr. Bernsconi, C.E., is engineer in charge.

Quebec, Que.

The plans for the bridge which is to join Quebec to Limoilou over the River St. Charles have been completed and submitted to Hon. L. A. Taschereau, Minister of Public Works. The proposed trusses of the bridge will be 240 feet long and 52 feet wide, and will consist of two car tracks, two foot passenger tracks and two carriage-ways. L. A. Valle, Provincial Public Works Engineer.

Toronto, Ont.

The C.P.R. and city have agreed on the following: a 30-foot subway at Scarlet road; a 26-foot subway at Jane street; a 56-foot subway at Elizabeth street.

The Board of Control decided on an appropriation of an additional \$15,000 to put in a new span over the Don at the Queen street high level bridge, the old one, according to the City Engineer, not being in sufficiently good condition to warrant placing it in the new structure.

Vancouver, B.C.

The Minister of Railways has approved, with certain restrictions, the plans of the Burrard Inlet Tunnel & Bridge Company for the bridging of the Narrows.

Wallachin, B.C.

Tenders are called until Nov. 28th by Public Works Department, Victoria, for erection of superstructure of 2 span steel bridge over the Thompson river near Wallachin (formerly Penny's) a station on the line of the C.P.R., 218 miles east of Vancouver; also for erection of substructure for same bridge. Tenders are also

called for the manufacture of superstructure for bridge, delivered and unloaded. Drawings, etc., at office of E. McBridge, road superintendent, C.P.R., 39 Fairfield building, Granville street, Vancouver, and at office of the Public Works Engineer, F. C. Gamble, Victoria.

AWARDED.

Montmagny, Que.

Contract for wharf extension has been awarded to E. Boulanger, Montmagny, \$5,250.

Shelburne, N.S.

Contract for wharf here was awarded to F. A. Ronnan & Company and D. Stewart, of Halifax, \$24,790.

Warton, Ont.

Contract for breakwater extension in Colpoys Bay was awarded to Kastner & Porter, Warton, \$13,990.

Public Buildings, Churches, Schools, etc.

Belleville, Ont.

A by-law was introduced at Council to provide for \$30,000 for erection of public school and site.

Dunnville, Ont.

Tenders addressed to J. W. Holmes, town clerk, will be received until November 1st for \$30,000 school debentures.

Dresden, Ont.

Tenders are being called until November 9th for construction of post office building here by the Public Works Department, Ottawa. R. C. Desrochers, secretary.

Edson, Alta.

Tenders addressed to J. Bruce Walker, Commissioner of Immigration, Winnipeg, Man., will be received until Oct. 31st for immediate erection of Dominion Emigration Halls. Tenders are also called for erection of same at Entwistle, Alta. Tenders may be for both halls, or for each hall separately. Plans, etc., at office of Mr. Manson, clerk of Dominion Public Works Department.

Fort William, Ont.

At the annual meeting of the hospital board it was decided to spend within the next twelve months about \$25,000. A new nurses' home, a larger kitchen, refrigerating plant, etc., are some of the needed improvements.

High River, Alta.

Tenders are being called until November 2nd for construction of armory here by the Public Works Department, Ottawa. Plans, etc., at office of W. Womerton, High River, and at office of J. J. O'Gara, architect, Calgary.

Hull, Que.

An option has been taken on 80 acres of land on the Aylmer road by a syndicate, chiefly of American capitalists, on which it is proposed to erect large stables, grand stand and construct a race course.

Lethbridge, Alta.

Tenders addressed to John Stocks, Deputy Minister of Public Works, will be received until Nov. 5th for supplying and erecting of electric lighting fixtures for the court house here. Specifications at engineer's office, public works, etc.

Montreal, Que.

The Hebrew community are anxious to obtain possession of the Labor Temple. If

the deal goes through it is understood that the present building will be pulled down and a synagogue erected.

The Jesuit Order has purchased a large block of land back of the mountain as a site for the new college building. Work has been started on clearing off the land preparatory to the commencement of building operations.

At the annual meeting of the Montreal Foundling and Baby Hospital, the question of erecting a new building to cost \$100,000, was discussed, and it was decided to appeal to the public for the funds. Miss D. M. Robertson, secretary.

Newmarket, Ont.

Tenders addressed to J. E. Hughes, town clerk, will be received until November 3rd for sale of \$15,000 debentures for high school purposes.

North Battleford, Sask.

The Council have agreed to meet the wishes of the Sisters of the Order of Providence, Montreal, in regard to the proposed hospital here. Estimated expenditure, \$50,000.

The provincial government has decided to locate the provincial asylum here on the banks of the Saskatchewan river.

New Westminster, B.C.

A local syndicate will, it is stated, erect a theatre of brick and concrete. Estimated cost, \$150,000. Work to be finished by August, 1911.

Ottawa, Ont.

Tenders for the electric fixtures for the city hall are being received by C. P. Meredith, architect.

The Woman's Auxiliary of St. Luke's hospital will have a conference with the hospital board in regard to the building of an up-to-date laundry in connection with the institution.

An addition to the children's ward of Water street hospital is contemplated.

Permit has been issued to Dominion Government for addition to East Block, \$222,800; Doran & Devlin, contractors.

Ponoka, Alta.

Tenders addressed to John Stocks, Deputy Minister of Public Works, will be received until Nov. 5th for supplying and erecting of electric light fixtures for asylum here. Specifications at Department of Public Works, Edmonton, at the branch office of the Department, Calgary, and at the inspector's office, Lethbridge.

Regina, Sask.

The Dominion Government received a permit for brick dwelling at the barracks, \$15,000.

St. John's, Que.

It is proposed to erect a curling ring beside the skating rink. Major Parke, or G. P. Smith are interested.

South Vancouver, B.C.

W. T. Broderick, a Cedar Cottage real estate agent, is calling for tenders for the erection of the Orange Hall near the station.

Toronto, Ont.

Tenders are being called for trades required in the erection of fire hall on St. Clair avenue until Nov. 1st. Advertisement in "Tenders and For Sale Department" of this issue.

The city architect has granted the permit for the erection of the medical wing of the proposed new General Hospital. It will be erected on College street, and will

be three storeys in height, with basement. The cost will be \$250,000.

Vancouver, B.C.

Plans for the campaign for raising \$500,000 for the purpose of building new quarters for the Y.M.C.A. were considered favorably at a meeting of the directors recently. E. W. Keenleyside, president; Mr. J. M. Graham, secretary, and Mr. C. R. Sayers, field secretary for Western Canada.

Winnipeg, Man.

The city solicitor has been instructed to frame a by-law to provide ultimately over \$2,000,000 for a new city hall on the site of the present one. Alderman Douglas is interested.

AWARDED.

Arthabaska, Que.

The contract for public building here was awarded to Paquet & Godbout, St. Hyacinthe, Que., \$22,000.

Battleford, Sask.

The contract for post office here was awarded to M. A. Pigott & Son, Hamilton, Ont.

Brampton, Ont.

The contract for temporary market building, 18 x 60 feet, has been let to W. B. McCulloch.

Brandon, Man.

The contract for brick work on city stables was given to J. Chambers. Work will be done by city, city supplying material. A Struthers is in charge. W. A. Elliott, architect.

Fredericton, N.B.

Contracts for the new school building on the Weldon lot were awarded as follows: P. Mooney & Sons, masonry, \$22,195; R. J. Green, carpenter work, \$13,500; J. E. Wilson & Company, steel and fire escapes, galvanized iron and steel ceilings, \$5,115; J. H. Pullen, painting, \$1,440; R. E. Fitzgerald, plumbing, \$3,715; J. H. Doody, heating and electric wiring.

Fort William, Ont.

M. H. Braden, this city, has been awarded the contract for erection of police station and court house here, \$50,251. The contract for the heating plant and plumbing was awarded to the Fort William Hardware Company, \$5,064.

Halifax, N.S.

The Halifax Canadian Club has accepted the tender of Mr. S. M. Brookfield to build a memorial tower at a cost of \$23,960. The tower is to be completed July, 1911.

Kaslo, B.C.

The contract for the erection of the new court house has been awarded to John Burns & Son, Nelson. It is understood the building will be completed and ready for occupancy not later than next autumn. The contract price is given at \$27,560.

Marieville, Que.

The contract for the public building here was awarded to Lachance Bros., of Ottawa, \$16,300.

Moose Jaw, Sask.

The contract for erection of curling rink here has been let to Thos. Grayson, this city, for \$10,185. Storey & VanEgmond, architects, Regina.

Montreal, Que.

The general contract for erection of church on St. Zotique street has been awarded to Messrs. Bonnell Bros. contrac-

tors, Guy street. J. R. Gardiner, Quebec Bank Building, architect.

Niagara Falls South, Ont.

T. E. Ferris was awarded the contract for building the new south end fire hall, \$5,000. Work to be completed by February 1st, 1911.

Ottawa, Ont.

R. W. & C. Lester have been awarded the contract for the excavation and foundation of new Bethany Presbyterian church. J. A. Ewart, architect.

Smith Brothers have been awarded the contract for erecting the model dairy at the Exhibition grounds, an addition to the fat stock building. It will be concrete up to the windows and iron-clad for the remainder. Cost \$6,000. Plans have been approved by Provincial Government.

Smith's Falls, Ont.

The contract for erection of new collegiate institute here was awarded to John Davidson, \$38,100.

Victoria, B.C.

Contracts have been let by the provincial government for the construction of the Central School at Fort Langley, at a cost of \$3,000; to Mr. John L. Bruge, for the construction of a school on Graham Island, at a cost of \$2,325; and to Mr. W. G. Simpson, for a school at Okanagan Landing, at \$1,750.

Waterloo, Ont.

The contract for public building here was awarded to L. B. Lachance, of Ottawa, at \$36,975.

Residences

Calgary, Alta.

Building permits were issued recently to S. H. Haslam, two \$4,000 frame houses on Fourteenth avenue, between Sixth and Seventh streets, also frame house, \$2,000, on Sixteenth avenue, between Tenth and Eleventh streets; Lee Goulding & Company, \$2,500, frame house on Mission property; G. A. Allan, \$2,000, house on Thirteenth and Fifteenth street west.

Ottawa, Ont.

The building permits include: R. P. Moodie, dwelling, Fentiman avenue, \$2,500; McArthur Brothers, builders; M. Korn, dwelling, Bell street, \$2,200; Daniel O'Byrne, dwelling, Gladstone avenue, \$2,500; Victor Realty Company, dwellings, Monk street, \$8,000; G. Tomlinson, builder; J. B. Cannon, dwelling, Irving street, \$4,500; N. Hollister, builder; W. F. Fraser, dwelling, Arlington avenue, \$4,000; Augusta Boehmer, dwelling, Shanley avenue, \$2,500.

St. Boniface, Man.

The following permits for dwellings were taken out: J. A. Senecal, Mason street, \$5,300; alterations to house on Mason street, \$2,500.

Toronto, Ont.

The Provident Investment Company have sold to W. O. McTaggart 600 feet of vacant land on Primrose avenue. Houses will be built on the property.

Victoria, B.C.

Building permits were issued to Lorne S. Bell for three dwellings on Oscar street to cost \$6,250; to William Dunford & Sons, dwelling on Chamberlain street to cost \$2,400; to G. H. Barnard for a dwelling to be erected on Rockland avenue, \$4,000, and to Mrs. I. Staples for a dwelling on Lansdowne avenue to cost \$2,200.

AWARDED.

Calgary, Alta.

W. M. Johnston has been awarded the contract for the erection of 3-storey residence for Lt.-Col. Walker. Estimated cost \$10,500. Size, ground floor, 38 x 40; Lang & Dowler, architects.

Victoria, B.C.

Mrs. K. C. Wilson has awarded contract to D. H. Bale for residence on Admiral Rd.

Business Buildings and Industrial Plants

Burton, N.B.

The McLellan-Smith Lumber Company, it is stated, will rebuild their mill which was destroyed by fire on the 16th inst. Estimated loss, about \$7,000.

Berlin, Ont.

The Wunder Furniture Company are erecting a large addition to their furniture factory.

Buckingham, Que.

A stable and carriage house for Alex. MacLaren will be built at Buckingham. J. P. MacLaren, architect, of Ottawa, is preparing plans.

Carlyle, Sask.

Marlatt & Clarke Company, Fort Atkinson, Wis., are negotiating for the establishment of a creamery here. One is already under way in North Portal. H. Vandoozar, representative.

Calgary, Alta.

We are informed that the business block mentioned in October 12th issue will be five storeys, of solid brick with concrete basement. Estimated cost, \$120,000. Architect, D. S. McIlroy, this city; owner, Thos. Underwood, Box 91, Calgary.

Tenders were called until October 22nd for excavation and concrete work required in the erection of business block for Wendell Maclean. Messrs. Lang & Dowler, Room 17, Alexander Corner, architects.

Duncan, B.C.

A committee composed of G. H. Hadwen, W. H. Elkington and others were appointed to prepare a report on proposed fruit canning and packing plant. W. Hanham, of the Bank of B. N. A., secretary-treasurer.

Emard, Que.

It is expected that contractor C. E. Deakin will start this fall building the plant for the Canadian Tube Company on St. Patrick street. Site purchased covers 5½ acres.

A conjecture is abroad that the recent purchase of 65 acres attributed to the C.P.R. is for factory sites. H. Hadley, ex-mayor of Verdun is interested.

Elmwood, Man.

The Stewart Sheaf Loading Company will erect a factory here in the rear of the Western Iron Works, on Union avenue, for the manufacture of sheaf loaders. The plant will be in operation in time to supply next season's demand.

Edmonton, Alta.

From press reports we learn that the application made by H. E. Davis, of Pittsburgh, for a permit to erect an 8-storey building on Jasper avenue, at a cost of \$1,500,000, was fraudulent. The applicant has disappeared.

Fort William, Ont.

Hugh Armour & Company have been incorporated for the purpose of erecting a

large abattoir and cold storage plant. The men chiefly interested in the company are Hugh Armour and Robert Armour, of this city, and Mr. Paisley, of Scotland. Capitalization, \$250,000.

Franklin, Man.

R. L. Campbell's elevator was destroyed by fire on the 14th inst.

Goderich, Ont.

It is stated that a representative of Chicago and Duluth interests has been looking over the ground with a view to the erection of a 5,000,000 bushel elevator.

Harriston, Ont.

On October 24th the town passed a by-law granting free site and factory building to the Canada New Shoe Company, Limited.

Hamilton, Ont.

We are informed that the Acme Motor, Carriage & Machinery Company, Limited, mentioned in issue of October 19th, will start operations at once on their new building. The intention is to erect three buildings, 600 x 60, one storey, corrugated iron roofing and siding, but only one will be erected this year. The plans are in the hands of a Detroit automobile factory. F. J. Woods, Waldorf Hotel, representative of the American Road Machine Company, is local manager.

The Canada Steel Company has taken out a permit for a frame and corrugated iron mill building, 210 x 70 feet, and one storey high. It will be located on Sherman avenue north, and will cost \$10,000. The entire plant, when finished, will cost about \$400,000.

Halifax, N.S.

H. E. Macarthur's woodworking factory was destroyed by fire on the 20th inst. Loss about \$5,000.

The Traders Bank are said to be interested in the purchase of a building site on Granville street.

Maisonnette, Que.

The branch of the Bank of Toronto to be erected here will cost, it is stated, about \$25,000; the Tetrault Boot & Shoe Company will erect a new factory building.

Medicine Hat, Alta.

The by-law granting site to the Alberta Iron Roller Mills Company was carried. Work is expected to commence on the 24th inst.

Montreal, Que.

A building permit was issued to St. Lawrence Flour Mills Company, Limited, Notre Dame street, for 6-storey mill building, \$50,000.

Montreal, Que.

Marler's garage, 431 Guy street, was destroyed by fire on the 18th inst. Total estimated loss, \$50,000.

New Westminster, B.C.

The Cloverdale hotel and Bernard & McIlroy's livery barn were destroyed by fire recently. Total loss, \$8,500.

Port Arthur, Ont.

The Port Arthur Wagon Company have deposited their guarantee in connection with the proposed large factory to be erected here.

Ottawa, Ont.

Tenders were called until October 24th for the stone, brickwork and fireproofing for new baking premises on Catherine St.

for the Slinn-Shouldis, Limited. James Mather, architect, 110 Wellington street.

Permit was issued for C.P.R. warehouse, Botelier street, \$3,500. E. G. Laville, builder.

S. Kronick will convert a double tenement on St. Patrick street into stores, and L. Rosin has purchased another tenement on the same street to be converted into a commercial property.

Work on the new Blackburn building has been discontinued as the result of an interim injunction issued against the owners, which prevents them using a certain yard which forms part of the site of the new building.

Penetang, Ont.

Tenders were called until October 25th for the trades required in erection of foundry building here. Forster & Clark, architects, Owen Sound.

Quebec, Que.

It is understood that a company, not yet incorporated, will take over the Price limits and lumber mills here and that a large paper making plant to handle the raw material will be erected. Notice was given in last issue of the increased capitalization of Price Bros., Limited. W. M. Aitken, of Montreal, is interested. Location of mill probably at Lac au Sable.

Tenders will be received by R. P. LeMay, architect, up to November 4th, for the construction of an office building for the Quebec Railway, Light, Heat & Power Company.

For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Mr. Wm. Wainwright, 2nd vice-president G.T.P., is authority for the statement that a large hotel will be built here.

Price Bros., Limited, are reported to be planning the erection of a large paper mill at Lac au Sable, Saguenay county.

Regina Sask.

Permits were issued to E. J. Blaquer for brick warehouse on Rose street, \$17,000; to P. McArara, Jr., brick garage on Albert street, \$10,000.

It is again stated that the Hart-Farr Company, a United States firm, will locate a branch here, a site being selected in block 186. W. H. Williams, representative.

The plans have been approved and permit secured for the plant to be erected by the Canadian Overland Company, Limited. Messrs. McArara Bros. and Wallace are in charge of the erection.

Stellarton, N.S.

H. S. McArthur's factory was destroyed by fire recently. Estimated loss, \$10,000.

Sault Ste. Marie, Ont.

It is understood that the Hearst interests are interested in the proposed establishment of a pulp mill by a syndicate of American newspaper proprietors, including capitalists in Chicago and San Francisco.

St. Boniface, Man.

The Rice Milling Company of Canada has taken out a building permit for their plant in St. Boniface, amounting to \$252,500. The size of the building is 280 by 86 feet, the portion containing the elevators being 60 by 40 feet and 138 feet in height, while the engine room is 40 by 28. It is expected that the plant will be ready for operation in about three weeks' time.

The Winnipeg Ceiling & Roofing Company, on lot 31, was given a permit for a

plant 160 feet long and 110 and 80 wide, costing \$59,000, which will be completed and ready by January.

Tilbury, Ont.

The vote on the auto top by-law was carried.

Toronto, Ont.

The north-west corner of Peter and Richmond streets has been purchased by George Weston for \$15,000. A biscuit factory will be erected on this site in the near future.

The Dayton Scale Company have purchased through the Provident Investment Company 200 feet of vacant land on Campbell avenue, near Boyce street, wherein a branch of the Dayton, Ohio, works will be erected.

The C.P.R. has purchased more property beside the present office, corner King and Yonge streets. Eventually a large central office building will be erected. Work on the tearing down of the Rogers building purchased previously has begun. This will give room for the extension of the ticket offices.

Victoria, B.C.

It is understood that plans will be drawn up within a short time for the erection of the five or six storey building for the Union Bank of Canada on Government St. G. H. Balfour, general manager. Noted in issue of Sept. 21.

Vancouver, B.C.

The Westrumite Limited, of Brantford, Ont., are preparing to erect a plant in Victoria or in this city. L. S. Van Westrum, president.

Tenders are asked for excavation for the new 12 storey Standard Building at the south-west corner of Homer and Pender streets to be erected by the Consolidated Buildings, Limited. Bids are also being called for the steel work. Architects, Donellan & Donellan, 219 Pender street.

A new four storey annex to the Hotel Vancouver, with a frontage of 125 feet on Robson street and a similar frontage on Howe street, and a depth of 40 feet, will be built immediately. Brick will be the material used, and the architecture will conform as nearly as possible to the new wing of the present main structure. Tenders for excavation work and the foundations were called on the 11th inst.

Among the building permits issued this week was one to Mr. E. E. Hewson covering a three storey brick block on Richards street just south of Georgia street. The building will be three storeys in height and is planned for stores and apartments, the expectation being the new tramline on the street will lead to its being developed as a retail business centre. The estimated cost of the building is \$36,000.

Important announcements of proposed terminal improvements to be made here by the Canadian Pacific Railway were announced by Mr. William Whyte, of Winnipeg, second vice-president. They include better accommodation at the station, better wharfage facilities and double elevator capacity.

Woodstock, N.B.

The Fleming Gibson, Limited, organized recently, will erect on their newly acquired property near McAdam Junction, a new mill to manufacture lumber. They have a contract for supplying 25,000 railroad ties. Capitalization, \$24,000. J. Gibson, Benton, president; M. L. Hayward, Hartland, secretary-treasurer; Hon. J. K. Fleming, managing director.

Winnipeg, Man.

Mr. D. Van Doresser, secretary-treasurer, Winnipeg Tanning Company, Limited, writes that no changes are contemplated in the Mullins tannery, acquired recently, until next year. Noted in last issue.

E. R. Gabett, consulting engineer of a large British firm engaged in manufacturing creosote, is in the city collecting data for the establishment of a large plant for the manufacture of creosote and allied products.

Negotiations with the city have been completed by the Ontario Wind Engine & Pump Company in regard to their locating here. The proposed plant will be five storeys of brick and stone. Estimated expenditure, \$100,000. Foundation will probably be put in this fall. J. M. Reid, representative.

Ymir, B.C.

The Active Gold Mining Company are making preparations to install a sawmill at Porcupine Creek. P. V. Loth, secretary-treasurer.

AWARDED.**Calgary, Alta.**

J. H. Gunn & Company, this city, has been given the contract for basement only of the business block to be erected for Thos. Underwood. D. S. McIlroy, architect.

Cobourg, Ont.

The C. N. O. Railway has let the contract for its station here to Martin, Jex & Company, contractors, Cobourg, who also have the contract for the mason work in the Port Hope station.

Montreal Que.

Contract for electric wiring of the new store building for Messrs. A. E. Rea & Company, Limited, have been awarded to the Sayer Electric Company, 14 Beaver Hill. General contractors, Byers & Anglin, 18 St. Alexis street. Architect, A. F. Dunlop, Lindsay building.

General contract for erection of store on St. Catherine street west for Mr. A. Larue has been awarded to R. Brouillet, contractor, 79 St. Elizabeth street. Architect, A. St. Louis, 80 St. Gabriel street.

Winnipeg, Man.

A. B. Ormsby, Limited, Toronto, received the contract for the sheet metal, copper and roofing work for the new Bank of Montreal now being erected at the corner of Portage avenue and Main street.

Power Plants, Electricity and Telephones

Brandon, Man.

City Engineer Speakman has completed his investigation of the hydro-electric power scheme submitted to the city by the Western Power & Light Company.

Belleville, Ont.

It is stated that Electro Power Company has taken over charter held by local men and that on January 1st the company will apply for the necessary concessions to enable them to build and operate here.

Cochitiam, B.C.

The Western Canada Power Company's by-law was carried. William McNeill, manager.

Duncan, B.C.

The electric light by-law was passed on the 8th inst. The electrical engineer who has been installing the electric plant in Stewart has been sent for and will begin

operation. The Eaton property has been secured and a brick building will be put up. At present the electricity will be generated by steam.

Edmonton, Alta.

In view of the action of Mr. A. Violette in seeking to establish prior rights in development of power on the Athabasca river which the city of Edmonton proposed to develop, Commissioner Bouillon, acting under instructions from the city council, it is stated, has taken up the matter with the Minister of the Interior, to ascertain the position of the city's claim, and to safeguard its interests.

Fort Frances, Ont.

The construction of the Rainy River Railway is being discussed. Engineer, G. A. Knowlton.

Lethbridge, Alta.

See "Public Buildings."

Nanton, Alta.

Tenders will be received until Nov. 15 for \$7,500 5 per cent., 20 year, electric light and fire protection debentures. W. Robertson, secretary-treasurer.

Ottawa, Ont.

See "Public Buildings."

Ponoka, Alta.

See "Public Buildings."

Phoenix, B.C.

The B. C. Copper Company has commenced construction on their aerial tramway from Lone Star mine in Washington State to Boundary Falls, B.C. (five miles). Estimated cost, \$75,000.

Port Hope, Ont.

Col. Ward, K.C., announces that the Ontario Government Cabinet has passed an order in council granting lease of land for power sites at Burleigh Falls to the Central Ontario Power Company, the owners, and also lessees of the Dominion Government of power and also use of canal dam and works.

Regina, Sask.

The money by-law to raise \$100,000 for street railway purposes was carried.

A serious proposition is confronted by this city in the form of an inadequate plant for supplying the amount of electrical energy to supply the light and power necessary and this in spite of the installation of a new unit last spring. The present equipment is badly overloaded, resulting in no less than three breakdowns in one day.

Renfrew, Ont.

The power house of the Renfrew Electric Company here, owned by the town, was destroyed by fire on the 21st inst. Manager, A. A. Wright.

Debentures to the amount of \$117,000 are being offered by the town of Renfrew, the proceeds to be used for the construction of a municipal plant and distributing system for electricity in connection with the Hydro-Electric Power Commission plant.

Sherbrooke, Que.

Plans are being prepared by Messrs. Ross & Holgate, of Montreal, Que., for the construction of a new power house on the Magog river. The proposed plant will develop about 3,000 h.p.

Stratford, Ont.

The Light & Heat Commission are considering alterations to the old electric

power station. Architect Hepburn has prepared plans and tenders will be called.

St. John, N.B.

James Kent, general manager of the C. P.R. Telegraph Company, foreshadows an extension of the company's lines along the Dominion Atlantic Railway.

Vancouver, B.C.

The plans of the local syndicate which has recently applied for a charter to build a scenic mountain railway provide for one similar to that up Mt. Tamapais in California. Those behind the application are said to be Messrs. Macdonell & Gzowski, engineers and railway contractors; Chas. H. Allen, barrister, formerly of Winnipeg, but now of this city; Mr. Geo. M. Grobs, former manager of the Dawson branch of the Canadian Bank of Commerce and now a local broker; and Mr. Walter E. Graveley, of the firm of Hope, Graveley & Company, of this city. A tourist hotel and cottages would probably follow.

Winnipeg, Man.

M. Peterson, secretary Board of Control, writes that the purchase of the motor car for tramway has been deferred for the present.

Tenders addressed to Chairman, Board of Control, will be received until Nov. 2nd for supply of 25,000 carbons for series alternating enclosed are lamps, one half to be corded, the other half solid. Specifications at office of the city engineer.

Yorkton, Sask.

A deputation of citizens will visit several American cities in order to get data regarding steam or gas producer plants. The town will install one or the other shortly.

AWARDED.**Maissonneuve, Que.**

The contract for lighting the streets for ten years was awarded to the Dominion Light, Heat & Power Company. Arc lamps of 2,000 c.p. at a rate of \$80 each will be furnished.

Ottawa, Ont.

The Ottawa Electric Railway Company has given the contract for building 18 new "pay-as-you-enter" cars to the Ottawa Car Company.

Toronto, Ont.

The McGuigan Company has the contract for erecting ten sets of concrete piers to support the steel towers for carrying the Hydro-Electric cables from a point opposite the High Park gate to within a short distance of the Exhibition grounds.

Winnipeg, Man.

The contract for the supply 5,000 pounds No. 6 waterproof copper wire, 3,000 pounds No. 8 waterproof copper wire and five miles galvanized iron wire with waterproof insulation has been awarded to E. F. Phillips Electrical Works, Winnipeg.

Miscellaneous

Hamilton, Ont.

The following building permits have been issued: Mills & Hutton, brick dwelling, corner Westmoreland and Delaware avenues, for H. S. Lees; E. B. Patterson, brick dwelling on Argue street, for J. J. Hobson, \$2,000; William McFarland, brick dwelling on Fairleigh avenue, \$2,200; Weeks & Atorrell, brick dwelling on Sanford avenue, between Main and Delaware avenue, \$2,200; Stewart & Witton, factory for the Gurney Scale Company, \$3,500; W.

(Continued on page 31)

Tenders and For Sale Department

Debentures for Sale

Sealed tenders addressed to the undersigned, marked "Tenders for Debentures," will be received up to 8 o'clock p.m. NOVEMBER the FIRST, 1910, for \$30,000 School Debentures for the Town of Dunnville, Ont., interest at the rate of four and one-half per cent. per annum, payable at the Canadian Bank of Commerce, Dunnville, in annual instalments of both principal and interest. No tender necessarily accepted.

J. W. HOLMES,
Town Clerk.

Dunnville, Ont., Oct. 13, 1910. 43

The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Street Railway Material," until the SEVENTH DAY OF NOVEMBER, at 12 o'clock noon, for supplying to the City of Calgary Rails, Cars, Equipment and Overhead Material for extensions to Municipal Street Railway.

Full particulars and specifications may be had on application to the Commissioners, City of Calgary; marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

Specifications are also on file at the office of the Contract Record, 504 Confederation Life Building, Toronto.

The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910. 43

The City of Calgary

Sealed tenders will be received by the Commissioners of the City of Calgary and addressed to the undersigned marked "Tender for Erection of Bridges," until the SEVENTH DAY OF NOVEMBER NEXT, at 12 o'clock noon, for the erection of steel bridges, one across the Elbow River at Twelfth Ave., and the other across the Elbow River at Second Street East.

Full particulars and specifications may be obtained from the Commissioners, City of Calgary, on application.

A marked cheque covering 5 per cent. of the amount of the bid must accompany each tender. The lowest or any tender not necessarily accepted.

W. D. SPENCE,
City Clerk.

Dated at Calgary, Sept. 28th, 1910. 43

Debentures for Sale

Offers will be received by the undersigned up to the FIRST DAY OF NOVEMBER NEXT, for the purchase of the following debentures, viz.:

- (1) \$4,250 payable in 30 equal annual instalments with interest at 5 per cent.
- (2) \$12,900 payable in 30 equal annual instalments with interest at 5 per cent.
- (3) \$13,250 (Local Improvements) payable in 30 equal annual instalments with interest at 5 per cent.

H. HARTMAN,
Clerk.

New Liskeard, Ont., Oct. 12, 1910. 43

Tenders

Quebec Railway, Light, Heat and Power Company

SEALED TENDERS are requested from responsible contractors for the construction of an

Office Building

in the city of Quebec, for the Quebec Railway, Light, Heat and Power Company.

Also for the heating and ventilation of same.

For the plumbing system.

The electric wiring, lamps and lighting fixtures.

The passengers and freight elevators.

Plans and specifications for any and all of the above can be seen at the office of the undersigned architect, or may be secured for the purpose of estimating, upon the deposit of a sum of \$25.50 as security for the return of the same.

All contractors tendering upon the above works must accompany tender with an accepted cheque, made payable to Mr. C. E. A. Carr, general manager of the Company, equal to fifteen per cent. (15 p.c.) of the amount of tender, which will be forfeited if any person tendering declines to enter into a contract as, and when called upon to do so, or fails to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

Tenders to be written on a special form, prepared by the architect, must be enclosed in sealed envelopes, plainly marked on the outside and addressed to Rene P. LeMay, Architect, 21, d'Aiguillon Street, Quebec.

Tenders will be received until four o'clock p.m., FRIDAY, THE 4TH OF NOVEMBER, 1910. The Quebec Railway, Light, Heat and Power Company reserves the right to reject any and all tenders.

By order,

RENE P. LeMAY, Architect,
21 d'Aiguillon St., Quebec.

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Tenders

for Storage Shed for the Fire Department to be erected at the rear of Cowan Avenue Fire Hall

Bulk tenders, or tenders for the several trades mentioned below, in connection with the above building, will be received by registered post only, addressed to the undersigned, up to noon on TUESDAY, 1ST NOVEMBER, 1910:

1. MASON WORK, ETC.,
2. CARPENTER, ETC., WORK.
3. ROOFING.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents. The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with, or tenders may not be entertained.

Tenderers shall submit with their tender the names of two personal sureties, or the bond of a Guarantee Company.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.

City Hall, Toronto, October, 1910. 43

To Building Contractors Valuable Manufacturing Plant for Sale in Town of Hespeler

Pursuant to the winding-up order made in the matter of The Parkin Elevator Company, Limited, and with the approbation of the Local Master of the High Court of Justice at Berlin, sealed tenders addressed to The London and Western Trusts Company, Limited, London, Ontario, and marked "Tender for Parkin Plant" will be received up till 4 p.m. OF THE 5TH DAY OF NOVEMBER, A.D. 1910, for the purchase of the real estate, buildings, plant, machinery, stock-in-trade and assets belonging to The Parkin Elevator Company, Limited, and situated in the Town of Hespeler, Ontario, of which the following is an inventory:

(a) Real Estate and Buildings . . .	\$14,936.00
(b) Plant Equipment	6,633.00
(c) Foundry Equipment	3,165.00
(d) Machinery	9,580.00
(e) Patterns	8,183.00
(f) Patents, Prints and Tracings . .	1,200.00
(g) Office Furniture	695.00
(h) Office Supplies	860.00
(i) Tools	875.00
(j) Stock-in-Trade	17,731.66
	\$63,848.66

The real estate and plant will be sold subject to an existing mortgage thereon bearing interest at 4½ per cent. per annum and payable in equal annual instalments.

The buildings are new and modern in every respect and the plant is up-to-date. The Town of Hespeler is admirably situated for manufacturing purposes, having both O.P.R. and G.T.R. connections. Switches adjoin the property. Several very large manufacturing industries are located there, among others, B. Forbes Woollen Mills, Canada Machinery Company, Limited, Jardine Tool Works, Hespeler Furniture Company and W. A. Kribs' large lumber and planing mill plant.

The following is a description of the real estate: Lots numbers five and six on the north side of Sheffield street in the George D. Forbes survey.

The property will be offered subject to a reserved bid and subject to conditions of sale.

Terms: A marked cheque for one thousand dollars payable to the order of the liquidator shall accompany each tender and the balance shall be payable in cash within thirty days from the date of acceptance of tender without interest.

The Local Master will attend at his Chambers, King street, Berlin, on the 11th day of November, A.D. 1910, at four o'clock in the afternoon to consider the tenders.

For further particulars, conditions of sale, form of tender, inspection of inventory or other information apply to The London & Western Trusts Company, Limited, Liquidator, London, Ontario, on the factory premises at Hespeler, or to Melvin A. Secord, Galt, Ontario, Solicitor for the Liquidator.

J. J. A. WEIR,
Local Master at Berlin.

Dated 7th October, 1910.

MELVIN A. SECORD,
Galt, Ont.
Solicitor for the Liquidator.

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We are in receipt of a neat concise map of railroads operating in Western Canada issued by the Board of Trade of Portage la Prairie, Man. On the back is a sectional map of the city showing the sites still available for manufacturing sites. H. G. Coleman, secretary.

Silica Brick & Lime Co., Limited

By order of the Trustees under Debenure Trust Deed, Messrs. Stewart Williams and Company will sell by Public Auction, on SATURDAY THE 12TH DAY OF NOVEMBER, 1910, at 11 o'clock in the forenoon, at the Driad Hotel, Victoria, B.C.

The undertaking and all the property and assets of the Silica Brick and Lime Company, Limited, as a going concern, and which comprise in particular the Freehold Lands forming the Site of the Company's Brick and Lime works at Atkins Siding, Esquimalt District, B.C., and being part (24 acres or thereabouts) of section 105 and all section 113 (about 142 acres), Esquimalt District, and all Buildings thereon and the brick and lime making Plant, Machinery, Fittings, Stock in Trade, Tools, Implements and other Chattels and effects in, upon and about the said premises.

Further particulars can be had and conditions of sale seen on application being made therefor at the Company's offices, No. 512 Fort Street, Victoria, or at the offices of the auctioneers, No. 637 Fort Street, Victoria, B.C. 44

Miscellaneous

(Continued from page 29)

A. Edwards, brick addition to Gurney-Tilden foundry and office, John street, to cost \$15,000; Springer & Company, frame dwelling at 11 Monroe street, and one at 23 Niagara street, for Burke-Daniels Company, to cost \$2,600; J. H. Williams, two brick dwellings on Westmoreland avenue, to cost \$3,000; J. H. Williams, two brick dwellings on Locke street south, between King and Main, to cost \$3,000.

Montreal, Que.

The work of widening and deepening the canal, just below the locks, has been progressing slowly, but it is said that it is being well done. It is said by the officials of the Government that further big improvements will be made to the canal in the vicinity of St. Paul, and that it would take about two years to carry out the improvement schemes.

Recent building permits include: G. Caichioni, 1449 St. Clair street, house containing two dwellings on Evelyn street, \$2,000; A. Larue, Longue Pointe, a store building at 32 St. Catherine street east, \$4,000; T. Sauve, 1161 Simard street, house containing three dwellings on Marquette street, \$2,500; J. A. Rochette, 1128 Rachel street east, house containing four dwellings on Messier street, \$3,000; Geo. A. Joannes, 670 Huntley street, two houses containing four dwellings on St. Hubert street, \$13,000; Richer & Freres, 1817 Christopher Colomb street, house containing five dwellings on Christopher Colomb street, \$6,000, and house containing two dwellings on St. Denis street, \$4,500; Jos. Mayrand, 50a Lacasse street, house containing two dwellings on Old Orchard avenue, \$2,500; Jos. Ferron, 1471 Hubert street, house containing two dwellings Gilford and St. Hubert streets, \$3,000; Z. Michaud, 982 Sanguinet street, house containing three dwellings on Sanguinet street, \$3,500; J. Paquette, 1931 Boyer street, two houses containing six dwellings on Dufferin street, \$3,800; A. Sauvageau, 209 Laval avenue, house containing three dwellings on Boulevard St. Joseph, \$4,800; J. Leveille, 66 Marcell avenue, a 3-storey house on Marcell avenue, \$2,000; Synod of Montreal, 1729 Dufferin street, a church building on St. Zotique street, \$14,000; L. Langevin, 228 Parc Lafontaine, two houses containing six dwellings on Lagachetiere street east, \$5,000; L. Larose, 2814 St.

Lawrence Boulevard, two houses containing six dwellings on Alma street, \$3,000; C. Bastien, 19 Laurier avenue, two houses containing five dwellings on Laurier avenue, \$7,000; J. E. Vanier, 5 Beaver Hall Square, a two storey stable building on Sanguinet street, \$4,000; N. Landry, 655 Beaudry street, house containing three dwellings and store, on Beaudry street, \$8,500; C. A. Lemieux, 668 Casgrain street, two houses containing four dwellings on Casgrain street, \$3,000; E. Major, 312 Clark street, house containing three dwellings on Waverly street, \$4,500; A. Dubreuil, 702 Mount Royal east, two houses containing two dwellings on Evans avenue, \$4,000; L. A. Meunier, 285 Letourneux street, two houses containing four dwellings and two stores on Laurier avenue, \$11,000; L. W. Chaput & Frere, 965 St. Catherine street east, an apartment house on St. Luke street, \$18,000; A. Garaleik, 329 Elm avenue, house containing two dwellings on Elm street, \$2,000; Ideal Saving Loans & Land Company, 292 St. Catherine street west, house containing two dwellings on Dandurand street, \$2,500; L. Lafleur, Lachute, Que., two houses containing six dwellings on Dufferin street, \$4,500; A. Croquette, 170 Bourbonniere street, house containing five dwellings on Stadacona street, \$3,500; A. Giguere, 427 Charlevoix street, two houses containing six dwellings on Park Lafontaine, \$8,000; D. Denis, 685 Cowan street, two houses containing six dwellings on Belgrave street, \$4,500, and a two storey house on Belgrave street, \$2,500; J. F. Lavoie, Cote des Neiges west, a two storey house on Lacombe avenue, \$3,000; P. Cote, La Salle avenue, house containing three dwellings on Garnier street, \$2,300; Y. Sauvageau, 209 Aylwin street, house containing five dwellings on Aylwin street, \$4,500; J. Fauteaux, 71 Marin street, house containing five dwellings on Albert street, \$4,000; U. Marcotte, 629 St. Edward street, house containing five dwellings on Christopher Colomb street, \$4,000; L. H. Maher, Guardian Building, alterations to property at 622 St. Catherine street west, cost \$5,000.

Temiskaming, Que.

Tenders are called by the Public Works Department, Ottawa, until November 15th for excavation of part of a channel above the completed sluices of the Temiskaming dam on the west side of the Ottawa river. R. C. Desrochers, secretary.

Toronto, Ont.

Recent building permits include: T. Gardiner, pair semi-detached 2½ storey brick dwellings, Beech avenue, \$4,600; Symons & Rae, two storey and attic brick dwelling, Bedford, \$12,000; Toronto General Hospital, 3 storey brick medical wing, College, \$250,000; G. Lawrence, 3 storey brick addition to bakery and garage, corner Carr and Denison, \$39,000; Mr. Dalton, pair semi-detached 2 storey brick dwellings, Brock, \$4,500; Canada Metal Company, 2 storey brick factory, Fraser avenue, \$35,000; Lewis LeGrow, pair semi-detached 2 storey and attic brick dwellings, Manning avenue, \$5,000; Jos. Bolons, pair semi-detached 2 storey brick dwellings, Constance, \$5,500; R. C. Vaughan & Son, 2 pair semi-detached 2 storey brick dwellings, Summerhill, \$7,000; J. H. Stanford, 2 storey and attic brick dwelling, Oriole road, \$4,500; Glidden Varnish Company, 1 storey brick melting house, Wallace avenue, \$5,000; G. Weston, 4 storey brick factory, corner Peter and Richmond, \$40,000; D. M. McConkey, 3 attached 2 storey brick dwellings, Palmerston Gardens, \$7,000; T. A. Duggan, 3 attached 2 storey brick dwellings and 2 storey brick

store, corner Sorauren and Geoffrey, \$8,000; Geo. E. Case, 2 detached 2 storey and attic brick dwellings, corner Indian and Westminster, \$8,000; H. Disston & Sons, 1 storey brick factory, Fraser, \$6,000; Toronto General Hospital, 1 storey brick emergency building and 2 storey brick patients' building, College, \$130,000; Hewitson & Proctor, pair semi-detached 2 storey brick and stucco dwellings, Ingham avenue, \$7,000; A. Edmunds, pair semi-detached 2 storey brick dwellings, Symington, \$5,800; K. McWhinney, 26 semi-detached 2 storey cement dwellings, Laughton, \$46,800; S. Stewart, 2 storey and attic brick dwelling, Glen road, \$6,500; M. T. Kent, 2½ storey brick dwelling, Walmer road hill, \$6,100; Faramel, Limited, 1 storey brick elevator and warehouse, Dupont street, \$15,000; H. W. McDonald, 2 storey brick bank and dwelling, corner Bloor and St. Clarens, \$10,000; Massey-Harris Company, 1 storey brick addition to printing office, corner King and Strachan, \$5,000; Thos. Hill, pair semi-detached 2 storey brick dwellings, Hillsborough, \$5,000; H. L. Kerr, 2½ storey brick dwelling, Roxborough east, \$15,000; N. Labracco, pair semi-detached 2 storey and attic brick stores and dwellings, Elm street, \$5,000; A. A. Kennedy, 3 attached 2 storey brick dwellings, Concord avenue, \$6,000; Toronto Carpet Company, 2 storey brick addition to warehouse, King street west, \$15,000; J. A. Orr, pair semi-detached 2 storey brick dwellings and 2 storey brick dwelling, Garden avenue, \$6,000; Consolidated Plate Glass Company, 5 storey brick warehouse, Spadina avenue, \$60,000.

Vancouver, B.C.

Under the terms of the contract awarded by the Dominion Government to William Simons & Company, Renfrew, Scotland, for the large bucket ladder dredge to be used in the narrows at the entrance to Burrard Inlet, the dredge is to be delivered at Vancouver within six months. As delivery entails a long trip of 10,000 miles, which will be made under the vessel's own steam, construction will be started immediately. Heavy penalties for delay are included in the contract signed. The Scottish firm tendered for the dredge through their Canadian agents, Messrs. John Reid & Company, of Montreal. The dredge will be the largest and most powerful on the Pacific seaboard. Messrs. Simons & Company were recently awarded a contract for the construction of a large bucket ladder dredge, similar to the one intended for Vancouver, to be used on the Panama canal.

Winnipeg, Man.

Tenders addressed to J. D. McLean, secretary, Department of Indian Affairs, Ottawa, will be received until October 27th for spruce timber on the Crane River Indian Reserve, Man.

Permits issued recently are as follows: G. Jones, dwelling, west side Home, \$3,800; Barker & Anderson, dwelling, west side of Horne, \$2,000; M. Montgomery, dwelling, west side of Agnes, \$2,000; A. G. Davidson, dwelling, west side of Craig, \$2,000; F. Swanson, dwelling, west side of Home, \$2,500; Borland Bros., dwelling, south side of McDermot, \$2,000;

AWARD—D.

Moose Jaw, Sask.

The tender of the Canadian Fire Engine Company, of \$1,455 for the supply of the combined chemical engine and hose wagon was accepted. That of W. E. Seagrave of \$385 for extra wheels was also accepted.

Laying C. I. Pipe Culverts in Soft Ground

Suggestive Ideas Obtainable from Practice of Prominent Railroad Engineers —Essential to Provide Substantial Foundation—Methods of Repairing Pipe

Some time ago the American Railway Bridge & Building Association appointed a committee to gather data on methods of preventing cast-iron pipe culverts from pulling apart in soft ground and on the ways of repairing them when pulled apart. A large number of engineers stated that they take great care in placing such culverts in soft ground to provide a substantial foundation under the pipe; old bridge timbers or ties are used for grillage and a cradle, a concrete foundation is placed under the entire pipe, or concrete piers under the joints, thus practically avoiding the danger of pulling apart.

A number of roads clamp the pipe together longitudinally, where it is liable to pull apart, by passing two or more rods fitted with turnbuckles through the inside of the culvert and hooking them over the extreme ends. The rods are then taken up by the turnbuckles. This method is also used to draw pipes together after they have pulled apart. Many, however, advocate digging up the pipe and relaying, or digging down to the joint and repairing with concrete.

The following paragraphs from some of the replies are taken from the appendix to the committee's report:

Mr. W. C. Cushing, chief engineer, maintenance of way, Pennsylvania Lines West, advises the following method: In placing cast-iron pipe 24 inches or more in diameter, build under each joint a block of concrete 12 inches thick, 24 inches wide and 48 inches long, parallel with the track. The pipe should be laid in position before the concrete is placed, so that it will get a good bond on the hub. The ground around the pipe, for its full length, should carefully tamped. Where pipes are put in under tracks in service the stringers supporting the track should be left in place for several months, until the ground has become well settled around the pipe, before the full weight is thrown on it.

In slips the best method of holding the pipe in place is to carry the small concrete piers to the bottom of the slip, if this is not too deep. In cases where the slips have been deep he has driven pile foundations, three piles in a row, spaced 2 feet on centres, parallel with the track, and spaced 4 feet centre to centre parallel with the pipe. The top of the piles were concreted and the pipe laid on the concrete. Where a culvert in a slip was treated as above, in 1907, no movement has since occurred, either in the pipe or in the slip.

Mr. R. G. Develin, assistant engineer, maintenance of way, Pennsylvania Railroad, described a case where a 24-inch culvert separated. It was put back and clamped by placing two split collars around it, one on each side of the joint in question. These collars were connected by a 1-inch bolt above and below the pipe. Wedges were driven between the collars and the pipe to prevent slipping of the former.

In another case where joints spread, due to the settlement of a fill, the joints were exposed, concrete placed around them and parapet walls built at the ends.

On the mountains or where culverts have much fall the pipe is clamped together with three 3 x 3/4 x 16-inch flats attached to the pipe by bolts passing through the pipe. Clamps are not placed on the bottom, where a smooth surface is desired. This method, Mr. Develin states, has been used for years and no trouble has been experienced with pipe pulling apart.

Mr. D. C. Zook, of the Pennsylvania Lines West, in his reply gives data on the use of a timber foundation. Our

method, he states, where the ground is only moderately soft, is to lay a floor of track ties, placing the ties as close together as possible, to form a bearing of about 8 feet wide. On this we lay our pipe, on a saddle of square timber. These pieces of timber are chamfered to conform to the curvature of the pipe as nearly as possible.

When, in our judgment, the ground is too soft to allow this mode of construction, we drive two-pile bents at about 6 feet centres, our pipe being 12 feet long. We cap those piles and on this foundation lay our pipe, supporting it between bents with the saddle already mentioned made of 12 x 12-inch timber fitted up to each side of the pipe and securely fastened to the cap. The object of the timber is to afford additional bearing to the pipe and prevent it from crushing.

We have already obtained good results from these methods and have never had any trouble where they were used, although when we first began using cast-iron pipe for this purpose we had trouble with our pipes sinking, as they were not supported other than by earth. We then had to dig them out and support them, as I have indicated.

Mr. S. C. Bowers, Pittsburg, Cincinnati, Chicago & St. Louis Railroad.—In slips the method of holding pipe has to be determined by the depth to solid material. We had a case of pipe pulling apart in a slip where solid ground was about 6 feet below the bottom of the pipe. In this case we excavated down to the rock and into it about 6 inches, and built up small concrete piers under the joints. The pipe had pulled apart about 2 feet before this was done. The work was done early in 1908, and there has been no trouble since.

Where the slip is too deep to excavate, piles should be driven, three in a row, 2 feet on centres parallel with track and 4 feet on centres parallel with pipe. Then concrete should be placed on top of these and the pipe laid in the concrete. This method was used in 1907 at a slip and there has been no movement since. This is not only a preventive from pulling apart, but also keeps the slip from moving.

Mr. B. F. Gehr, Pittsburg, Cincinnati, Chicago & St. Louis Railroad.—My experience with laying cast-iron pipe in soft ground is to place a concrete pier just back of each bell; and, if under a heavy fill, also at the centre of the pipe section, on a uniform grade. If the soil is such that it is necessary to build concrete piers and there is still fear of settling a small amount under the track, it is well to leave the line of pipe crowning in the centre. In addition, holes may be drilled in ends of the pipe and 3/4-inch rods may be run through from the inside and bent over on the outside. I would use four clamps at each joint for a 3-foot pipe and more or less according to the size of the pipe.

Disagreeable tastes and odors in the water supply from the high service reservoir at Lowell, Mass., during the winter of 1909, were due, it is thought, to algae which had remained in the basin since the previous summer. To remedy the trouble, as much of the old water as possible was first drawn out and a thin coating of ice over the surface was broken by rowing a boat through it several times. This was done, according to the last annual report of Mr. Robert J. Thomas, the superintendent, to expose the water to the action of the air. In eight days the reservoir was filled with fresh water to its regular depth. No further complaint is said to have been made regarding the supply.

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"Wake up, England!"

At a recent annual meeting of the North Staffordshire Chamber of Commerce, Major A. E. Blizzard, managing director of Messrs. George Woolliscroft & Son, Limited, delivered an address, which should be particularly instructive and beneficial to his countrymen in general.

Readers of the "Contract Record" will require no introduction to the Woolliscroft firm, but it may be as well to state that the company has an extensive plant at Hanley, in Staffordshire, where roof, floor and glazed tiles, terra cotta, Faience, mosaic, and other products of world-wide reputation are turned out. The firm is paying particular attention to Canada, and it was in this connection that Major Blizzard paid a visit to this country earlier in the season. Upon his return he made a number of pointed observations. It was inevitable, he said, that with the development of Canadian trade and the natural expansion of local industries, many of the statements of imports from the mother country should show a decrease. At the same time, however, he advised his hearers to strengthen their hold on the market as far as possible. He found, he said, a general desire amongst business men to increase business with England. But there were many complaints of old country methods, chiefly in the matter of delivery. He had asked for some concrete cases, because general remarks very often flew about and amounted to very little. An important business man had told him that galvanized iron was sent in to him in cases, and the manufacturers in England would not send it to him in bundles. Consequently that manufacturer ceased ordering from that particular source, and his order went to another country. He wanted a

particular knife which was used in the skinning and ranching business, and which he could not get in England, and had to get in another country. This gentleman also showed him an order for chains and anvils which had been given some months previously, and in one case there had been no acknowledgement of the order. An order given for sanitary ware in June, 1909, had not been delivered in June, 1910, and another sanitary order which was wanted promptly was given in March, and not executed in June. Canada could get very prompt deliveries of goods ordered from the United States. Those were very serious complaints, and were specific cases about which there could be no doubt.

There still remains another indictment of British traders, which is that they do not readily adapt themselves on the spot to Canadian business methods. This mistake is not made by American manufacturers. Altogether Great Britain will have to wake up if she is not to find herself supplanted in the Canadian market by the United States, which have the advantage of proximity, promptness of delivery, and adaptability. Efforts are being made by the Dominion Government to people its territories from the Mother Country, but the latter must help in more ways than in mere emigration.

An Instructive Discussion

Whether municipal work is done more cheaply and more satisfactorily by contract than by day labor—that is the question. A familiar one it is, but it is presenting itself in many new aspects to readers of the "Contract Record." Engineers and contractors will derive appreciable benefit, not only from following this discussion closely, but by participating actively in it. The preparation of such letters as are contributed to this issue by A. W. Godson (Toronto), A. J. Latonell (Edmonton), and others, induces careful reflection, and tends to give the writer, even more than the reader, a better and broader conception of what is undeniably one of the most vitally important matters before the interests concerned. Whatever differences of opinion there may be between the writer and the reader, the latter will at least admit that the former has the courage of his convictions. The avoidance of publicity is only to be commended in certain well defined instances. In matters of vital interest to his profession at large, a man should give proof of having some identity and not be afraid to submit his views. We should indeed be an unenlightened community and make poor progress if everyone refused to impart his experience for the benefit of his fellow-worker. We trust that this incidental observation may lead those of wide experience, but reticent tendencies, to contribute to the discussion.

Rumors, as they Affect Labor Conditions

Railway construction in the west is hampered by the lack of men, and doubtless some of the contractors on the Government roads would welcome the introduction of Asiatics as a means of solving the problem. A Toronto paper thinks that the contractors have themselves to blame for the scarcity of labor, and, on the strength of "many rumors," discusses the alleged unsatisfactory conditions existing in construction camps, enumerating certain charges made against contractors by the men. The article concludes: "Instances are cited where hundreds of workmen have refused to work under such conditions and have left the camps."

The dissemination of such "news" as this is inimical to the interests of the country. "Rumors" are bad enough at any time, but coming at this juncture, and repeated

insistently, as are most stories the origin and veracity of which are doubtful, they are particularly undesirable. The merest allegation of this kind is sufficient to deter many who would otherwise seek this kind of employment. We would strongly advise those of our readers interested in railroad construction to give this matter some consideration, with a view to taking steps to counteract this baneful influence.

Engineers and the Press

The Ottawa branch of the Canadian Society of Civil Engineers are discussing the advisability of closing their doors to representatives of the daily press. It is contended by one faction that the reporters should be ad-

mitted, as many things are discussed that are of much interest to the public; and by the other that they should be excluded, on the ground that they make such a hash of technical matter. We understand that a decision has been left with the executive. Our own impression is, as one might expect, that the interests of publicity should not be made to suffer for the occasional distortion of a technical matter. A little co-operation in the latter connection would mean a great deal. If members of the profession are sufficiently interested in being reported correctly they will take the trouble to see that the newspaper man is properly provided with the gist of their remarks and that he gets it down correctly. This is the day of the newspaper man. He is ubiquitous; and seeing that he will not let one work without him, there is only one alternative, and that is to work with him.

The Contract System Versus Day Labor

Toronto Contractor Defends his Position—Some Pointed Observations and Open Queries — Municipal Engineers' Views — "Construction Department" Suggested

The letter written by Mr. Charles Curtis, of the Western Pavers, Limited, Winnipeg, published in our issue of September 14, is resulting in a most interesting and instructive discussion. Mr. Curtis contended, it may be remembered, that if the city engineer was to estimate on the work of his own department, he should be compelled to bid under the same restrictions that are laid upon contractors. The writer cited an interesting case from his own experience, and after stating that the contractor, by reason of his specific experience, was the best man to handle city work, concluded in part as follows: "City engineers have admitted to me that they would rather see work left undone than have it carried out by day labor." This is somewhat at variance with the expression of Mr. G. G. Powell, principal Assistant City Engineer, of Toronto, who, writing in our issue of the 12th inst., says: "Day labor work is becoming so popular in some cities that the citizens themselves are requesting that local improvements be done by day labor instead of by contract." Mr. Powell contends that the engineer and the contractor *do bid on even terms*. Mr. Powell's letter was in criticism of one contributed to our issue of September 28, by Mr. A. W. Godson, of Toronto, who held that it was unfair for the engineer to tender against the contractor, there being so many circumstances and opportunities favoring the former in the execution of the work. Mr. Powell's statements, however, by no means convince Mr. Godson, who puts up some stiff arguments in a letter published in the following columns. After reading this letter an unbiased reader will surely be disposed to wonder whether the advocates of day labor will be able to stand their ground.

There is one particularly noteworthy suggestion made by Mr. A. J. Latonell, City Engineer of Edmonton. This is for cities to establish a construction department, an organization complete in itself and separate from the department responsible for design and supervision.

Contractor Godson Hits the Nail on the Head.

Toronto, October 14, 1910.

Editor, "Contract Record":

I notice in your last issue, Mr. Powell's criticism of a letter written by me at your request giving my opinion as to the advisability of engineers doing civic work themselves—as it is termed by day labor. Before going into further details I desire to impress upon you the fact that I have the

most friendly regard for our city engineer and his subordinates, but I do feel, and complain of, the unfairness of our city specifications and the system which requires the engineer to compete for work as a contractor.

If you have not already obtained a copy of these specifications for the different road work, I would ask you to get one, and I think you will agree with me that it is entirely one-sided, as against the contractor. It stipulates that the city engineer shall be sole judge and arbitrator in case of any misunderstanding between the contractor and the city, and it requires that the different materials entering into the work comply with certain conditions and tests made by the city. The contractor then uses the material without further question after the same has been approved, and proceeds with his work, which calls also for a guarantee for maintenance of from five to ten years.

If this work proves to be faulty within the guarantee period, the contractor is called upon to make repairs or have them done by the city at his expense, and the amount deducted from any drawbacks or money coming to him from the city.

Take a brick pavement for instance, where the bricks have been inspected and, as the contractor supposes, subjected to the tests called for by the department and passed by them as being up to the required standard: Is it fair to hold the contractor responsible for repairs due entirely to their inferiority? Is it not enough to hold him responsible for his workmanship? Surely when he has paid the manufacturer for them on the basis of their having passed the city's tests, he should not be held responsible for anything faulty on their part. This is one of my contentions: we are not allowed to put anything into the works that is not up to standard and city tests. Why, then, should we be further held to make good when the only fault in the work is due to the poor quality of the material passed by the city officials as O. K.

As I stated in my former letter, although all our material has to comply with the specifications, and exacting as these are, the city employs from one to three inspectors on contract work: one, perhaps to see that the subgrade is according to plan, another to look after the laying of curb and gutter, and another to see that the correct quantities of cement, sand and stone are used and properly incorporated, as called for by the specifications.

When this has all been done you would think the contractor had done his duty and was entitled to his money, and so

I think. Contractors, however, as a rule have sufficient faith in their engineer to guarantee the work, feeling that where a fault, if any, shows later and is beyond question not due to their work, that they will not be held responsible, and that is where the city holds, or expects to hold, the winning card.

Years ago when Mr. Frank Shanly was city engineer, he spoke to me about the one-sided aspect of the specifications. "It may be necessary," he said, "to hold a troublesome contractor, and the clause may be used, but where a desire is shown to do good honest work I hold a contractor only to the spirit of my specifications." Since then, year in and year out, these specifications have been added to and revised apparently with the object of putting all contractors out of business. Why should it be so, if there is nothing further than an engineer's desire to do his own construction work? You see what the contractors have to submit to in the way of inspection. Do you suppose that the city is employing inspectors, and paying them to help contractors, to make money at the expense of the constructional part of it—I think not.

Do you think it safer to put a gang of men on to do the work by day labor under the sole control and inspection of a foreman, and the occasional visit of the engineer himself?

I am sorry Mr. Powell has read my letter to construe dishonesty on the part of the engineer or his foreman, but I do contend that the city engineer and his staff cannot be more anxious to secure stable work than a reputable contractor, who has these specifications and guarantees to contend against.

The fact that the city's foremen knows nothing about the estimated or contracted cost of the work does not acquit him of a desire to make a reputation for hustling it along, and doing it cheaply—perhaps too cheaply.

Is it fair and in the interest of the community to employ public money to destroy private enterprise? A continuance of these methods will certainly result in this. My ambition has been to build up a business, and after acquiring a very large plant and equipment for carrying out public works required in this and other cities, it seems hard to find a disposition on the part of our engineers to crowd us out, thereby not only making us lose our money, but destroying the result of many years' work and enterprise.

I trust that this letter, which contains my views on this vexed question, may not give offence to anyone, but that it may be received as an honest and out-spoken expression of opinion.

Yours very truly,

A. W. Godson.

P.S.—It may be well to direct your attention to the fact that only the lowest tenders are accepted by the city. Why, then, not give the contractor credit for having saved for the city the difference between his tender and the next lowest? In our work alone we can show a saving of from ten to twenty thousand dollars a year, for which the city has benefited by the contract system.

A.W.G.

An Engineer's Admissions and Suggestions.

Edmonton, Oct. 10, 1910.

Editor, "Contract Record":

I have read with considerable interest Mr. A. W. Godson's letter, published in your issue of Sept. 28th. I do not fully agree with all that Mr. Godson says, but this is hardly to be expected, as he speaks from the contractor's point of view. However, it must be admitted that there are a great many things about the engineer's estimate that are open to criticism.

The system has objections both from the standpoint of the engineer and from that of the contractor. The contractor's main objection is that he is placed on an unfair basis: that the engineer is bidding on work which he himself will control, and consequently is in a position to deal leniently with himself; in other words, the engineer is not governed by the speci-

cation under which the work is obtained. The result might be a very inferior job.

Another objection that might be raised on behalf of the contractor is that the engineer runs no financial risk, and that if the work should cost no more than his bid, he does not pay for it out of his own pocket, as the contractor must do. Briefly, there are two ways of taking care of a low estimate: first, to do the work honestly according to plans and specifications, making up the loss from some other source; secondly to skimp the job so as to come within the estimate. One of these methods is honest, the other dishonest. The engineer who practices the latter method, because he may do so, and the contractor who attempts the same thing, because he hopes he may accomplish it in spite of inspection or the restraining power of the engineer, are equally dishonest. The only difference is that it is easier for the one to succeed than the other.

The aim should be to adopt such method of doing work as will give the best grade of work at the lowest possible cost. In my opinion, the question is very closely associated with that of municipal versus private ownership. Where work is undertaken by a municipality by day labor, it is usually done because it is assumed that it can be carried out more cheaply than by contract, for the reason there are no profits to be made—just as in the municipal ownership it is assumed that cheaper service can be given the people because there are no dividends to pay. If it is true in the one case, why not in the other?

I believe, however, that it is desirable to eliminate from the method of securing this work certain features which are more or less objectionable to the engineer as well as to the contractor. The engineer does not like to feel that he is awarded the work, owing to a handicap having been placed on all other bidders; nor does he like to feel that, even though he may carry out the work strictly to the plans and specifications, the method leaves him open to the charge of being lenient with himself. In this connection I might point out that the engineer has always a strong incentive to do good work, from the fact that as long as he holds his position he must stand behind and maintain that work.

Most cities find it necessary to do some day labor work and to keep a quantity of plant, tools and machinery on hand. Also, they must have a number of foremen and other officials constantly in their employ. It is desirable, where it can be done to advantage, to carry on enough work to keep these occupied constantly.

There are two methods of deciding to do work by day labor: first, to make the decision without calling for tenders; second, to call for tenders and award the contract to the engineer, provided he is the lowest bidder. The first method is open to the objection that if no estimated cost is fixed before the work is started, it may lend itself to the inefficient prosecution of the work, resulting in costly construction. The second method is the one to which Mr. Godson, with some reason, takes exception.

A method which, it seems to me, should eliminate these objections would be for the city to have a Construction Department, absolutely distinct and separate from the Engineering Department, who design and supervise the construction of the work. It is desirable, in my opinion, that the party concerned with obtaining good workmanship should have no interest in the quantity of work done per day or in the financial side of the work. Let one side look after the quality, the other will look after the finances. Quantity and quality are the two chief elements that enter into construction work and these should be properly balanced. Quality must not be sacrificed to quantity; neither must quantity be sacrificed to quality by striving to obtain such a state of perfection as would make the cost of the work beyond reason. This balance may be obtained by having one party control both these essentials, but probably it would be better obtained by having

quality looked after by one party, and quantity, or rate of progress, by another. It should be the aim, first of all, to do good work, and then to accomplish as much of this good work as possible per day..

A construction Department, as separate from the Engineering Department, should be financed by the city at large, just as a contracting firm would be financed by its shareholders. It would bid on the work on behalf of the municipality, and the price bid would be the price charged up to this work. In the case of a loss it should be charged to the General Fund. If on the other hand there should be a gain, i.e., the work completed below the price tendered, the difference between the actual cost and the price bid should be credited to the General Fund. The Engineering Department would supervise and inspect the work, and pass estimates in favor of this company in the same way as they would do were the work being done by a private contractor. In other words they would be placed in competition with all other contractors on an equal basis. It should be the aim of the municipality not to discourage bidding on work by private contractors, for, without this, competition would be eliminated, and all the worst features of the day labor system would probably make their appearance.

Yours truly,

A. J. Latornell,
City Engineer.

A Satisfactory Arbitration Clause.

New Westminster, B. C., Oct. 11, 1910.

Editor, "Contract Record":

I have read carefully Mr. Godson's letter, published in your issue of September 28, and agree with the writer on certain points. I certainly think that it should be the aim of every engineer to write a clear concise specification, leaving no doubt as to the kind of construction he requires.

With regard to the Arbitration Clause, I never allow myself to be sole arbitrator, as I consider that it puts the engineer in a position which would weaken his case should there be any legal proceedings.

The clause that I always insert is as follows:

"If at any time during the progress of the works or after their completion, there should be any disputes or differences in opinion respecting the true intent and meaning of any part of the Contract or this Specification, or with regard to the quality of the material or workmanship, or with respect to anything affecting the carrying out of the works comprised in or connected with this Contract, such dispute may be finally and conclusively settled by the decision of three (3) Arbitrators, the first to be appointed by the Corporation, the second by the Contractor, and the third by the two Arbitrators then chosen. In case the two first chosen fail to agree upon a third, the latter shall be appointed by a Judge of the County Court of the City of New Westminster. By the decision of these three Arbitrators, or by the ruling of the majority of them, both parties of this Agreement shall be finally bound."

I think this clause is perfectly fair and gives the contractor a chance to have any dispute fairly judged.

Unreasonable clauses in my opinion no doubt weaken the engineer's case in the case of a dispute.

Yours truly,

J. W. B. Blackman,
City Engineer.

"Sound Business Wisdom to Have the Engineer Tender."

Editor, "Contract Record":

I have read with interest the letters of A. W. Godson and "R. W.," appearing in your issue of September 28.

The system of having a city engineer tender upon work in open competition against contractors, seems to me a wise step,

and I fail to see any legitimate cause of complaint against it. As a city engineer of some years' experience, I found that when I tendered on any work, the competing contractors were proportionately lower in their bids than they had been heretofore; further, that on occasions where the bidding was liable to be shared by only a few contractors the fact that I was bidding on behalf of the city prevented any pre-arrangement of bids.

Mr. Godson's assertion that poor workmanship and material are put into the work by the city engineer if he underbids the contractor, does not bear the appearance of fact. The engineer, of all men, is the one most interested in having his design properly executed in every way, for upon the results he is adjudged competent or incompetent.

As far as the ratepayer is concerned, he reaps the advantage, as he is saved both the contractor's profit and the salary of the inspectors.

To sum up, I consider it sound business wisdom to have the engineer tender on all works that he can undertake, placing him on the same footing as the competing contractor, as to time limit and cost. In a properly conducted civic enterprise, all orders for materials and plant, time sheets, etc., pass through the storekeeper or city clerk's department, where they are audited and checked, thus preventing improper and dishonest practices, such as are hinted at in the correspondence in question.

Yours truly,

An Ex-City Engineer.

Value of Good Workmanship in Cement Floors

Good workmanship is seldom more essential to good results than in the laying of granolithic floor finish. An engineer and mill architect, reporting his own experience and observance, said:

"There is a tremendous difference in the wearing qualities of cement finish, and I believe it is largely a matter of workmanship. To wear well, in my opinion, the top finish must be much more thoroughly trowelled than is customary among cement finishers. I also seem to find that a finish made only with cement and sand, like the ordinary sidewalk, does not stand the trucking nearly so well as where we get in as much stone as possible. We have found also that it is an absolute necessity to use in the finish as hard a grade of stone as we can get to have a oor that will stand.

"The average cement finisher dislikes to work with stone in the top finish. I would not object so much to the wearing down of the top finish if I knew of some practical way for repairing it. When the top finish is removed and we attempt to put a new one down, it is always more or less of a gamble as to whether the repaired finish will stand up under the trucks."

A suspension footbridge, 435 feet long, built of discarded $\frac{3}{4}$ -inch derrick cables, has been erected across the north fork of the Feather river, Cal., near the masonry dam now under construction for the Great Western Power Company. The main cables consist of two groups of three $\frac{3}{4}$ -inch cables each, and the suspenders are $\frac{3}{8}$ -inch wire rope. The floor is 2 feet wide and bracing is provided under it to prevent twisting. Wire fencing is placed on both sides of the walk. The towers are of timber. The main cables are anchored to old rails concreted solidly into a cross tunnel driven through the rock.

Carborundum cement was placed on steps at the entrance to one of the stations of the Metropolitan Railway in Paris in 1905 to determine its wearing qualities. According to the "Annales des Travaux Publics de Belgique," the stairs, after being used by at least 50,000,000 people, showed no appreciable wear; this type of construction, it is stated, has been adopted by the Metropolitan Railway for all its new stations.

Collapsible Mold for Sewers and Culverts

Constructional Details of a Simple Device for Facilitating Form Work
—Economical and Readily Adaptable—Valuable to Concrete Workers

By A. A. HOUGHTON

The necessity of getting up and taking down forms in making this class of concrete work is a large waste of time, in addition to the great amount of lumber required.

With the simple form described and illustrated in this article, which can be constructed by any one in a short time and at a slight expense, the labor in handling forms when molding all classes of bridges, sewers and culverts will be saved, as in a moment's time the form can be placed in position to mold a section, and by simply removing the "key" blocks the form will neatly fold together so that it can be removed and used again without delay in construction.

Another advantage is the slight amount of lumber required. In building a sewer several forms can be used, and by working at both ends of the sewer, or starting work in the middle of same, while the concrete is setting over one form, the other can be removed from previous section molded and set in position ready to mold another section.

The use of a pin hinge in fastening the sections together will allow them to be taken apart into six sections, easily, when necessary to handle same in a difficult part of sewer, as well as to set up in such a place easily.

This form should greatly facilitate the work as it will remove the necessity of a gang of men in building forms, and where the grade is understood, any laborer can remove from section molded and set in position for the next section in a very short time, thus enabling the contractor to put in an increased amount of work, with less help each day.

To illustrate the manner of construction we will take a size with a breadth of 6 feet 9 inches and a height of 3 feet $4\frac{1}{2}$ inches when completed and give measurements for that size.

First, it will require for each section 24 one-twelfth segments of a circle, as four sets of six each are used as supports to each section. The easiest manner to cut these, for this size, is to cut twenty-ofur pieces of 8-inch plank, two inches thick and $19\frac{1}{2}$ inches long; take one of these for a pattern and on it at each end make a mark $1\frac{1}{2}$ inches from the top or one side; in this one and one-half inch space draw a semi-oval line from the marks at each end so as to bring the highest point of same in the centre of the top edge of plank; this will give you a one-twelfth segment of a circle the required diameter. In mitering same, mark $1\frac{1}{2}$ inches from each end along the bottom of the plank; draw a line from this to the end of the oval line at top and when this three-cornered piece is cut off it will make a miter that is correct for the purpose. The plank is cut along the lines drawn, making the one-twelfth segment of circle complete and correct. Use this one as a pattern in cutting the others.

Now supposing the length to be 12 feet of the completed section; use lumber 2 inches wide and $1\frac{1}{2}$ inches thick, of this length, lay four of the segments of circle with oval sides up at equal distance apart and cover with the 12-foot lumber, nailing on top. The oval segments should be so covered as to leave one-half inch projecting on each side, this is planed down on one edge, in a bevel, even with the ends of the supporting timbers so

as to make a tight joint when they are joined together.

After completing the six sections in the above manner join them together with a hinge on each support as illustrated in Fig. 1 and Fig. 2, requiring twenty hinges. As illustrated in Fig. 1, the hinges are all placed on the bottom side of supports, except those in the centre on top; these must be on the outside to enable it to fold together. By using a flat strap hinge for this, there will be very little mark left in the completed work.

For the cross supports cut four strips of 2 x 4 inch lumber (these should be strong enough for this size of section), 4 feet $10\frac{1}{2}$ inches long. Cut these as follows: One foot from each end and the balance of strip in the

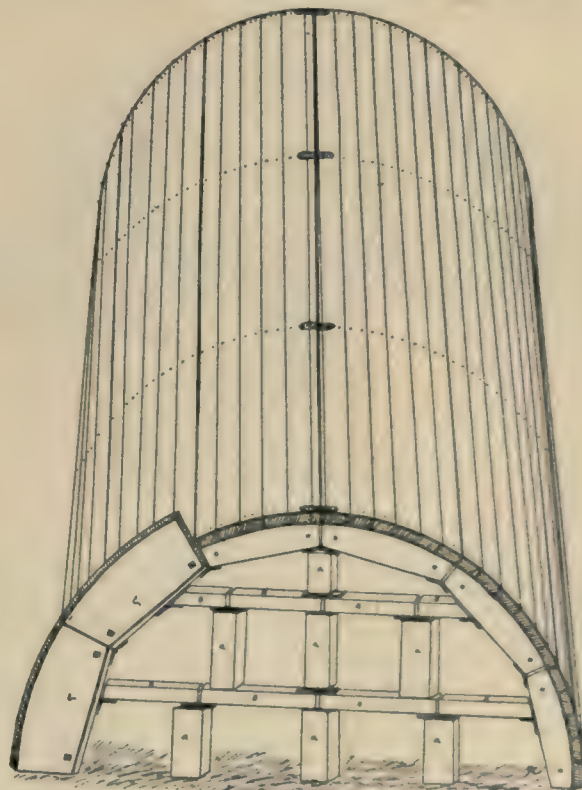


Fig. 1

centre, making four pieces; join together with these hinges as illustrated in Fig. 1 and Fig 2, putting one hinge on top of strip and two on bottom, at joints, and then fasten to the bottom supports with hinges, at bottom of strip and fastened to support at about the centre. This allows these cross supports to break down as illustrated in Fig. 2, and thus folds the section together.

The top cross strips or supports are cut from the same lumber (2 x 2) and 3 feet 6 inches long, and are divided into four pieces, in a proportionate manner as the bottom cross supports, and are hinged together and fastened to sections in the identical manner as the bottom ones. This allows both cross supports to fold down alike, and thus drawn in the sections together, so that it can be removed from the completed work in a very short time and without damage to the concrete.

As illustrated in Fig. 1, blocks marked (a) are used

to hold the cross supports in position while the section is in use. These should be at least 4 x 4 inches and the proper length to closely fit into the spaces. As illustrated, seven of these are used at each set of supports.

In removing the section or mold from the completed work, all that is necessary is to knock out these blocks, and by breaking down the cross supports the outside sections are folded in together. In setting up, the opposite method places and locks the entire form in position, and does away with fitting together a number of pieces, saving a large amount of unnecessary labor and expense, as well as a vast amount of time, as this form can be folded and unfolded very rapidly.

On the outside supports of the semi-oval section, bore a one-half inch hole at each end of the sections, as illustrated in Fig. 1. Through these holes bolts are placed to bolt on the guide forms at each end of which two are shown in position in Fig. 1. By having holes at each end of the complete section, the guide forms can be used on either end of mold, and removed at will, and by having them cut in six sections, as illustrated, they will not interfere with the folding of the main form when it is

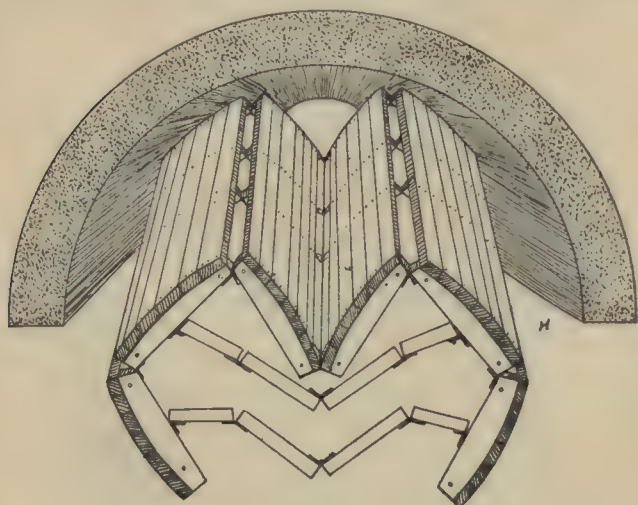


Fig. 2

desired to leave them in place while removing the mold from completed work.

This form is adaptable to any size of work desired, as any one can easily change the dimensions given to suit any large or smaller size of work that it is desired to mold. The size of lumber used must be increased in proportion (except outside boards), as you increase the size of the form or mold, so as to secure the proper strength. This allows any reinforcement desired to be used in the work, and will not interfere with any design of bridge.

For casting a number of bridges of the same size, as in railway culverts, this would be of great value as it is always ready for use at a moment's notice, and the one form does for all, without the necessity of a gang of men to build the forms.

In all form of sewer work (except tunnels) it should be of great value to the contractor, as with several forms in use he can keep his concrete workers busy all the time without the expense of hiring form builders, resulting in a saving of time, labor and expense and with the advantage of completing the work with greater rapidity.

The Minister of Railways has warned the C. P. R. that unless construction is commenced within eighteen months route approvals for the second C. P. R. line from Toronto eastward may be cancelled.

Maintenance Guarantees*

I am firmly of the opinion that pavement guarantees extending beyond a term of one year, which is ample to test the integrity of material and construction, are against the best interests of the taxpayers. In support of this view, I offer the following reasons:

1st. Guarantees are always of doubtful legality. On assessment work, which is the basis of payment for over 75 per cent. of the street pavements laid in the United States and Canada, the courts have frequently if not generally declared maintenance guarantees to be illegal, because they provide for indirectly assessing abutting taxpayers for the cost of maintenance, which city charters usually say shall be paid for by the city at large.

2nd. There is always to be more or less dispute between the contractor and the city regarding the contractor's obligations to make certain repairs, especially when the damage done can even remotely be attributed to causes lying outside the jurisdiction of the contractor and the city as to the extent of repairs and nicety of condition of maintenance of the pavement which is proper under guarantee, cities generally endeavor to require under guarantees, cities generally endeavor to require contractors to make repairs to pavement surfaces that they would not think of making at the expense of the city.

3rd. When guarantees for maintenance are required, prudent, conservative contractors always include in their bids the interest on the cash retained, and the cost of the surety company bond premiums required by the city, and a sufficient amount to cover a conservative estimate of maintenance charges. It has been calculated that if surety company bonds for five years maintenance were required on all pavements laid in the United States and Canada, the premium, always added to the contractor's bid, would each year amount to more than a million dollars.

It has been suggested that in lieu of surety company bonds for guarantee, the cities retain 5 per cent. of the contract price. If this were generally adopted the cash retained by the cities would aggregate approximately \$5,000,000 annually, and the interest alone on the accumulation of five-year guarantee periods would amount to \$1,500,000. This bond premium, or interest, contractors must add to their prices just as surely as they must increase their prices when the cost of labor and materials advance. Generally speaking contractors, regardless of the estimated cost of maintenance, will add to what would otherwise be their contract prices the full amount retained by the city. Few contractors are sufficiently strong financially to have their capital tied up even when it is drawing interest. Such a system would drive the comparatively small, but reliable contractors out of business, and leave the field in possession of concerns that are financially strong enough to carry or negotiate for carrying the amount of money retained by the cities.

4th. Maintenance guarantees tend to produce lax inspection, or the loss of control of construction by the proper city officials, as the contractor in case of dispute or disagreement as to the methods of construction, will notify the city officials, that if he is not permitted to do the work in the way he thinks best he will not be responsible for the guarantee.

5th. Maintenance guarantees encourage the acceptance of proposals from incompetent or inexperienced contractors, and the selection of pavements of doubtful desirability. How often do we hear the statement made

*Extract from paper by George C. Warren, before the American Society of Engineering Contractors.

in connection with the awarding of street pavement contracts—"The contractor may not be reliable, or the pavement may not be successful, but we have the surety company bond, or the cash retained to back the five-year guarantee."

In twenty-five years' experience in the street paving business I have seen many paving contract guarantees defaulted, but I have never seen a pavement made good through a guarantee bond or a cash retainer, when the pavement or the contractor failed, or when it was against the business interests of the contractor "to make good."

Finally the best interest of the city in the construction of pavements will be conserved, *as it is in all other classes of construction*, by the adoption of the following policy:

(a) Decide upon the form of construction best suited for each particular case.

(b) Prepare careful plans and specifications for the work, and give the construction the closest and best expert inspection and supervision.

(c) Take entire responsibility for the results. In the long run this policy will produce better pavements and at lower costs, than will the apparently attractive, but misleading maintenance guarantee system.

Modern Road Making

The following illustrates the efforts in England to meet in road making the conditions imposed by motor and trolley-car traffic:

A new and direct roadway is proposed between West Hartlepool and Middlesborough, near Newcastle, in the County of Northumberland, a direct line of $7\frac{3}{4}$ miles. In designing the roadway the engineer in charge has given attention to the possible development in both heavy, slow and fast vehicular and motor traffic, each of which demands separate consideration, and possibly different methods of road-surface treatment. The plan accordingly provides for a centre footpath 9 feet in width; on the east side of the footpath a road for motor and light, fast traffic, 24 feet in width; and on the west side of the footpath a road for heavy, slow traffic, 22 feet in width. This gives a width for highway purposes of 55 feet.

A scheme similar to this will doubtless control future road making in England, and existing roads may be reconstructed on a corresponding plan. One of the chief advantages in separating the several kinds of traffic would be in permitting different methods of surfacing the roads to be used, and those best adapted to the traffic accommodated. Another advantage would be the lessening of the chances of accidents. A third advantage would be the greater speed permissible to fast travelling.

Zinc as a Substitute for Mortar

It is stated that zinc instead of mortar was used for joining the stones of two elliptical arches of an eighty-two-foot span that supports a newly completed armored concrete bridge near Lyons, France.

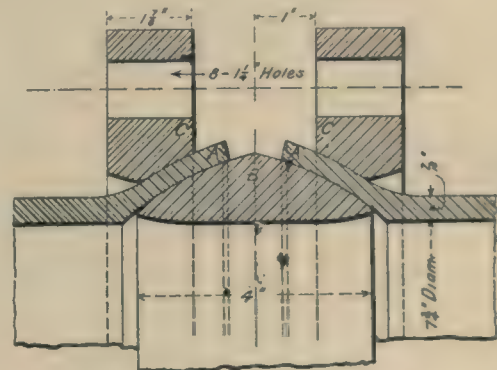
Previous experiment having proved that the molten zinc—at 800 degrees Fahrenheit—caused no fractures in dry stones, the zinc was melted and poured between the stones, forming metallic joints an eighth of an inch thick. The substitution for mortar increased the cost about \$2.40 for each square foot of the bridge's horizontal surface.

Tests with cubical stones, $2\frac{1}{2}$ inches on a side, showed of about 14,000 lbs. per square inch, but are 10 or 15 per cent. weaker than stones having a strength such that zinc joints do not weaken stones having a strength between 14,000 and 18,500 lbs. A less compressible metal is needed for very hard stones.

Cement joints, when as thin as one-twenty-fifth of an inch or less, stood the tests equally well, but disintegration gradually reduces the original strength of joints of mortar.

Flexible High Pressure Pipe Joint

A special type of pipe joint for the reduction of damage by electrolysis is used in the new high pressure fire protection system at Baltimore, Md. One of the aims in its design has been to make the electrical conductivity of the joint approximately equal to that of the main body of the pipe. The system of fire mains may be operated either with fresh water from the city mains or, in case of emergency, with salt water. The pressure can be raised to 800 lbs. per square inch. The main supply pipes are 24 inches in diameter, 20 feet long and are made of soft open-hearth steel lap welded. As described in a paper before the Association of Civil Engineers of Cornell University, by Mr. Raymond Schlegel, the two ends of the pipe, AA in the accompanying sketch of an 8-inch pipe joint, are expanded and accurately machined to the same radius as that of the separating ring B. This ring, which is made from the same grade of steel as that of the pipe, is circular and has a cross-section as



Joint for High Pressure Fire Mains

shown. The flanges, C, C, are made of medium open-hearth steel, having a tensile strength a little greater than that of the steel used for the pipes, being about from 60,000 to 68,000 lbs. per square inch. These flanges are accurately machined and the curved surface which is in contact with the pipe is made true, so that when the two adjacent pipes are deflected the contact between the pipe and the flange is fair and without strain. Preparatory to connecting these joints the rings are heated to a temperature sufficient to just melt the coating on the pipes and so secure a metal-to-metal contact in the joint. The ring is held in position by means of a rod screwed into a small tap hole provided at the peak of the ring, and the pipes brought together so as to bear firmly against the ring.

The bolts are then put into the flanges and the final tightening of the joint is made by the tightening of these flange bolts, without the use of lead, gasket, cement or any other filler. Another marked advantage, according to Mr. Schlegel, is its flexibility. Each joint permits a deflection of about 2 inches for each linear foot of pipe, so that by deflecting the pipe at the joint many obstructions in the ground are easily avoided. Tests of the joint were made at the plant of the Pittsburgh Valve, Foundry & Construction Company by raising one end of a jointed section so that three joints were suspended in the air. Under these conditions a test pressure of 1,000 lbs. per square inch is said to have shown no leakage.

an earth fill 27 to 28 feet thick, which was placed in 4-inch layers and well rolled with a 16-ton roller. This material is quite compact and carries the foundations of the building and of the smokestack. The heavy pumping machinery, however, rests on the wall of the pump pit, and this has shown no settlement.

The building has settled considerably, from $3\frac{1}{2}$ inches at the northeast corner to $11\frac{1}{2}$ inches at the southwest corner, but the walls have not been injured, owing (it is thought) to the steel bands embedded in the brickwork. The settlement is considered to be due to the compacting of the silt and the layers of vegetable matter, rather than to the compacting of the filled material on the surface. The settlement occurred within a short time after the construction of the building, and no further movement has been noted. It was considered, therefore, that the surface fill, where not disturbed by the trench for the repairs to the intake, would form a good foundation for the repairs to the buildings. In view of the running sand it was thought inadvisable to seek a deep foundation.

The plan suggested, and now executed, was to build a heavy reinforced concrete girder under the end of the building; its ends rest on large footings in the solid fill, and it has a clear span of 55 feet over the unstable material with which the trench for the intake pipe was filled. The footings are so designed as to limit the bearing pressure upon the soil to about 1,600 lbs. per square foot.

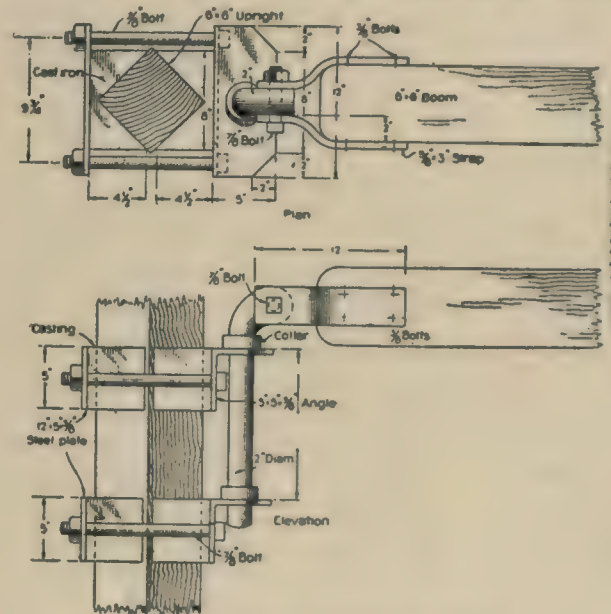
The girder is 95 feet 6 inches long, or 105 feet over the footings, with a clear span of 55 feet between the footings. It has a uniform thickness of 3 feet 6 inches, with a depth of 14 feet 6 inches in the main portion and increasing to 19 feet over the deepest part of the footings. Each footing is 20 feet 6 inches by 25 feet, and has a knee brace against the outside of the girder. On the inner side of the girder, at each end, is a return wall supporting the end of the side wall of the building. Two concrete struts 12 by 16 inches extend from the top of the girder to the wall of the pump pit.

The concrete used was a 1 : 2 : 4 mixture, made with broken stone ranging in size from 2-inch downward. The size of the girder is so great, and the reinforcing bars are so large, that there was plenty of opportunity for the concrete to thoroughly surround all parts of the reinforcement, consisting of cold-twisted steel bars, mainly 1 and $1\frac{1}{4}$ inches square, and steel stirrups. The form was built on the ground. It was left in place 30 days after completion and during this time was kept continuously moist. The construction of the girder occupied 20 days. The concrete was deposited uniformly over its full length in layers 12 inches thick, and on finishing work each day the surface was left as rough as possible. Before depositing concrete the next morning the surface was covered with a thick grout of cement and sand, 1 to 1. Then the first layer was deposited and well tamped.

The old brick wall was 30 inches thick for its full height of 45 feet, and was ornamented with heavy stone trimmings and cornice, the weight above water table being about $6\frac{1}{2}$ tons per linear foot, or 620 tons for the west wall. This construction was unnecessarily heavy. The new wall is 12 inches thick with 30-inch pilasters to carry the roof trusses, and with large window openings to further reduce the weight. The stone cornice was replaced with one of galvanized iron to match the other sides of the building. Altogether the weight of the wall was reduced to $3\frac{1}{2}$ tons per foot. The weight of the girder is also $3\frac{1}{2}$ tons per foot, making the total load supported 7 tons per foot. The cost of the work on girder and wall was \$16,270.

A Novel Boom-Seat for Hoisting Derrick

In the execution of building contracts novel expedients are often devised with a view to facilitating the performance of some detail of the work, or some peculiar form of construction is adopted in connection with the apparatus which is likely to command the immediate attention of the contractor or builder who may see it. In connection with the recent erection of a reinforced concrete building a rather novel fastening of the boom to the upright of a derrick was adopted by the concern executing the contract for the work. The boom seat was attached to a construction elevator tower, the elevator being used for hoisting concrete and the derrick for raising reinforcing steel and forms to the various floors of the building. The seat consisted of two pairs of castings 8 inches wide by 5 inches deep by $4\frac{1}{4}$ inches thick cast to fit a 6 x 6-inch timber diagonally. Each pair of these castings was tightly clamped to an upright of the elevator tower by two $\frac{7}{8}$ x 11-inch bolts, a 12 x 5 x $\frac{3}{8}$ -inch steel plate and a 5 x 5 x $\frac{3}{4}$ -inch angle 12 inches



Boom-Seat for Hoisting Derrick

long. The two pairs of castings were spaced so that there was a distance of 12 inches from top to top of the outward flanges of the angles. In the horizontal flanges were holes through which passed a 2-inch steel pin, held in place by a collar resting on each angle. The head of the pin was bent slightly out from the upright, upset and drilled for a $\frac{7}{8}$ -inch bolt. This bolt held a $\frac{5}{8}$ x 3-inch strap to either side of the head of the 2-inch pin, and the 6 x 6-inch boom was tightly bolted to these straps by four $\frac{3}{4}$ -inch bolts.

The derrick boom seat here illustrated and described was designed and used by the Aberthaw Construction Company, Boston, Mass., in connection with the erection of the building in question.

Messrs. Witchall & Son, who have the contract for building the new addition to the Telegram building, at Toronto, have introduced a somewhat novel feature in the city in connection with excavating. The space to be excavated is 40 x 95, and the depth about 20 feet. The ground is first ploughed by steam. An ordinary plow is attached to a steel cable and the earth after being turned up by the plow, is loaded into waggons, hauled up to the level of the street by a 40 horse power engine.

Modern Methods of Treating Road Surfaces

Some Instructive Costs Together with Practical Directions for Obtaining the Most Satisfactory Results — Merits of Various Preparations

In the first place, a road should be prepared and rolled so that it is perfectly smooth before any finishing coat is applied. I am sure you have felt in riding over some roads that the surface resembled the waves of the ocean. This is caused by loads of material being dumped at different points, top leveled off, leaving the centre of the load undisturbed and more compact by being dumped. As the surface material is so much softer, when the road is first leveled and raked these depressions do not appear, but the hard core in the centre of each load will remain there and grow more and more exaggerated by the action of the traffic. The wheels going over the hard place and striking the soft will leave the road very uneven. Every load of gravel or stone placed upon the surface of the street should be dumped upon a platform or every shovelful should be so handled that it will be evenly spread. In this way it is possible to get a smooth, even surface. A good quality of gravel spread upon the surface of the road and thoroughly rolled and wet and covered with a preparation of some of the heavy asphalt oils or the lighter tar preparations will make a road almost free from dust and cheap to maintain. This method will appeal particularly to the towns where the appropriations are small and the mileage great.

Experience of Newton, Mass.

Newton, Mass., has about 37,000 inhabitants, with 9 miles of telford, 82 miles of macadam and 115 miles of gravel road. You can see by this that a large percentage of our streets is macadam; they were built on a good gravel foundation with the average city. Our city has experimented several years with different preparations, and I think it would be hardly fair to say that any one surface preparation on the market is superior to any other, for our choice must be governed by the conditions of traffic.

In the first place, if you have a good gravel road, properly crowned, it must be surfaced with a material suited to the kind of traffic it carries. The best way to decide this is by actually counting for 24 hours two or three times during the season the number of motor-driven and horse-drawn vehicles passing over the road. If the majority are horse-drawn, a preparation of heavy asphalt oil covered with sand or fine stone screenings and spread on the surface of the road will be the best to keep down the dust. It will not be slippery during rainy or frosty weather and gives a good footing for horses.

If, on the other hand, preparations are to be used for motor-driven vehicles, the several heavier asphalt oils and different preparations of tar can be used to good advantage.

If you treat a macadam road with tar or any of the heavier asphalt oils costing 7, 10, 12 or 15 cents per square yard a great saving is made in two years, for you save the surface of your road as well as get rid of the dust.

In 1907 we treated a section of a road where the old macadam surface had become badly worn. It was spiked up and covered with a light grouting of Portland cement mortar mixed in the following quantities: Two parts sand, one part cement. This was spread evenly over the entire surface; it penetrated the sand in such a way as

to bind the whole material together, and was then smoothed off with street sweepers' large brooms. The road was closed for about four days, giving the cement time to set. After that it was opened to traffic and was used for about one year. The surface was then swept with an ordinary horse street sweeper and covered with a thin coating of Tarvia A, which was heated to a temperature of 80 degrees. We used about $\frac{3}{4}$ gallon Tarvia to the square yard. It adhered readily to the cement and has made a smooth and satisfactory surface for three years and remains to-day in first-class condition. On a small portion of this same street a second coating of cement grout was applied, covering it with Tarvia A, to see if the materials would adhere and make a satisfactory surface. The experiment was successful.

Some Instructive Costs.

In the spring of 1908 one of our principal streets was so badly out of shape that it required a new surface of about 3 inches of stone. This was put on an area of 6,290 square yards at the following cost:

Labor and teams	\$1,250.08
Crushed stone, 500 tons	610.55
Screen gravel	14.85
Use steam roller	210.00
Tarvia A, 10,890 gallons	816.75

Total cost\$2,902.23

Cost, 46 cents per square yard.

At about this same time another street having an area of 9,821 square yards was treated in like manner, except that it was thought best to give it a much thinner coating of stone. This street was spiked up with the roller, and the crushed stone and Tarvia rolled on the surface in the same manner as described previously:

Labor and teams	\$1,085.88
Crushed stone, 546 tons	557.90
Use steam roller	362.50
Tarvia A-10, 767 gallons	807.52

Total cost\$2,813.80

Cost, 28½ cents per square yard.

A third roadway, measuring 39,205 square yards and used exclusively for automobiles, was rebuilt at the following cost:

Labor and teams	\$3,298.47
Crushed stone, 521 tons	522.90
Screened gravel	38.30
Use steam roller	571.25
Tarvia A, 31,424 gallons	2,356.79

Total cost\$6,787.71

Cost, 17 cents per square yard.

After this treatment had been applied an experiment was made by taking a small quantity of Texas asphalt, J brand, and heating it to a temperature of about 400 degrees, so that it would run freely through the sprinkler of a watering pot. Less than $\frac{1}{4}$ gallon to the square yard was used at an additional expense of about 2¾ cents a square yard. The surface has not only been less slippery than the Tarvia road, but it stopped the tar from boiling out on the surface in hot weather, and is as

smooth as when it was first applied. It seems to seal over the tar and hold it so tightly that it does not deteriorate with the action of the weather. Records have been taken which show that on an average from 1,500 to 2,000 autos pass over this road in 24 hours, and yet it has not been cut by the chains of the autos, and is in perfect condition to-day.

On another road this year we tried a preparation of 90 per cent. heavy Standard oil. This was heated to a temperature sufficient to make it flow freely through the sprinkler of the oil distributor and put on to the surface of an old macadam road. The road was first spiked up and then covered with 2 inches of screened stone taken from an ordinary gravel pit, and varying in size from 2 inches down to $\frac{1}{2}$ inch. The small stones filled in the spaces between the larger ones. The whole was rolled smooth and hard, then the oil was applied hot and it readily penetrated the entire mass, taking about $1\frac{1}{2}$ gallons per square yard. This was covered with a coating of screened gravel, which had passed through a $\frac{1}{2}$ -inch screen and was thoroughly rolled with a steam roller and opened to traffic within 12 hours after it was completed. I have no doubt that this is making a very satisfactory road for heavy teaming. It is dustless as well as perfectly hard and smooth at the present time.

Another road was treated exactly in the same manner, using asphaltolene. Of the two, this road seems to be a little more elastic.

Mixing Process Not Always Necessary.

I merely speak of these preparations being applied in this way to show that the mixing process is not always necessary, as I believe the penetration treatments have given us as good results as any of the mixing preparations, and the application is cheaper.

Last year dustoline was tried on about 40,000 square yards of one of the main thoroughfares, and the cost was less than 3 cents per square yard for the season.

Tarvia B was used in one of the residential sections of the city, covering an area of 70,000 square yards, at a cost of $3\frac{1}{4}$ cents per square yard.

Several streets surfaced with macadam, having varying grades, up to a maximum of 9 per cent, all of them having both a heavy horse-drawn and automobile traffic, were selected for a trial of the liquid asphalt treatment.

A quantity of sand was heated to a temperature of about 200 degrees Fahr., then dumped in a pile and leveled. The liquid asphalt was poured over the hot sand in the proportion of 1 gallon liquid asphalt to 1 cubic foot of sand, and the whole mass turned with shovels or mixed in a concrete mixer. This work was done at the pit. The mixture was then carted to the street to be surfaced, and spread on the roadway to a depth of less than $\frac{1}{4}$ -inch, being raked evenly with 14-tooth wooden lawn rakes. Rolling was not considered necessary, and the street was kept open for traffic at all times. This treatment cost about 3 cents per square yard. It also has the advantage of leveling up and building up the surface of the road, and each new application provides a new wearing surface. This work was done in the summer of 1909, and is in perfect condition to-day, without any further expense.

We have had very good results by using gravel from an ordinary gravel pit and running it through a $\frac{1}{2}$ -inch screen, putting in a little over $\frac{1}{2}$ gallon of asphaltolene to 1 cubic foot of gravel. It is better to heat the oil or the gravel before mixing unless applied in the summer time. If done at this season there is no need of heating. A large pile of material can be prepared and ready to use at very short notice. We found it best to apply this after a heavy rain, as all the depressions in the road will

show little pools of water, and if these are filled with this mixture and the surface raked with a wooden rake it will become as smooth as it was when first built. We have found this patching process very satisfactory, as in many cases it saves the expense of resurfacing the entire street. After the patching is completed the street can be resurfaced with a coating of heavy asphalt or Tarvia, which will make a new surface at a comparatively small expense.

Use of Heavy Asphalt Oils.

This year we have used a large quantity of the heavy asphalt oils, Tarvia A and B, and also some of the heavier standard oils. All the preparations came to us in tank cars and were heated and unloaded in the following manner: The car was connected with a small steam boiler and was heated to a temperature of about 100 degrees Fahr. This allowed the material to flow through the hose at the bottom of the car after the car had been placed on a trestle about 10 feet above the level of the ground. This material was then run into a Studebaker tank wagon. It is a steel tank, holding about 550 gallons, and contains forty 2-inch perpendicular tubes which pass through the tank. Underneath this tank there are two large burners supplied with kerosene oil, which is forced in by pressure. This heats the oil to the desired temperature, and a thick, heavy asphalt oil can be melted and applied in this manner. There is a firebox that extends the whole length of the tank, which gives an even heat right through. The oil is applied through a sprayer or spreader, which is perforated, and the oil trickles down on to the surface of the road in very fine streams and covers the road thoroughly by going over it once. In my opinion this is a very desirable way of putting on any heavy asphalt oil, as the material can be readily heated and applied in large or small quantities by valves which regulate the flow. We have found this wagon very useful in our work this year and I believe will be one of the most useful appliances for its purpose. It can be regulated so that it will put on as small a quantity as 1-6 gallon to the square yard.

After the oil was applied the road was covered with a light coating of sand, which dried out very readily, and we were able to use the road within a very few hours after the application of the sand coating.

In applying the oil it is better to take half of the road at a time, leaving the other half open for traffic. This saves driving on to the oil by the teams spreading the sand and also the liability of teams getting spattered with the fresh oil. One of the roads treated this year covered an area of 19,194 square yards.

6,415 gallons asphaltolene at $7\frac{1}{2}$ cents	\$481.13
79 $\frac{1}{2}$ cubic yards of sand	63.60
labor and teams	163.25

Total	\$707.98
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The cost per square yard was $3\frac{3}{4}$ cents. This price is as small as any of the work done this year, as it has cost as high as $5\frac{1}{2}$ and 6 cents. But this difference in price is accounted for by the long distance that the material has to be hauled and the increased quantity used.

On another section we used Tarvia B. The area treated was 41,288.69 square yards, at this cost:

Labor and teams	\$309.33
Sand, 92.5 cubic yards	74.00
Roller	40.00
Tarvia, 10,057 gallons	502.85
Freight	36.00

Total	\$962.18
Cost, $2\frac{1}{8}$ cents per square yard.	

Design Assumptions for Standard Practice

The basis for calculations relating to the strength of structures in accordance with the assumptions recommended by the Special Committee on Concrete of the American Society for Civil Engineers are in part as follows:

Calculations shall be made with reference to working stresses and safe load.

A plane section before bending remains plane after bending.

The distribution of compressive stresses in beams is rectilinear.

Tensile stresses in concrete shall be neglected in calculating the moment of resistance of beams.

Perfect adhesion is assumed between concrete and reinforcement. Under compressive stresses the two materials are stressed in proportion to their moduli of elasticity.

The ratio of the modulus of elasticity of steel to the

four cutters is used for the scraping, and is attached to the shaft of the machine. The engine having been started up, the driver turns the hand wheel in the desired direction of travel, the result being that the revolving knife is gradually fed into the pipe after the manner of a boring machine. The apparatus is such that in long lengths it is possible to clean 20 yards in each direction from the hole, or 400 yards in all. The speed of cleaning is about 50 yards an hour, or in ordinary practice an average of about 300 yards a day. The appliance has been in actual operation at Huyton and one of the machines, it is stated, has been ordered by the Liverpool Corporation Water Committee.

A New Vacuum Street Cleaner*

In constructing this new vacuum street cleaner, it has been the purpose to so construct a machine that will gather all of the street refuse, heavy material as well as the fine dust, without sprinkling, thereby saving an enormous amount of money and doing away with an extensive equipment and making a thoroughly clean street without allowing any part to be afterwards exposed to view, so that no one may breathe the many injurious germs that are contained in this kind of dirt.

The machine is propelled by the same power that operates the fan and revolves the brushes, and in selecting these operating parts, the most simple known to automobile construction have been employed. We use the two-cylinder opposed 24 horse power motor, and the friction type of transmission, enabling us to have a great many changes of speed, and at the same time, making it impossible to strip any gear or break any parts, as it will act as a safety between the power and the driving wheels.

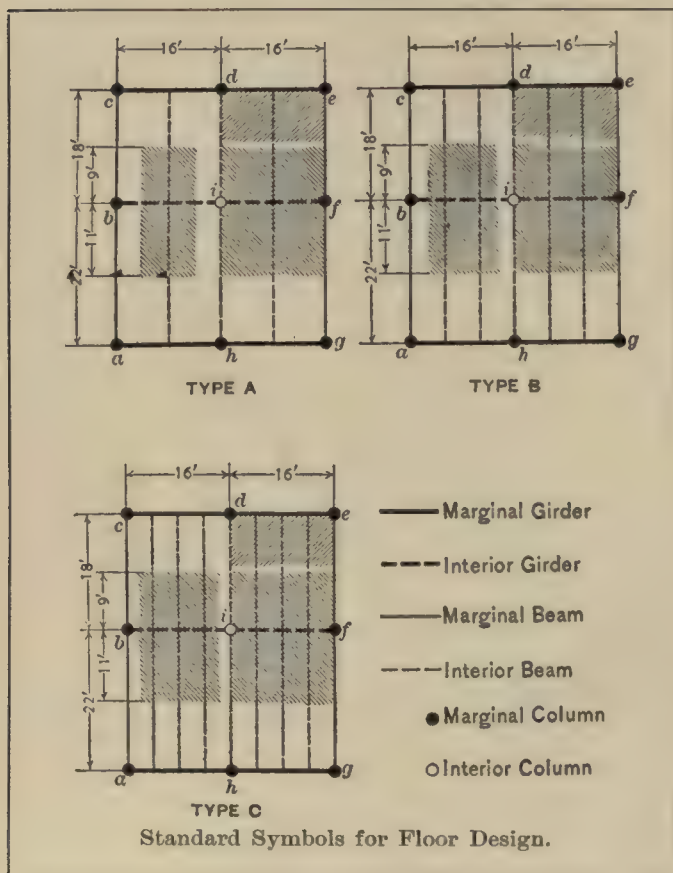
In moving forward, the brushes rotate so that the dirt is swept to the centre, where it is brought under the suction duct, and is lifted into the fan, and as the fan draws its air over the brushes, the dust that is raised is also drawn into the fan. After leaving the fan the separation is by gravitation. The heavier dirt comes out through the first outlet, the next heavy comes through the second outlet, and so on through the other two outlets that part of the dirt that is carried beyond this point is carried, by the air, into the retort, where it takes a downward spiral motion and is taken off at the bottom of the cone. Up to this point it is an easy matter to take care of the dirt, but there is a small quantity that does not want to leave the air or refuses to be separated, for it is as light as air itself; the quantity is small, not being over 1 per cent. of the total, but if allowed to escape, would make it very annoying, and has been the one stumbling block to this great means of sanitary cleaning. We, in our machine, effectively take care of this refuse by employing hydraulic means, but as the water is used over and over again its operation is so simple that it requires scarcely any attention.

This cleaner is one that will clean, with two men, as much street surface as several men could do with their present methods, and do it much better, without raising dust. It travels while working from two to six miles per hour, depending upon the amount of dirt upon the street, and can be governed by the operator at will.

The brushes are so made that they can be adjusted to clean the ordinary street in four laps.

At the first annual convention of the American Society of Engineering Contractors at St. Louis recently, a decision was practically arrived at as to the quantity of cement that a contractor should find in a barrel when he opens it. The standard adopted by the society was: Four cubic feet, weighing 56 pounds each, of loose cement.

*Paper by D. C. Smith, of Muncie, Ind., before the Indiana Engineering Society.



modulus of elasticity of concrete is taken at 15.

Initial stress in the reinforcement due to the contraction or expansion in the concrete shall be neglected.

The above assumptions are quoted from the Blue Book of the Pittsburg Steel Products. The accompanying sketch shows standard symbols for floor design.

The cleaning of water mains by a machine invented by Mr. R. A. Adamson, engineer of the Rivington Works, is described in the engineering supplement of the "Times," London. An opening of 9 feet is made in the main to be cleaned and a bracket is fixed on each end of the opening. The brackets carry two rails and a screw of coarse pitch. A petrol engine is then lowered into the hole so that the wheels on the frame rest on the rails, while the screw passes through the centre of the machine. The shaft of the engine is then central with the main. The frame of the machine is fitted with a hand wheel, by turning which the machine is propelled along the rails in either direction by means of the screw. A specially constructed knife formed on a central bar carrying

Purification of Public Water Supplies

Adaptability and Limitations of Hypochlorite Treatment—Amount of Chemical to be used—Precautions against Under and Over-Dosing*

The use of hypochlorites for sterilization purposes has now reached a stage where its field of usefulness in the destruction of objectionable bacterial life in public water supplies, filtered or unfiltered, is well understood. Until the fall of 1908, the data were scarce and more or less indefinite as regards practical application, but since that time enough history has been made to allow of the statement that a new epoch in the art of water purification has been ushered in; one which is revolutionary in character and which will always remain one of the most striking developments in the art of water purification.

Limitations of Filtration Processes.—When the first municipal filter was built at London, England, in 1829, the only office it was expected to perform was that of a mechanical strainer in removing turbidity from the water, for the germ theory of disease had not been advanced up to that time. It was not until 1849 that this theory assumed definite proportions during the severe cholera epidemic of that year. With the recognition of the germ theory of disease came the realization that polluted water, when passed through beds of sand, was made more safe for human consumption. This, however, was not widely recognized, as before stated, and in the late eighties the art of water filtration for municipalities was on a very insecure and uncertain footing. The striking results obtained at Altona, Germany, during the cholera epidemic at Hamburg in 1892, did more than anything else to convince the sanitary world and the public in general that filtration of polluted waters was deserved of the most serious consideration in connection with efforts to minimize the death rate from water-borne diseases. The splendid work of the Altona filters during the Hamburg cholera epidemic is too well known to require repetition here.

About the time of this epidemic the Massachusetts State Board of Health, as a result of the information accumulated during the early years of the work at Lawrence, arrived at the conclusion that the purification of waters as highly polluted with sewage as those of the Merrimac River could be successfully accomplished at a reasonable cost. Cholera appeared in New York harbor in the same year, probably emanating from Hamburg, and its appearance caused the city officials of Lawrence to decide upon the construction of a slow-sand filtration plant, thereby taking a step which was to prove to be the opening of an era of practical accomplishments in the field of water filtration in America. It must also be pointed out that sand filter plants were built at Poughkeepsie and Hudson, N. Y., as early as 1874.

It is probable that the most sanguine advocates of water filtration have never firmly believed that filtration of polluted water, even when carried out with the greatest care, will render it entirely free of bacteria at all times, or do more than greatly minimize the danger from drinking such water.

The hygienic efficiency of filter plants is usually stated on a basis of the percentage removal of bacterial life from the unfiltered water. Ordinarily such removal amounts to 90 per cent. and over, and it is clear that the danger in drinking polluted water is minimized in proportion to the removal of bacterial life. Filters will not remove all bacteria, and probably a fair statement of the safety of a filtered water for drinking purposes would be to say that, other things equal, it will to a considerable extent vary with the quality of the unfiltered water. In other words, a water which is primarily but

slightly polluted, after filtration will be potentially less dangerous to public health than one which is initially foully impure.

Regardless of the initial impurity of a water, efforts have always been directed toward keeping as low as possible at all times the numbers of bacteria in the filtered water. In Germany the effort has been made to set and maintain a standard of purity for filtered waters of 100 bacteria per cubic centimeter, and when the filtered water contained a higher number than this the filter was to be judged inefficient and was to be shut down and cleaned. The results of the practical operation of large filtration works in this country and abroad show clearly that it is not possible at all times to live up to such a standard as this, and there will be times with practically all filters when the number of bacteria in the filtered water will amount to several hundred per cubic centimeter.

Filtration of impure waters has undoubtedly been instrumental in reducing by about 75 per cent. as an average proposition, the typhoid death rate in cities in this country using filtered water. It is by no means uncertain that there is also brought about by filtration a very material reduction in the death rate due to other diseases than typhoid fever, substantiating the theorem of Hazen.

By filtration water may be made at all times clear and free from turbidity and color, and substantially free from bacterial life. In the last two years the practical adaptability of hypochlorites in rendering filtered waters practically sterile, and, for that matter, unfiltered waters, has been clearly demonstrated. The hypochlorite treatment would therefore appear to be a finishing touch in the art of water purification, and to make available an exceedingly economical and harmless means of removing virtually the last fraction of potential danger from drinking water, whether initially impure or merely under suspicion at times.

The Chemical Nature of the Process.—Much has already been written about the chemistry of the process of hypochlorite treatment in the sterilization of water, but it may be that a condensed statement at this time and in this connection may not be out of place.

Hypochlorite of lime, commercially known as "chloride of lime," or "bleaching powder," has been and is extensively used for bleaching purposes in paper mills and many textile industries. It is sold in the form of a dry white powder, and is usually shipped in wooden or sheet-iron containers of a capacity ranging from 100 to 750 lbs. each. It is manufactured at numerous places in this country, as well as abroad, and its cost in large quantities is about 1½ cents per pound at the works. When exposed to air the powder deteriorates in strength quite rapidly, due to the absorption of moisture and carbonic acid. It is usually bought on the basis of its strength in so-called "available chlorine." The product in this country usually runs about 35 per cent. pure, according to this standard.

When the hypochlorite in the powder form is dissolved in water containing carbonic acid, hypochlorous acid is liberated. This acid is a powerful oxidizing agent and in the presence of organic matter gives up oxygen in an atomic state with an amount of energy which makes this chemical as an oxidizing and sterilizing agent approach ozone in intensity of action. It is generally considered to be superior to ozone on practical grounds, for the reason that it is more easily applied and brought in contact with all parts of the water to be treated in a speedy and thorough manner, which appears not now

*Extracted from a paper by George A. Johnson, New York, before the Milwaukee Convention of the American Public Health Association.

possible in the case of ozone. There seems to be no doubt, also, that it always is materially cheaper than ozone.

The chemical itself, as bought, is a mixed salt consisting of approximately equal amounts of calcium chloride and calcium hypochlorite. When the powder is added to water the calcium chloride remains inert, but the calcium hypochlorite, being acted upon by the free and half-bound carbonic acid in water, splits up into calcium carbonate and hypochlorous acid. The decomposition of the exceedingly unstable hypochlorous acid liberates oxygen in a very active state and leaves hypochloric acid. The latter then drives off the weaker carbonic acid and unites with the calcium, forming calcium chloride. It is the liberation of oxygen in this manner that effects by oxidation the destruction of bacterial life.

The general result following the application of hypochlorite of lime to water is the destruction of the majority of the non-spore-bearing forms of bacterial life, which the water may contain, a reduction in the organic color of the water, an oxidation of the organic matter proportional to the amount of the chemical applied, and a slight increase in the total hardness and total solid matter of the water. Where quantities no greater than from 5 to 15 lbs. of the powder are applied to each million gallons of water, as is the common practice, the changes in the physical and chemical characteristics of the water before and after treatment are so light as to be barely noticeable, and are well within the limits of accuracy of the prevailing methods of analysis. The important result and greatest change is the virtual destruction of the bacterial life in the water, more particularly the germs of disease-producing origin. Included in this group are the germs of Asiatic cholera and typhoid fever.

Hypochlorite of Soda.—There is another method of obtaining hypochlorites; namely, through the electrolysis of solutions of common table salt whereby hypochlorite of soda is produced. Careful study of the relative efficiency of hypochlorite of lime obtained from common table salt, shows that, unit for unit, hypochlorite of soda is slightly more efficient than hypochlorite of lime in the destruction of bacterial life. The process of manufacture of hypochlorite of soda is not so well understood from a chemical standpoint, however, but it appears certain that where electric current can be obtained for $1\frac{1}{2}$ cents or less per kilowatt-hour, and salt for $\frac{1}{3}$ cent per pound or less, it will prove to be a cheaper germicidal agent than hypochlorite of lime. Furthermore, its use, in some cases, may be preferable to hypochlorite of lime, because of the esthetic objections sometimes raised against the use of bleaching powder which, in the case of the electrolytic solution, should be entirely overcome. It is understood that at the water purification works of the City of Cincinnati, preparations are now being made to install electrolytic cells wherein hypochlorite of soda will be manufactured and substituted for the hypochlorite of lime used in the past.

Absence of Poisonous Features.—It has been asserted by some that free chlorine is liberated from the bleaching powder as applied to water, and that it may persist in water so treated for some time. In this connection it may be well to point out that the term "available chlorine" is a term of convenience used by the analyst to express the strength of the bleaching powder or the electrolytically prepared solution of hypochlorite of soda. The term was adopted by industrial chemists for the reason that in bleaching operations at some places the commercial product is treated with strong acids which can break up the chemical and release free chlorine. It is a perfectly clear proposition that if free chlorine could be released from bleaching powder when applied to water, such free chlorine would immediately combine with the hydrogen of the water and from hydrochloric acid, at the same time liberating free oxygen in an atomic state. The end result, therefore, would be the same.

There is plenty of evidence of a conclusive character to show that the weak carbonic acid as found in natural waters, is

capable of releasing appreciable or even measurable quantities of free chlorine from bleaching powder. Instead of this hypochlorous acid is produced, and hypochlorous acid is not a poison. Upon its decomposition with organic matter, the chlorine which the hypochlorous acid contains combines with the alkalinity of the water and forms calcium chloride. No free chlorine within the limits of measurement of laboratory methods is found in the application of this chemical to an ordinary water supply. Efforts have been made in the past by those who did not favor the process to locate a toxicologist who would classify this treatment as a poisonous one, but such efforts have been unavailing.

Preparation of Hypochlorite Solutions.—It is the more common practice to make up hypochlorite solutions of $\frac{1}{2}$ per cent. strength; that is, 1 lb. of the bleaching powder to 200 lbs. of water. It is probable that solutions as strong as 4 or 5 per cent. may be made without material loss of oxidizing power. But the more dilute the solutions are the more easy they are to work with, because of the deposits of quicklime formed in orifices and in pipes. At this place it is well to point out that where electrolytically produced solutions of hypochlorite of soda are used no trouble is had on account of deposits of sludge as in the case with hypochlorite of lime. This is another feature of no little importance in favor of the use of hypochlorite of soda.

As to material for solution tanks, concrete appears to be the most suitable. Iron tanks may be used, but they are attacked by the chemical and eaten through eventually, although they last a long time, owing to the protection afforded by deposits of lime upon the exposed surfaces. Black iron pipes have lasted for over two years at the Boonton plant, and special bronze pumps have lasted well at a number of places. Wooden tanks are the least suitable of all, but of these, cypress seems to be the best material. White pine is reduced to a pulp in a comparatively short space of time.

When the solutions of bleaching powder are used it is essential that the contents of the tank be thoroughly stirred in the beginning in order to get into solution all of the soluble portion of the powder. Afterwards stirring is of convenience in keeping the sludge well distributed, otherwise it gets bothersome as the last portion of the solution is removed from the tank. Tanks 10 or 12 feet deep, containing a $\frac{1}{2}$ per cent. solution of bleaching powder or hypochlorite of lime will show a deposit of lime sludge about 1 inch thick. This sludge contains about as much of the active agent as the $\frac{1}{2}$ per cent. solution does, and care should be taken in its disposal, otherwise it will cause trouble with fish.

Solutions deteriorate but little upon standing in covered tanks that are constantly stirred; perhaps some 2 per cent. in a day or two.

Quite recently considerable attention has been given to the feasibility of applying the bleaching powder in dry form. If appliances can be devised that will allow of the addition to water of a suitable quantity uniformly at all times and do it in a more or less automatic manner, there is no reason to suppose that hypochlorite applied in the form of powder will not act as satisfactorily as in the form of a solution, provided there are afforded adequate facilities for complete mixing of the dry powder with the water to which it is applied. Hypochlorite of lime absorbs moisture rapidly, and this is probably a point which will be most difficult to overcome where the application is in the dry form, as the powder will tend to lump and grow pasty with time.

Period of Contact.—All of the available data indicate clearly that the germicidal action of hypochlorites is exceedingly rapid. This is due, of course, to the fact that atomic oxygen is released promptly when the chemical is applied to the water.

As a general proposition it is thought advisable to provide for a period of contact of at least one hour before the treated water is delivered to the consumer. In some cases even shorter periods have given satisfactory results. Such periods of

contact are naturally provided in some cases by long pipe lines or distributing reservoirs between the point of application of the hypochlorites and the nearest consumer. It is also highly important that the chemical be quickly and thoroughly mixed with the water and this is usually effected by mechanical stirrers or baffling arrangements.

Amount of Chemical to Be Used and Best Point of Application.—The best point of application of hypochlorite to a water depends largely upon the conditions surrounding each individual problem. As a general proposition, as before stated, from 5 to 15 lbs. of the powder per million gallons of water are required to effect practical sterilization of filtered or unfiltered waters which contain normal amounts of organic matter. If the water contains abnormal amounts of organic matter, or iron in an incompletely oxidized state, considerably larger quantities of the germicide are required to obtain the best results. Each individual problem must be studied by itself and the correct dose of the germicide ascertained in the beginning.

The earliest studies with hypochlorites were directed at the total elimination of bacterial life. This is not considered necessary in the sterilization of water. The principal object is to destroy all disease-producing germs, such as those of typhoid fever, if such germs are present. This can be done without effecting the complete destruction of all bacterial life in the water, for the reason that the typhoid bacillus, as well as the colon bacillus, is less hardy than most forms of bacterial life which naturally predominate in water, and which are known to be non-pathogenic. Their removal, therefore, is not a matter of consequence as regards the sanitary quality of the water.

It is known that hypochlorite has a selective action upon such germs as the bacillus of typhoid fever and coli, and owing to their less resistant state in water, destroys them more quickly and completely than it does some of the harmless forms of bacteria common to water. It is not unusual to find that such bacteria as resist the hypochlorite treatment are spore formers and other hardy forms of non-pathogenic water bacteria.

In gauging the amount of hypochlorite to be added to a given water, the water must first be carefully studied in connection with the germicidal treatment, and the quantity of the chemical which gives satisfactory results under normal conditions ascertained as nearly as possible. When this is found it is the quite common practice to increase this quantity some 25 or 50 per cent. in order to guard against sudden fluctuations in the quality of the untreated water which may increase its power of absorption of the hypochlorite. Where the germicide is added to a filtered water, such fluctuations are much less marked.

Precautions Against Under and Over-Dosing.—It can be readily understood that if too little of the germicide is used there may result an unwarranted feeling of security, for the reason that for months on end the results may be thoroughly satisfactory with a given quantity of chemical applied and then, owing to a sudden change in the character of the water, unsatisfactory results may be obtained. For this reason it is always better to use more of the chemical constantly than is actually required under normal conditions.

Overdosing, on the other hand, is quite as undesirable. If the attempt is made to effect complete sterilization of the water rather than to aim at the destruction of the pathogenic bacteria, then there is a strong probability that at times there will be imparted to the water an undesirable taste or odor which has been variously termed by laymen as similar to carbolic acid or iodoform. It is not believed that within working limits the presence of an excess of this chemical in the water is deleterious to health, but it is objectionable to the senses and is, therefore, inadmissible. There is no excuse for such over-dosing, for when the quantity of chemical required under normal conditions is once ascertained, by making use of a moderate excess over and above this quantity a

sufficient margin of safety has been provided under all ordinary conditions.

Advantages of the Process.—Reciting the practical status of the use of hypochlorites in connection with the purification of water, it may be stated that the advantages of the process are as follows:

1. Substantially complete destruction of objectionable bacteria, particularly those of intestinal origin.
2. Reliability and ease of application of the chemical, together with the small variation in the required dose.
3. Total absence of poisonous features, either in the chemical product as applied to the water or in any of its resulting decomposition products.
4. Merely nominal cost of the chemical and its application.
5. Speed of reaction, making unnecessary any substantial arrangements as to basins other than storage facilities.
6. Substantial saving in the cost of coagulation of waters that are sufficiently unsatisfactory appearance to require classification or filtration.
7. Permitting rates of filtration materially in excess of those possible where high bacterial efficiency is required of the filtration process in the absence of sterilization.
8. Reduced clogging of the filter beds with a consequent lengthening of the runs between cleanings, due to the destruction of various forms of algae.

Limitations of the Process.—In making a complete analysis of the practicability of this process it is necessary to recognize the fact that it is not possible by the use of this germicide to accomplish certain features looked for in connection with certain styles of water treatment, as follows:

1. Inability to remove or destroy all of the spore-forming bacteria, but which kinds of bacteria are not considered to be pathogenic to man; at least those common to water.
2. Inability to remove bacteria which are embedded in particles of suspended matter.
3. Inability to remove turbidity.
4. Inability to remove appreciable amounts of color or dissolved vegetable stain.
5. Inability to remove organic matter appreciably.
6. Inability to remove swampy tastes or odors.
7. Inability to remove creosote tastes or odors coming from the cleaning of stills used in the destructive distillation of wood.
8. Inability to soften water; as a matter of fact, the addition of hypochlorite in the hardness of the water, although this is not ordinarily measurable, notwithstanding the fact that the commercial product usually contains a little free quicklime which reduces slightly the carbonic acid in the water.

9. Difficulties encountered in applying this process except with the greatest care to waters which contain substantial quantities of reducing agents or compounds capable of oxidation, such as nitrites and unoxidized iron.

The above statements set forth the advantages and shortcomings of this process which, like other things that are new, is likely to be, and is, in some cases, considered a cure-all for all water ills, and, no doubt, with disappointing results in some cases.

The application of hypochlorite to a water, while comparatively simple, should always be carried out with much care and fidelity by a competent analyst; otherwise, if the dose is not adjusted so as to meet satisfactorily all local conditions, there is liable to be alternately an underdose of the chemical insufficient to sterilize or an overdose which will result in objectionable tastes and odors readily noticeable to the consumers, and due to the bleach itself.

The use of hypochlorites cannot be considered in the light of a substitute for filtration. Where waters are uniformly satisfactory in appearance, but open to suspicion as regards their content in bacteria, the use of the hypochlorite process alone may, in many cases, prove insufficient. Where waters

are unsatisfactory in physical appearance and are also polluted and require filtration, the combined process is called for. As an adjunct to filtration processes it has a distinct field of applicability, as above stated, for at a moderate cost it is feasible to obtain a water which is practically above suspicion;

and furthermore, there is brought about a substantial economy in the first cost of the filtration plant. This is made possible by the use of higher rates of filtration than are ordinarily used, and the required filter area may, therefore, be reduced. It also effects a substantial economy in the cost of operation.

Vancouver and Coast Correspondence

Importance of Organization urged upon Master Builders by E. T. Nesbitt, of Quebec—Rapid Developments at Port Mann, B.C.—General Notes

Office of the "Contract Record."

Vancouver, October 20, 1910.

"There are laws on the statute book of Canada that should never have been placed there," declared Mr. E. T. Nesbitt, president of the Canadian National Association of Builders' and also of the Quebec branch of that body. The statement was one of a number of trenchant expressions delivered on the occasion of a visit to Vancouver on Oct. 8th, when Mr. Nesbitt addressed a gathering of Vancouver master builders on matters pertinent to their business. Mr. Nesbitt has been making a tour of the West accompanied by Mr. J. H. Lauer, of Montreal. Meetings addressed at Winnipeg, Regina and Edmonton, were reported in previous issues of the Contract Record. The importance of organization was emphasized, it being pointed out that the holding of the annual convention at Winnipeg next year would offer a grand opportunity for the western Exchanges to get into close touch with those of Eastern Canada, in reference to legislation and other matters affecting their common interests.

Address Before Vancouver Exchange.

Mr. Nesbitt urged his hearers to organize, and become affiliated with the National Association so that they would be in a position to protect themselves against detrimental legislation that might be introduced into Parliament. The labor associations had accomplished much for themselves and had been successful in getting laws placed on the statute books that should never have been placed there, laws that would never been passed had the builders been properly organized and taken steps necessary for their own protection. He and Mr. Lauer had personally fought the eight hour law when it was introduced at Ottawa, and they had been successful in getting it shelved until next year. The Association had also been successful in getting a Workmen's Compensation Act in Quebec Province greatly modified. Very little permanent work could be accomplished unless the builders were united. The power of the Canadian Manufacturers' Association should be a patent object lesson. There was no good reason why the builders of Canada should not become equally as powerful for their own protection and the furtherance of their objects. Mr. Nesbitt instanced how the Canadian Manufacturers' Association kept a representative for the special purpose of keeping them posted upon everything that was introduced into Parliament tending to affect their interests prejudicially, the timely notice enabling them to frame up an effective opposition. He thought the Builders' Exchanges should adopt similar measures. He did not blame the labor organizations for looking after their interests, but he did wish to impress upon the builders that such harmful legislation as had been allowed to become law might have been avoided if Builders' Exchanges had been formed at all principal points and affiliation sought with the National Association.

President Nesbitt, while in Vancouver, was the guest of relatives and saw a good deal of the city. He was greatly impressed with the great progress on every hand.

Port Mann, C. N. R. Terminal on the Fraser.

Port Mann, opposite New Westminster, where the Canadian Northern Railway will establish its main Pacific Coast terminal, seems destined to become a city without having to pass through the slow degrees of growth peculiar to ordinary centres of trade and commerce. The townsite comprises two thousand acres above the big railway bridge, having two miles of water frontage. According to official advices, the plans of the railway management include provision for the needs of the system following the completion of the Panama Canal, the development of inter-provincial trade and the expansion of commerce between the Dominion and Australia, Central and South America and the Orient. The business and residential section of the new city will be built on a sloping hillside, extending southward in a series of terraces. Along the two-mile water front sites will be reserved for wharves, grain elevators, freight sheds and factories of various kinds. The machine and car shops, which will be immense structures, will be located adjacent to the yards, the laying out of which is now being carried on by Mr. W. G. Swan, divisional engineer, who is directing the construction of the initial wharf, 1,000 feet in length, which will be located about a mile and a half above the railway bridge. Surveyors are now at work subdividing the big area into lots.

Official Inspection Made.

Port Mann occupied the close attention of Mr. William Mackenzie, president of the Canadian Northern, upon his recent visit. The various points of interest were shown him by M. T. C. Holt, executive agent for Messrs. Mackenzie, Mann & Co., in British Columbia, and Mr. A. D. MacRae, a business associate and general manager of the Canadian Western Lumber Company, of Fraser Mills. Mr. Mackenzie seemed to enjoy the outing. They left the automobile, and after examining the waterfrontage and the site of the proposed car shops and machine shops, climbed up the wooded terraces in the southern portion of the townsite. As a result of the visit Mr. Mackenzie will finally decide upon the details of the survey and the extent of the railway terminals. Subsequently the party boarded a launch, viewed the townsite from the river, examined the site of the proposed wharves, and then crossed over to Fraser Mills, where the huge mills of the Canadian Western Lumber Company are located. Mr. Mackenzie is a large shareholder in the latter enterprise, and took a keen interest in watching the transformation of saw logs into lumber.

Vancouver Island Activities.

Several days were devoted by Mr. Mackenzie to an inspection of the Vancouver Island coal mines, which he purchased several months ago from Mr. James Dunsmuir for \$11,000,000. On the tour he was accompanied by Mr. A. D. MacRae, managing director of the new Canadian Collieries (Dunsmuir) Ltd., and Mr. W. L. Coulson, manager of the mining department. The Extension and Comox fields were visited. Mr. Mackenzie after an examination of the mines,

discussed with his fellow-directors details of the programme involving the expenditure in the next three years of \$3,000,000 in opening up two new coal mines at Extension, and an equal number at Cumberland, as well as increased development of the present producing collieries. In both districts the equipment will be renewed, and steel tipples will be built at the new mines about to be developed. Mechanical haulage will also be installed. A 50,000 horse power plant in the Comox field will also be developed in order to supply power for operating the mines and operating the railway, which, like the line from Ladysmith to Extension, will be rebuilt and laid with 86-pound rails instead of the 56-pound rails now in use. The management expect that the coal output will be increased to about 10,000 tons daily before the end of three years, and the coal bunkers at Ladysmith and Union Bay will be enlarged proportionately.

The new Cambrie Street bridge across False Creek will be a massive and imposing structure. The three caissons for the draw-span were completed last week, these being 35 feet below the bed of the Creek. Twenty of the twenty-four concrete piers have also been finished, and the erection of the ironwork will be commenced in the near future. The bridge will be about 1,000 feet longer than the Granville Street structure, and unlike the latter, the north and south approaches will have concrete retaining walls filled in between with earth. The roadway will be 44 feet in width, or two feet wider than Granville Street bridge, with six-foot walks on either side. The level of the bridge above high tide will be 41½ feet at the draw. The original estimate of the cost of the new bridge was \$770,000, but this is likely to be exceeded.

A large limestone deposit on the Chilliwack river has been secured by representatives of an English syndicate, the object being the establishment of a large cement works. The quarry is adjacent to the New Westminster-Chilliwack line of the British Columbia Electric Railway recently opened.

A Lobnitz rock-crushing vessel being built in Scotland for use in Victoria harbor is to be completed in November, and will be shipped on one of the Blue Funnel liners in knock-down shape. The strange craft is operated similarly to a stamp mill, a 20-ton hammer being dropped at the rate of ten times a minute by steam, pulverizing the rock. The removal of reefs and other obstructions in the harbor will occupy about two years unless the work is arranged in two shifts.

Building Inspector Jarrett, of Vancouver, is now predicting that the permits for 1910 will foot up to a round total of \$12,000,000, or an average of \$1,000,000 per month. Winnipeg's total for nine months has topped the \$13,000,000 mark, but for the next five months Jack Frost will be the only builder at work in the prairie metropolis, while in Vancouver an army of masons, carpenters, lathers and plasterers will be steadily engaged all winter adding to the city's building total. If the present rate of progress continues—and all signs point that way—the disparity between the building figures for the two cities is an inspiring one: 1902, 417 permits, value \$833,607; 1903, 580 permits, \$1,426,148; 1904, 836 permits, \$1,968,891; 1905, 940 permits, \$2,653,000; 1906, 1,006 permits, \$4,308,410; 1907, 1,773 permits, \$5,632,744; 1908, 1,697 permits, \$5,950,883; 1909, 2,054 permits, \$7,258,565; 1910, first eight months, \$8,270,645. Watch us grow!

City Engineer Clement, of Vancouver, is being criticised rather harshly by Mayor Taylor, and a section of the city council in connection with what is termed the fad of bench-grading of streets, as carried out in Seattle and other Sound cities. Certainly the cutting down of a number of streets, and raising the levels of others, has led up to a "messy" condition, but this has nothing to do with the merits of the case. The fact that the work was not undertaken sufficiently

early to escape wet weather should not be permitted to "swamp" the facts. Bench-grading is either right or wrong—if the former, Vancouver wants the best system going; if wrong, then the Board of Works is culpable in having allowed the engineer to expend thousands of dollars of the people's money on a Yankee fad.

As a result of the severe weather in northern waters last winter, a number of the acetylene gas beacons were put out of commission for a time, owing to the freezing of water in the buoys. A possible recurrence of the trouble will be avoided by enclosing all buoys in portable houses, a number of which have just been sent north by the Government.

Messrs. Waddell & Harrington, consulting bridge engineers, of New York and San Francisco, will probably be appointed by Vancouver City council to act in a similar capacity for a period of five years, on a percentage basis, 3½ per cent. on the total cost being suggested, the city to pay all expenses. It will be remembered that this firm superintended the construction of the Granville Street bridge. When engaged on work other than bridge work for the corporation it was suggested that the rate of remuneration be \$50 per day in addition to travelling and other expenses.

New Westminster city council has decided to appoint a building inspector, and is now wrestling with a large number of applications for the position. It is probable that a re-assessment of the whole city will also be made with a view to adjusting present inequalities. This undertaking will carry with it a re-survey of the town plot, for which permission has already been secured from the Provincial Government. The cost will mount into the thousands.

The roads of Vancouver, B. C., are so bad that coal-dealers of that city are thinking of raising the price fifty cents a ton on certain districts, notably Kitsalano, Fairview and Grandview, in many sections of which localities are streets on which delivery wagons sink axle deep in mud during the wet weather. We venture to think that the citizens will find it more economical in the long run to agitate for an extensive street improvement programme next season. A Fairview contractor states that he is now paying 75 cents a load above the normal price for delivery of building materials.

Progressive New Westminster Industry

New Westminster, B. C., has a number of enterprising concerns within its boundaries, but none more so than the Dominion Wood Pipe Company, Limited, who report the most prosperous season in their history. The capacity of their plant has been doubled and at the present time they have sufficient orders to carry them well into December. The probability is that operations will be prosecuted at this rate right through the winter. The Dominion Wood Pipe Company, Limited, manufacture double wire wound and continuous stave wood pipe, also cast iron specials, valves, hydrants and waterworks supplies. They have only four competitors, and it is noteworthy that these are all located on the Pacific Coast. The Dominion Wood Pipe Company's products have earned a reputation for excellent material and high grade workmanship. The officers of the company are as follows: President, Mr. Jno. Schmehl; Vice-President, Mr. D. McKenzie; Managing Director, Mr. F. A. Shand; Secretary-Treasurer, Mr. W. H. Wilson.

A Winnipeg deputation waited upon the Hon. Robert Rogers, Minister of Public Works for Manitoba, last week and submitted the proposal of the Provincial Good Roads Association that the Government set aside a fund of \$500,000 for highway improvements. The question will be submitted to the Cabinet at its next meeting.

All Trades Busy at Ottawa

Fall Business Stimulated by Award of a Number of Good Contracts—New Aqueduct Half Finished

Ottawa, Oct. 22, 1910.

A large number of contracts have been awarded lately in Ottawa for remodelling residences in the more expensive part of the city. These are large in the aggregate, and consequently all trades are very busy.

The plumbers have had a good summer and will be very busy all fall. The general extension of the sewer system in the outlying parts of the city, and the enforcement of the by-laws against open privy vaults wherever there is a sewer, has made the plumbing business very active indeed. This large amount of jobbing is increased by the many reconstructions of the plumbing systems in old residences. The master plumbers and the journeymen plumbers are working under a satisfactory agreement, and the supply of labor in this trade is about equal to the demand.

The electricians report a great many contracts on hand for the next few months. The inspector for the fire underwriters has been very active inspecting the wirings, particularly of the commercial buildings. In many cases this has influenced the owners to entirely renovate their systems or install new ones. The many business buildings now being constructed will also mean a number of big jobs in electric fitting. There is a slight scarcity of electricians, but not sufficient to affect the situation.

The construction of the new aqueduct by the city is about half completed. The total distance to be excavated is about 2,000 feet and about 1,000 feet is finished. However, all the difficult parts have been completed, such as crossing under a portion of the river, under the C. P. R. yards, and under the Massey Harris building, without any unsatisfactory results. From now the excavation will be along a street. The excavation in through rock, and is 30 feet deep and about 28 feet wide. The bottom of the duct is the same level throughout its course. The construction of concrete arches, which cover the duct is kept apace with the excavating so that a very small part of the traffic of the street is interrupted at one time. This work will be continued all winter.

The bottom of the river above the aqueduct will be lowered from five feet below the surface to 15 feet for the intake pipe. A dredge has been built especially for this work. This work will be begun at once and will be continued all winter. This portion of the undertaking will cost about \$80,000. The entire work is under the supervision of City Engineer Ker.

Winnipeg Making New Records

Western Metropolis Expects to Spend Fifteen Millions on New Buildings during 1910—Trade Conditions

Winnipeg, Man., Oct. 21, 1910.

As far as important building work goes, 1910 has practically closed its records in Winnipeg. Building figures for actual building—subways and bridges excepted—stand at \$13,500,000. Probably there will be enough money represented in house permits before the end of the year to bring the total to fifteen million dollars. Fall weather has arrived and builders and architects are abandoning schemes to rush through any more big buildings this season. A number of excavations are being started preparatory to next year's activity, but at present there are just two structures upon which it is expected that work will really be commenced in earnest this year. The Canadian Bank of Commerce will start on the eight-storey structure which is to replace and extend the present offices on Main street, and which when completed will cost in the

neighborhood of \$700,000. Excavations have been made for the new home of the Sterling Bank, on Portage Avenue. It is stated that James Chisholm & Son, the architects for the latter building, have almost completed the plans and will call for tenders within a few weeks. This building will also be eight storeys in height and will cost approximately as much as the Bank of Commerce building.

With either one of those commenced, the city is certain of setting up new Canadian records, for there is no abatement in the stream of home-builders who are pouring daily into the offices of the Building Inspector for permits. To-day more than \$50,000 was represented in eighteen permits issued, and for the week, house permits ran close to \$200,000.

Now that the season is coming to an end, contractors and builders are commencing to look back over the progress. There is still a very large amount of work uncompleted, and a great deal of this is concrete work. There have been many delays during the season. Practically every possible cause has entered into these. At the commencement, men were none too plentiful. There was a heavy demand on Winnipeg workmen by the western towns, where big wages were offered. When the working forces were brought up to normal, the trades unions brought on the masons and bricklayers lock-out, which set back building operations from two to three weeks.

All spring and summer, and up to the present time this fall, the steel companies have been none too expeditious in making deliveries. In some cases the delays were serious. The shortage of brick early in the year had its effect in a slight delay, for which no one was responsible. The stone yards have been entirely unable to cope with orders from contractors all over the city, and this has been one of the most serious drawbacks to the building trades this year. In cement construction there appears to have been no hold-up by men or material.

In apartment blocks and factories, as well as in several warehouses and business blocks, cement construction, faced with brick or terra cotta, or cement supports, has been employed very largely. The greater number of warehouses, however, are of the old style mill construction, while buildings built entirely of brick are remarkably few.

Personal News and Notes

The death occurred recently at Montreal, of Mr. Richard Lynch, assistant superintendent of the western division of the Civic Roads Department.

Up to September 30, 1910, the total value of buildings erected in Port Arthur exceeded that of the corresponding period of 1909, by nearly \$210,000.

The Industrial Commission of Montreal have decided to hold an exhibition in that city in 1912. Tenders are now being called for a site of from 100 to 200 acres.

The works committee of the Toronto city council have decided to engage Mr. Rudolph Hering, New York, at a fee of \$3,000 to report on the question of establishing garbage incinerators.

Mr. A. E. Hanna, secretary of the Dominion Wire Manufacturing Company, Montreal, is leaving shortly for Winnipeg, where he will assume the position of western sales manager of the Steel Company of Canada, Limited.

The death occurred at Seattle last week of Mr. J. Heney, well known railway contractor, who has carried out extensive work in British Columbia and Alaska. The late Mr. Heney built the White Pass & Yukon railroad system.

A deputation representing the Toronto Building Trades Council appeared before the Fire and Light Committee and asked for an amendment of the building by-law compelling contractors to provide the same proper protection for working-

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Chippawa, Ont.

The ratepayers defeated the by-law to raise \$30,000 to provide for installing a waterworks system in the village. This is the second time the waterworks by-law has been defeated.

Edmonton, Alta.

Resume of Engineer Potter's report on sewage and water systems. Sewer System:—Cost of sewer system, \$4,000,000. Provision for city of 250,000 people. Sewage will be drained into tunnel sewer ten feet six inches in diameter, to be carried from present Rat Creek outlet to the river along the eastern boundary of penitentiary property. Cost of Rat Creek tunnel sewer, \$137,000; outlet, \$23,000; connection with system, \$7,000. A storm drain for St. James district. A district sewer for Bellevue district and the territory east of the city as far as Packington. (This district is out of the jurisdiction of the city of Edmonton authorities.) A disposal plant of 85 acres of land on south side of river opposite penitentiary. Sewage to be carried beneath the river to disposal plant by syphon. Both sewer and drainage from parts of the city which can be economically carried below the city to be covered by system of conduits. At other points where the cost of conveying the storm water to a point below the city would be prohibitive, separate conduits to be installed. Provision for two drainage systems in west end, one for draining storm water and the other for sanitary sewage. The other portions of city will discharge both via Rat Creek sewer. Water System:—Cost, \$400,000. Provision for city of 250,000 population. Declares that proposal to establish pumping station at Pigeon lake unfeasible. Present site suitable for future needs. Laurier Park (McGibbons property) entirely unsuitable as site for pumping station. System of water purification to alleviate danger of contamination; hence location of pumping site in river immaterial. In future, extensions of pumping plant, two stage system of pumping is desirable, viz., water should be raised from river level to that of filtration plant by low lift pumps, then pumped from clear water basin into distributing system. Installation of new feed main and new standpipe in the north-east of city. Mr. Potter states that reinforced concrete should be used in construction. The detailed cost of the sewage system is as follows: Combined Sewers—North central system, 4,920 acres, \$2,286,324; Bellevue, 611 acres, \$2,663,707. Separate Sanitary Sewers: West separate system, 3,047 acres, \$195,125. Storm Drains: St. James storm sewer district, 1,250 acres, \$343,662; west storm water district, 1,817 acres, \$228,942; total, \$3,917,760.

Moncton, N.B.

The report of W. Chipman, expert engineer, Toronto, has the following suggestions and recommendations: The two mains

cannot supply the electric pumps with sufficient water to get the full benefit; the capacity of the present reservoir is inadequate, particularly in a dry season. It cannot be depended upon for a greater supply than at present. The construction of another reservoir is recommended and a site selected on McNutt brook, some 3 or 4 miles from the city. An estimate of the cost of the new reservoir, pumping station and 20-inch main, \$209,000; with filtration plant and meters, \$254,000.

Montreal, Que.

Ald. U. H. Dandurand has purchased the Fraser and Boyer farms owned by the Lachine Hydraulic Company. The intention of those interested in the purchase, it is stated, is to have after the lots are laid out, the streets macadamized, cement sidewalks laid down, etc., before building operations start. The Lachine Hydraulic plant will supply lighting and power required.

A city boulevard plan was submitted by Mr. W. S. Maxwell, architect, to the Parks Commission. This project taking Victoria Square as a central point, provides for a spacious highway, diverging east and west to the city limits and forming a large artery throughout the length of the city in the neighborhood of Dorchester and Lagachetiere streets. The Commission took the matter under advisement.

Tenders will be invited shortly by the Board of Control for the construction of sewers in the undermentioned streets or sections of streets, namely: Comte street, from St. Hubert street to Labelle street; Boyer street, from Everett street to Rosaire street; Montee du Zouave, from St. Denis street to end of Montee du Zouave; De Fleusimont street, from Dufferin street to Christophe Colombe street; Notre Dame de Grace avenue, from end of existing sewer to 500 feet northwards.

Rouleau, Sask.

The city has voted \$45,000 for the installation of a waterworks system.

Toronto, Ont.

The proposal of the board of directors of the National Exhibition to pave the roads in the Exhibition was sent to the board of control for approval. Manager, Dr. Orr.

The construction of the following asphalt pavements has been recommended by City Engineer Rust: Dovercourt road, \$21,893; St. David street, \$5,212; Rebecca street, \$1,970; Armstrong avenue, \$936; Danforth avenue, \$12,242.

Vancouver, B.C.

The local improvements passed recently for wood block pavement, asphalt and bitulithic, and widening Granville street to Alma road. Total, \$300,000.

It is probable that at the January elections the ratepayers will be asked to approve a by-law carrying a large amount for the extension of the city's waterworks system. This will cover not only city extension work but will also provide for the enlargement of the system on the

north side of the inlet. Superintendent of Waterworks, Madison; engineer in charge, H. M. Burwell.

Walkerville, Ont.

Tenders will be received by Cecil H. Robinson, town clerk, up to November 8, for construction of a brick sewer on Windermere road. Owen McKay is the engineer. See advertisement in "Tenders and For Sale Department" of this issue.

Winnipeg, Man.

Tenders addressed to Chairman, Board of Control, will be received until Nov. 4, for supply of quantity of sewer pipe and specials. Specifications at office of city engineer. M. Peterson, secretary.

Tenders addressed to the Chairman, Board of Control, will be received until Nov. 14th for supply of quantity of cast iron water pipe, valves and hydrants for domestic water works system. Specifications at office of City Engineer, M. Peterson, secretary.

In regard to the proposed supply of water from the Winnipeg river, City Engineer Ruttan estimates the cost as over \$6,000,000 and the time to complete it four years. In estimating this, two pipe lines are considered, capable of delivering 23,000,000 gallons daily. The following is estimate of the report of the Water Commission of 1907, plus 15 per cent.: Land and right of way, \$18,000; intake works, \$150,000; pumping station, Winnipeg river, \$400,000; pipe lines, \$3,399,000; coagulating basin, \$65,000; filters, \$375,000; filtered water reservoirs, \$270,000; Winnipeg pumping station, \$507,000; keepers' houses, \$12,000; telephone lines, \$11,000; tramway, \$150,000; total, \$5,357,000; add 15 per cent. \$803,550; total on basis of Water Commission's report, \$6,160,550.

AWARDED.

Moose Jaw, Sask.

The Canadian Fire Engine Company, Ltd., London, Ont., was awarded the contract for supply of combination hose wagon and chemical wagon, \$1,455. W. F. Heal, city clerk.

New Westminster, B.C.

Contract for the construction of approximately two miles of sewer was awarded to F. F. Sinclair, of Vancouver, at \$55,795. Other bidders were: Messrs. Hugh & J. I. McDonald, of Vancouver, at \$59,965; the Puget Sound Bridge & Dredging Company, Vancouver, at \$68,753; Robt. McLean & Company, Vancouver, \$89,000; McDonell & Gzowski, at \$99,500.

St. Catharines, Ont.

The following tenders for pavements on King and Queenston streets respectively were received: Warren Paving Co., \$30,000, \$29,900 (accepted); Thomas Riley, \$30,900, \$30,937; Newman Bros., \$31,000, \$30,624; City engineer, \$31,854, \$31,011. The report recommended the acceptance of the tender of the Warren Bituminous Paving Co., of Toronto, it being the lowest, the contractors to proceed with the work when notified by the engineer.

Vancouver, B.C.

Tenders were considered as follows: wood block paving in rear of postoffice and Winch block, M. P. Cotton, \$2,280; Higman & Doctor, \$3,630; T. B. Nickson & Co., \$2,300; Romano & Pinto, \$1,950; awarded to Romano & Pinto. Resurfacing Abbott street, Warren Construction Company, section from Hastings to Cordova, \$3,349.50; from Cordova to Water, \$3,571.40, same firm.

Victoria, B.C.

The contract for paving was awarded to the Westrumite Asphalt Paving Company, \$33,204. A. Smith, city engineer.

Railroads, Bridges and Wharves**Chatham, Ont.**

Tenders addressed to W. Abraham, reeve Tp. of Chatham, will be received until November 5th for construction of two bridges over Running creek dredge cut west of this town. Tenders may be either for steel or concrete. Plans, etc., at office of township clerk, Chatham, and at Shaw's hardware store, Wallaceburg.

Crofton, B.C.

Construction is to be begun forthwith upon a line of railway from Crofton to Cowichan lake in pursuance of the agreement between the E. & N. Railway Co. and the American Securities Company. At Osborne Bay, near Crofton, the Empire Lumber Company, an organization subsidiary to the Securities Company, will erect a sawmill at the cost of \$1,000,000. This will be the largest plant in British Columbia.

Edmonton, Alta.

Rumors that the C.N.R. interests are going to take over and build the Alberta and Great Waterways Railway are revived by the fact that several parties of surveyors have been sent out to the north country for Mackenzie & Mann.

Fredericton, N.B.

Preliminary arrangements for the rebuilding of the Perry Point bridge across the Kennebecasis river in Kings county are under way. Messrs. George B. Jones and James A. Murray, M.P.P., are interested.

Ottawa, Ont.

Work will be started this fall from the Ottawa end of the Canadian Northern line from here to Toronto, via Smith's Falls. The company has completed the purchase of its right of way between here and Smith's Falls.

The joint committee of Board of Trade and City Council will petition council for funds to have new entrance project and feasibility of C.P.R. tunnel looked into.

Port Stanley, Ont.

The cost of the desired improvement here is estimated at \$650,000, and the deputation which waited upon the Dominion Government asked that a grant of \$250,000 be included in this year's estimates. Dredging and breakwater is required.

Quebec, Que.

An important deal has just been consummated by which Mr. J. G. Kilt, of Ottawa, has acquired all the damaged iron and steel work of the demolished Quebec bridge.

Red Deer, Alta.

The Canadian Pacific Railway Company will build a 1,000,000 gallon reservoir near here.

St. John, N.B.

Engineer Davy has begun to make borings on the site of first two docks to be built at Courtenay Bay. Extensive construction work is expected to be begun early in the spring to provide terminal facilities for the Grand Trunk Pacific.

Toronto, Ont.

The Temiskaming & Northern Ontario Railway, it is stated, have been able to secure a suitable location for a new route from North Bay to Riddle, 34 miles north. The proposed new route lies eastward of the present one, and will not only save several miles in actual distance, but will cut down the grade almost one-half.

The Works Committee of the city council have added a by-law for \$75,000 to construct a subway on Coxwell avenue, and another for \$175,000 for a viaduct to connect Parliament street with the proposed Bloor street viaduct.

Victoria, B.C.

The route of the C. N. Pacific through Vancouver Island has been determined and will involve the construction of 153 miles of railway instead of 100 miles as originally contemplated. Tenders for the construction of the railway will be called for as soon as the engineers can complete their location surveys, and the whole work pushed to completion with all possible speed.

Winnipeg, Man.

Tenders are being called until November 10th for erection of timber trestle at Mileage 53.7, Crow's Nest Sub-division. Maximum height, 115 feet; length, 750 feet. Plans, etc., at following offices: Assistant Chief Engineer, Winnipeg; Division Engineers, Moose Jaw and Calgary; Resident Engineer, Cranbrook; H. B. Walkem, acting division engineer, Calgary.

AWARDED.**Hamilton, Ont.**

The contract has been let by the Beach Commission for the building of a revetment wall at the Beach, 100 feet out in the bay to Joseph Battle of Thorold, \$23,000. The work will not be started until spring. G. G. Barrow, engineer who drew plans.

Port Mann, B.C.

The C.N.R. has awarded to the Northern Construction Company a contract for building a large wharf, 1,000 feet long and 100 feet wide.

Public Buildings, Churches, Schools, etc.**Brandon, Man.**

A by-law to authorize expenditure of \$40,000 on new east end school will be submitted shortly. Plans will be asked for among the city architects and tenders invited with a view to beginning construction next year.

Cobalt, Ont.

Plans are well under way for the establishment of a Y.M.C.A. here. A site has been purchased opposite the town hall. Total expenditure estimated at about \$35,000.

Camrose, Alta.

We are advised that the Scandinavian College now under consideration will not be erected until late in 1911. O. B. Olson, secretary-treasurer.

Carleton Place, Ont.

A vote was taken of the congregation of Zion Presbyterian Church, Carleton

Place, which has resulted in the decision that a new church will be built on the site where the one was burned last summer.

Calgary, Alta.

At a recent meeting of the school board it was decided to erect two new cottage schools and purchase sites for two schools and authorize the purchase of a 3-acre site in Hillhurst and one in East Calgary. All this was considered necessary owing to the threatened overcrowding and the necessary accommodation in the spring.

High River, Alta.

The by-law to expend \$3,200 on installation of steam heating plant, etc., was defeated.

Halifax, N.S.

The following tenders were received for Memorial Tower: Falconer & MacDonald, \$24,829; S. A. Marshall & Son, \$29,762; M. E. Keefe Construction, \$34,160. S. M. Brookfield, Ltd., \$23,960.

Melville, Sask.

Tenders were called until Nov. 1st for furnishing materials and erecting a frame hospital building here. Specifications, etc., at office of secretary-treasurer, J. Crow.

Moose Jaw, Sask.

The congregation of St. Andrew's carried a motion to erect a building for congregational purposes in the northwest of the city at once. J. L. Bryant and J. E. Chisholm are interested.

Montreal, Que.

Tenders will be called shortly for the construction of a new art gallery building. Messrs. Edward and W. S. Maxwell, architects.

The management of the Montreal Association for the Blind have decided to erect a thoroughly educational and industrial institution which will cost in the vicinity of \$100,000. P. E. Layton, treasurer.

A building permit has been issued for the construction of a branch building of the Y.M.C.A. on Park avenue, \$75,000.

Mr. Joseph Vanier, architect, 5 Beaver Hall Square, will be inviting tenders shortly for the erection of a Roman Catholic Church in Southbridge, Mass. Approximate cost about \$125,000.

North Battleford, Sask.

It is stated that tenders will be called at once for the construction of hospital mentioned in last issue. Address Grey Nuns of Montreal.

Nanton, Alta.

The county council have decided to issue \$6,000 electric light and \$1,500 fire protection debentures.

Ottawa, Ont.

At the next meeting of the Children's Aid Society Mr. John Keane will present plans for an addition to the Detention Home.

The Separate School Board will take up the enlarging of St. Roch school early next year.

Tenders for the installation of electrical fixtures in the city hall are as follows: J. A. Ellacett, \$2,170; Ottawa Electric Company, \$2,243, or \$2,0004 for fixtures of their own make; Marchand & Donnelly, \$2,379. Architect C. P. Meredith's estimate was \$2,300.

Paris, Ont.

Tenders will be received until Nov. 10th for the repair of the armory. Eug. Fisot,

Colonel, Deputy Minister of Militia and Defence, Ottawa.

Stratford, Ont.

The Perth County Council authorized the issue of debentures to the amount of \$11,000, 15-year, for the erection of registry office for the North Riding, County of Perth.

South Vancouver, B.C.

A movement is on foot to provide a public hall for South Vancouver. No plans have been drawn yet, but a 3-storey structure is contemplated. Councillor Baird and Messrs. G. Greenslade, F. E. Elliott and Thomas Houston are interested.

Toronto, Ont.

None of the plans for the new Government House will be accepted, but as the competition was carried on in good faith, it has been decided to award the prizes as follows, namely, the first prize of \$1,000 to George W. King, and the second prize of \$500 to G. W. Gouniock, both of Toronto. Mr. Heakes, architect of the Department of Public Works, has been asked to furnish plans and has consented to do so.

The architects in charge of the new Knox College building are Mr. F. Darling, of Toronto, and Mr. P. E. Nobbs, of Montreal. The committee appointed to confer with them comprise Principal Gandier, Messrs. D. Bruce Macdonald, A. M. Campbell and others.

Vancouver, B.C.

Plans are now under consideration for a new Church of England in Fairview known as St. George's. The site has been secured. Rector, H. M. Jackson; chairman of building committee, William Haddock.

Victoria, B.C.

A by-law is being prepared to authorize the granting of a site for the new theatre mentioned in Oct. 5th issue. Amount of private subscription, \$70,000.

Winnipeg, Man.

The by-law for new city hall was referred to works committee.

The parks board was authorized to set aside a portion of Selkirk park for erection of proposed bath house.

Owing to alleged dissatisfaction among organized architects of the city over the regulations advertised to govern the competition for tubercular hospital plans, only four sets of drawings have been received. It has been decided to submit the drawings to Stern, the celebrated hospital architect of Chicago, and to Dr. Lawrison Brown, of Saranac Lake. The committee appointed Ald. Macdonald and Ald. Wallace to take up the subject with the architects.

Tenders were called until October 28th for erection of school on St. Paul's for S.D. 1546 (centre St. Paul), near Bird's Hill, Man. Plans, etc., at office of architect, W. Wallace Blair, 400 Nanton Building. T. Turnbull, secretary-treasurer, S.D.

AWARDED.

London, Ont.

The London board of education has awarded the contract for the new Alexandra school on Colborne street to Hyatt Bros. for \$44,754.

Melville, Sask.

The contract for frame school here was let to A. A. Cunningham, \$1,079. H. Wilson, architect.

Moose Jaw, Sask.

The contract for excavation for Saskatchewan College here was awarded to H. Giles, \$1,300. We are informed contracts for superstructure will not be let until the spring.

Toronto, Ont.

The contract for installing the ventilating apparatus in the Provincial Parliament Buildings was awarded to Purdy, Mansell & Company, of this city. The system will apply to the new northern wing and the one being rebuilt. Approximate cost, \$50,000.

Victoria, B.C.

Contracts for three new public schools in the interior districts of British Columbia have been awarded as follows: Two-roomed schoolhouse at Glenbank, in the Slocan district, James Dancy & Company, Nelson, at \$3,977; Okanagan Landing, one-room large schoolhouse, W. G. Simpson, of Vernon, at \$1,750; and Yale Road, two-roomed schoolhouse, Thomas Turnbull, at \$3,500. Construction in each case will begin at once.

Residences

Montreal, Que.

The apartment house on Bishop street in course of erection was destroyed by fire. Loss estimated at \$50,000.

Tenders are being invited for the erection of a residence on Harvard avenue, Notre Dame des Graces Ward, for J. Hamilton, Ferns, Esq. Plans, specifications, etc., prepared by Mr. W. E. Doran, architect, 180 St. James street.

Nelson B.C.

The erection of an apartment house is under consideration by Mr. E. Kerr. A. Carrie will visit neighboring cities to gain the latest information regarding the architecture of such buildings.

Ottawa, Ont.

A. Tracy, architect, is preparing plans for a residence for Cram Brothers, of Westboro, Ont.

Recent building permits include: Geo. MacDonald, brick veneer dwelling, Argyle avenue, \$3,000; D. K. Edwards, brick veneer dwelling, Clemow avenue, \$5,000; J. P. Band, brick veneer dwelling, Gordon street, \$1,500; R. A. Kemp, dwelling, Oakland avenue, \$3,500; F. X. Laliberte, brick veneer dwellings, St. Patrick street, \$5,500.

Quebec, Que.

The residence of A. J. Price, Belvidere road, was destroyed by fire on the 26th ult., involving a loss of several thousand dollars.

Victoria, B.C.

Richard Hall will build a 2½ storey residence on Linden avenue, \$12,000. A permit for the construction was issued.

Building permits were issued as follows: To Mrs. M. Banman, dwelling on Dallas road, \$3,100; H. A. Porter, for a house on Linden avenue, \$3,500; to T. L. Toy, for a house on Pendergast street, to cost \$2,400; Mr. Richard Hall, dwelling to be erected on Linden avenue, \$12,000; to Messrs. Moore & Whittington for a dwelling to cost \$2,500, and to Miss L. M. Sylvester, dwelling on Queen's avenue, \$2,100.

Winnipeg, Man.

J. A. Hudson is preparing plans for a \$25,000 two storey apartment block.

Business Buildings and Industrial Plants

Crofton, B.C.

See "Railroads."

Calgary, Alta.

The C.P.R. will take immediate steps towards the erection here of a handsome, modern, several storey building. Wm. Whyte, vice-president.

Edmonton, Alta.

E. F. Wayman, of Regina, will start a soap factory here. A capital of \$23,000 has already been subscribed. \$40,000 is required.

Hamilton, Ont.

Wagstaffe, Limited, announce that they will enlarge their present plant, the addition to be completed by next year. Estimated cost, \$30,000.

The International Harvester Company has secured a building permit for an addition to the warehouse, to cost \$60,000. W. H. Cooper is the contractor.

The Garlock Packing Company has purchased the factory on Queen street formerly occupied by the Ontario Tack Co. It is their intention to enlarge the building and centralize business here.

Lachine, Que.

It is understood that the Canadian Tube & Iron Company lately incorporated at Ottawa for the manufacture of iron and steel pipes, and tubes, tinplates, etc., with a capital of \$1,000,000, have had agents here looking after a suitable site for the erection of a large plant to employ several hundred men.

Medicine Hat, Alta.

We are informed that those in charge of the construction of the plant for the Alberta Rolling Mills Company were expected to be on hand last week to make arrangements for its construction. Estimated expenditure, \$150,000.

Montreal, Que.

See "Power Plants."

A permit was issued to Transportation Limited Company for the erection of a building on St. Francois Xavier, between St. James and Notre Dame streets, \$1,000,000. The architects are Messrs. Ross & McFarlane. They will be assisted by a firm of American architects.

The plans for the new Ritz hotel have been entrusted to Warren & Wetmore, of New York, and the outlook now is that construction will be started next spring. The negotiations for Wilson-Smith property have been closed.

New Westminster, B.C.

A. R. Snelgrove has purchased the corner of Columbia and Begbie streets, where he intends to erect a six storey business building.

Ottawa, Ont.

W. E. Noffke will call for tenders shortly for the Blackburn building.

The work of the new Blackburn building will be resumed. Sir William Mulock, presiding high court judge, has granted permission for the parties to settle their differences. Noted in last issue.

W. E. Noffke, architect, is calling for tenders for a business block including five stores to be built for Barrett Brothers on Main street. The building will be solid brick and will be two storeys high.

Tenders addressed to P. E. Ryan, secretary Commissioners, Transcontinental Railway, will be received until Nov. 15th

for construction of ice houses at Springfield, Man., Redditt, Man., and Graham, Ont.

Peterboro, Ont.

The council granted a site for the factory of the Canadian Chiclé Company on George street.

Penticton, B.C.

The Penticton Lumber Company has been incorporated for the purpose of erecting a sawmill and factory for the manufacture of piping for irrigation purposes. The company owns 11,000 acres of tamarac, and the capital is \$200,000.

Portage la Prairie, Man.

Thompson Bros., of Duluth, wholesale manufacturers of boots and shoes, are to build a five storey factory here and the city council have voted to submit a by-law to the people on Nov. 15th to grant concessions. A five storey factory 60 by 100 feet, of steel and brick construction, will be built and the firm will employ 150 hands the first year and 250 hands every year thereafter.

Regina, Sask.

It is stated that the plant of the Capital Flour Mills will be enlarged next spring. Messrs. Cook & Vanstone, owners.

St. Cyrille de Wendover, Que.

The sash and door factory owned by Mr. C. Caron here has been destroyed by fire with a loss estimated at \$15,000.

South Vancouver, B.C.

Messrs. Greenslade & Houston, of the South Hill Brokerage, will build a three-storey block on the southeast corner of Fraser avenue and Ferris road. The building will have a frontage of 93 feet on Fraser avenue and will extend back 113 feet on the road. Construction work will be started by next January.

St. Boniface, Man.

Mr. E. P. Butchart, of Tod Inlet, B.C., one of the most experienced cement makers in Canada, will, it is stated, at once erect a plant in St. Boniface.

Strathcona, Alta.

The C.N.R. have purchased another 24 lots southward, thus providing an excellent site for the station and freight buildings to be erected here for the terminal business of the C.N.R. southeast and southwest lines to Calgary.

Sydney, N.S.

The town of Florence, near here, owned by the N. S. Steel & Coal Company, suffered by fire on the 28th ulto., to the extent of about \$100,000.

Victoria, B.C.

Messrs. Challoner & Mitchell and P. R. Brown, it is stated, will erect a large business block, five or six storeys, early in the new year. Total expenditure estimated at \$400,000. Plans will be prepared at once.

The following were some of the heaviest losers in the fire of the 27th ulto: D. Spencer & Co., furniture dealers, \$200,000 to building; Young & Company, building, \$100,000; Five Sisters Building and stock, \$150,000; Victoria Book & Stationery, building and contents, \$100,000.

A company is being talked of with a view to erect a fruit preserving factory here. Capital will be about \$50,000; Mr. Jas. Drumond, manager of Victoria Fruit Exchange is interested.

Vancouver, B.C.

Mr. Lincoln Chandler, of Birmingham, England, is in Vancouver in connection with the establishment of large engineering construction works in close proximity to the city. At least \$5,000,000 will be expended upon this undertaking. The works will cover from 50 to 100 acres. Mr. Chandler is connected with the British Empire Bridge works of Birmingham, and is secretary of the Metropolitan Amalgamated Carriage & Wagon Company, Limited, of Saltley, Birmingham.

Application has been made for the first extension which covers the seven storey extension of the west wing of the Hotel Vancouver, fronting on Howe street and extending to the centre of the block, \$200,000. Plans are now being prepared for the extension of this wing to Robson street at a probable cost of \$300,000, and excavation for this building is now in progress. As soon of these Howe street structures are completed the management will be in a position to give over the present main hotel for the extensive enlargement in view.

Welland, Ont.

The United Motors, Limited, recently incorporated, will build the first airship factory in Canada at Welland, for the manufacturing of airships.

Windsor, Ont.

The Imperial Electric Company, E. J. Rumsey and A. W. Rumsey, 327 Jefferson avenue, Detroit, Mich., will soon erect a plant in Windsor for the manufacture of magnetos, it is reported.

Woodstock, Ont.

The Maximillian Machine Company of Buffalo has agreed to erect a factory here as a Canadian branch for the manufacture of pneumatic hammers and drills. Capitalization, \$100,000. J. B. Porter, president.

Winnipeg, Man.

Tenders were called until October 26th for concrete foundations and steel grillage required for the Sterling Bank building, corner Portage and Smith street. Jas. Chisholm & Son, architects.

Information from Minneapolis, Minn., headquarters of the B. F. Nelson Manufacturing Company, states that it is the firm's intention to follow up the opening of their Canadian business by the erection of a factory here for the manufacture of roofing and building papers. F. P. Barker, local manager.

L. B. Lincoln, of Montreal, president of the Canadian Peat Society, is here to complete arrangements for installing a peat fuel plant, with a capacity of 100,000 tons. There are several good deposits of peat close to the city which he is investigating.

Plans are being prepared for the erection of a large new office for the C.P.R. on the site of the present Canada Life Building. Work, it is stated, will be commenced in 1911. Local officials, F. W. Peters, G. J. Bury and B. S. Jenkins.

AWARDED.

Brantford, Ont.

J. D. Tindall & Son, of Woodstock, have received the contract for the new Penman, Limited, factory at Homedale, Brantford, \$52,000.

Guelph, Ont.

The contract for erection of large C.P.R. passenger station here has been awarded to Wells & Gray, Limited, engineers and contractors, 315 Confederation Life Building, Toronto.

Newmarket, Ont.

The contract for the new factory buildings being erected for the Office Specialty Manufacturing Company, Limited, has been awarded to J. L. Youngs, Stratford. Estimated expenditure, \$75,000. By this addition, 63,000 feet of floor space is given. Mr. O. E. Tench, this town, architect.

Ottawa, Ont.

George A. Crain has been awarded the contract for brick and stone work and fireproofing on the Slinn-Shouldis factory. James Mather is architect.

Port Arthur, Ont.

J. L. McRea, has been awarded a contract by the Marconi Wireless Telegraph Company for the construction of a wireless station here.

The C.N.R. has awarded the contract for the storage warehouse, with 32,400 square feet of floor space, to the Thunder Bay Harbor Improving Company.

Toronto, Ont.

Contract was awarded to A. B. Ormsby, Limited, for the roofing, galvanized iron and fire doors on factory for B. F. Harvey; also for same on addition to the Langmuir Mfg. Company's building.

Vancouver, B.C.

The sub-contracts for construction of 8-storey steel and concrete bank office building for the Bank of Ottawa are as follows: Heating, W. Leek; plumbing, E. A. Brown; wiring, Mather & Enell, all of Vancouver. Total estimated cost, \$260,000.

Winnipeg, Man.

It is reported that the contract has been let to Norcross Bros., New York, for the erection of a large brick and stone warehouse for the Hudson Bay stores. The building will be five storeys, 200 x 50 ft.

The contract for constructing the building here for the Canadian Bank of Commerce has been let to Peter Lyall & Sons. Estimated expenditure, \$800,000; material, brick and granite, fireproof; frontage of 105 feet, depth, 120 feet.

Power Plants, Electricity and Telephones

Brandon, Man.

At a special meeting of the city council the Brandon Light & Power Company's franchise, granted by the city five years ago, was extended for another ten years, with an added clause stating that if the city, at the expiration of the term of the franchise, gave one year's notice of taking the company's plant over, and did not do so, the franchise would be extended for another five years.

Coquitlam, B.C.

Dominion Government Engineer J. R. Freeman has finished his investigations at Coquitlam lake and will shortly make his report to the Government at Ottawa. In the main, Mr. Freeman will demand the taking of more adequate precautions to entail the conservation of the purity of the city's water supply and will insist upon certain changes in the structure of the dam to be built by the Vancouver Power Company.

Englehart, Ont.

It has been decided to sell debentures for \$30,000, covering a period of 30 years, for the purpose of developing the power at High Falls to generate electricity for the town.

Edmonton, Alta.

Edmonton is endeavoring to effect a co-operation with other towns and cities in the province in bringing influence to bear on the Provincial Government to take under its control the water power resources of the province and to develop and operate them for the benefit of the municipalities. In accordance with a resolution passed by the city council, the scheme as outlined is in principle the same as that which has been consummated in Ontario by the Hydro-Electric Commission.

London, Ont.

In regard to the proposed radial line between Sarnia and this city, it is said that English capitalists have agreed to take over the whole stock and build the road, which includes branch lines to Grand Bend on Lake Huron, Strathroy, and other points. D. A. Stewart, promoter.

Medicine Hat, Alta.

It is reported that the Alberta Electric Railway Company is applying to the Dominion Government for a charter to instal telephone and telegraph lines, to construct and operate light and power plants, to acquire and operate coal mines, and to construct and operate an electric railway to connect Medicine Hat, Calgary, Lettbridge, Banff and intermediate towns.

Montreal, Que.

The Lachine, Jacques Cartier & Maisonneuve Railway Company has forwarded copies of a plan to construct a railway line in and near Montreal to the Railway Commission and to the Board of Control. The company proposes to build its line from the junction of St. Laurent avenue and Cartierville avenue, in St. Laurent parish, ending at St. Catherine street. It is intended ultimately to connect the eastern and western terminals of the system in the city. The G.T.R. proposes to build an east end station with docks and wharves.

Rouleau, Sask.

The city has voted \$15,000 for electric light system.

St. Vital, Man.

The proposition to construct a railway through this municipality has been withdrawn by one of the promoters, Jos. Bernier, M.P.P.

Toronto, Ont.

The city council, by a vote of twelve to nine, decided against the purchase of the Toronto Railway Company.

Tenders addressed to Chairman, Board of Control, will be received until Nov. 8 for cast iron lanterns and pillars for the Toronto Hydro-Electric system. Specifications at office of above, City Hall.

Weston, Ont.

Plans for the transformer plant will soon be submitted by the Hydro-Electric Commission. The present pumping station and equipment are very inadequate. Transformers of a different cycle must be purchased, and they will be on hand when the station is done.

Winnipeg, Man.

The board of control recommends to council the purchase of 305,000 pounds of copper wire, for use in the distribution of power about the city. Engineer Chase advised the purchase, and while some of the material will not be required for 12 months or more, the contract will be let at once.

Tenders will be received by the chairman, Board of Control, Winnipeg, Man., up to Nov. 7th for overhead wire and cables; and also up to Dec. 1st for poles and line

supplies. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

The board of control has received a proposal from the Selkirk Light & Power Co. which now operates a steam plant. It was suggested that the city supply the company with all the power necessary for commercial and domestic purposes from the Point du Bois works. The only difficulty in connection with reaching an agreement is to be found in the transmission of power from this city to Selkirk. The local electric company has the franchise for the Main street road, but it is possible the city can secure rights over McPhillips St. and its continuation to the lake town, without purchasing a right of way. The board and the power committee will investigate.

AWARDED.**Toronto.**

The Foundation Company, Limited, 76 Bank of Ottawa, Montreal, have been awarded the contract for constructing 10 sets of concrete piers for carrying the Hydro-Electric steel towers and cables. These piers are to be in the lake at Parkdale, and in general follow the line of the shore. The contractors have started work and same is progressing rapidly.

Vancouver, B.C.

The B. C. Telephone Company has awarded contracts for \$500,000 of material as follows: To the Wire & Cable Company, Montreal, for about 250,000 feet of cable, average size of 200 pair of wires per cable, and for 25 tons of supporting wire; to the Northern Electric Company, Montreal, for 52 switchboard sections, and 3,000 telephone instruments.

Miscellaneous**County of Victoria, Ont.**

Tenders will be received by J. R. McNeillie, clerk and treasurer, Lindsay, Ont., up to Nov. 16th, for the purchase of debentures of the above county. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Edmonton, Alta.

The following building permits have been issued recently: Blacket & Dawson, a store building, \$5,000; to C. E. Smith, for dwelling on the west side of Ottawa avenue, \$2,500; to Patrick Dunn and Frank McMahon for the erection of two dwellings on the east side of Sixth street, each to cost \$2,400; to A. W. Robson, for the erection of a dwelling on the east side of Sixth street between Nelson and Vermilion, to cost \$2,450; to Clifford C. Mitchell, a dwelling on the west side of Government avenue, \$2,550; to Alex Stuart, K.C., a dwelling on the west side of Catherine street, \$3,000.

Hamilton, Ont.

The following building permits have been issued: Stewart & McPhie, brick ad for the Hamilton Mirror Plate Company, \$2,000; W. H. Yates, Jr., brick stable on Ashley street, for A. H. Ewing, to cost \$4,500; Adam Haist, brick dwelling on Blake street, \$3,000; James Holden & Son, brick dwelling on Murray street, for H. White, \$2,500.

Montreal, Que.

Recent building permits include: George Paquette, 50 Dagenais street, house containing three dwellings on Parc Cartier, \$3,500; A. McFarlane, 8 Hampton Court

Apartments, four dwellings on Cedar avenue, \$13,300; P. Garayt, 2004 Dufferin street, house containing three dwellings on Dufferin street, \$4,000; Chas. J. Brown, 4263 St. Catherine street, Westmount, four houses containing four dwellings on Grey avenue, Notre Dame des Graces Ward, \$15,000; Caron Bros., 278 Sherbrooke street west, a 5½ storey factory building at 233 Bleury street, cost \$63,800; Mde. R. Blouin, 1801 St. Denis street, house containing three dwellings on De Fleurimont street, \$5,500; George Marcell & Company, 180 St. James street, two houses containing four dwellings on Mayfair avenue, Notre Dame de Grace Ward, cost \$9,200; Fabrique St. Jean de la Croix, a church and presbytery buildings corner St. Lawrence Boulevard and St. Zotique streets, cost \$20,000; Alf. Gagnon, 1437 Des Erables street, house containing three dwellings on Bordeaux street, \$4,000; Alf. Gagne, 108 Joliette street, a two storey house on Duquette street, \$2,000; H. Perreault, 780 Cowan street, house containing two dwellings on Cowan street, \$2,000; Catelei Cie Limitee, Comte and Sanguinet streets, a two storey factory building, to cost \$12,000; J. R. Laviqueur, 210 Plessis street, two houses containing six dwellings on St. Urbain street, cost \$4,000; J. D. C. Martin, 650 Bourbonniere street, two store buildings on St. Lawrence Boulevard, cost \$10,000; S. M. Connell, St. Lambert, Que., a two storey house on Wilton avenue, cost \$3,500.

Toronto, Ont.

A by-law for \$500,000 will likely be submitted for improvements in Ashbridge's Bay.

Vancouver, B.C.

Recent building permits include: M. A. Whelan, frame dwelling, 723 Eleventh east, \$2,000; J. S. Martin, frame store, 510 Keefer street, \$6,000; R. F. & R. A. Bristol, frame dwelling, 1617 Twelfth avenue east, \$3,000; F. Wilkinson, frame storage, Granville street, \$3,500; J. A. Davis, frame dwelling, 550 Thirteenth avenue west, \$3,000.

Winnipeg, Man.

The following building permits have been issued. J. Forseng, house, each side Burnell, \$2,200; L. G. Hallgrimson, house, west side Home, \$2,500; Merriek-Anderson, warehouse extension, west side Lewis, \$5,000; E. F. King, house, west side Lipton, \$4,000; C. R. Newman, house, south side of Matheson, \$2,000; Dunn & Wallace, house, south side of Kylemore, \$2,750; W. J. Baldry, house, west side Horner, \$4,500; Mark Fortune, garage, north side Wellington crescent, \$3,000.

Ball & Sleno, contractors, Montreal, Que., are stated to have dissolved.

A. King & Company, contractors, Montreal, Que., are stated to have dissolved.

F. Adam, Camrose, Alta., lumber merchant, is stated to have sold out to Globe Lumber Company, Limited.

The B. C. Gazette gives notice of the incorporation of the following company: B. C. Hydraulic Power Company, Limited, capital \$10,000.

The B. C. Gazette gives notice of the incorporation of the following companies: New Michel Sawmill Company, Limited, capital \$50,000; Flanagan & Hart Lumber Company, Limited, capital \$100,000.

The incorporation of the Wayagonmack Pulp & Paper Company, with a capital stock of \$5,000,000, head office Montreal; and of the Acme Motor Carriage & Machinery Company, of Hamilton, capital stock, \$800,000, are announced.

Tenders and For Sale Department

Province of Ontario

County of Victoria

Offers will be received by the undersigned until **TUESDAY, NOVEMBER 15TH, 1910**, for the purchase of debentures of the County of Victoria, to be issued December 20th, 1910, for the sum of \$10,000, bearing interest at 4 per cent. per annum, payable in 20 annual instalments of \$735.82 each. No offer necessarily accepted.

J. R. McNEILLIE,
Clerk and Treasurer.

Lindsay, October 26th, 1910.

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Tender for Sewer

Town of Walkerville

Sealed tenders will be received by registered letter, addressed to the undersigned, up to noon on **TUESDAY, 8TH DAY OF NOVEMBER, 1910**, for the construction of a brick sewer on Windermere Road from Niagara street south to Grand Coulee Ditch, in the town of Walkerville.

Plans and specifications may be seen on application to Mr. Owen McKay, civil engineer, Walkerville, Ont.

Tenders must be accompanied by a marked cheque, made payable to the town treasurer, equal to 5 per cent. of the amount thereof.

Should any party whose tender is accepted fail to execute the necessary contract and bond for the due fulfilment of the same his deposit will be forfeited to the town.

Deposits of unsuccessful tenderers will be returned.

The lowest tender not necessarily accepted. The names of two responsible persons willing to act as sureties must accompany each tender.

CECIL H. ROBINSON,
Town Clerk, Walkerville.

Walkervills, 24th October, 1910.

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City of Winnipeg

Electrical Distribution System

Tenders for Wire and Cable, Poles and Line Supplies

Sealed tender, on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope, "Tenders for Overhead Wire and Cable," will be received at the office of the undersigned up to 11 a.m. on **MONDAY, NOVEMBER 7th, 1910**.

Sealed tender, on prescribed forms, addressed as above, and marked on the envelope, "Tender for Poles and Line Supplies," will be received at the office of the undersigned up to 11 a.m. on **THURSDAY, DECEMBER 1ST, 1910**.

Copy of specification and form of tender may be obtained at the office of Smith, Kerry and Chace, Carnegie Library Building, Winnipeg, Canada, or at the office of the firm in Toronto, Ontario.

Each tender must be accompanied by a certified cheque as set forth in the instructions to bidders, which cheque will become forfeit to the corporation under the conditions set forth in that document.

The city reserve the right to reject any or all tenders, or to accept any tender which shall appear advantageous to the city's interests.

M. PETERSON,
Secretary.

Office of the Board of Control,
Winnipeg, October 24th, 1910.

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Silica Brick & Lime Co., Limited

By order of the Trustees under Debenture Trust Deed, Messrs. Stewart Williams and Company will sell by Public Auction, on **SATURDAY THE 12TH DAY OF NOVEMBER, 1910**, at 11 o'clock in the forenoon, at the Driad Hotel, Victoria, B.C.

The undertaking and all the property and assets of the Silica Brick and Lime Company, Limited, as a going concern, and which comprise in particular the Freehold Lands forming the Site of the Company's Brick and Lime works at Atkins Siding, Esquimalt District, B.C., and being part (24 acres or thereabouts) of section 105 and all section 118 (about 142 acres), Esquimalt District, and all Buildings thereon and the brick and lime making Plant, Machinery, Fittings, Stock in Trade, Tools, Implements and other Chattels and effects in, upon and about the said premises.

Further particulars can be had and conditions of sale seen on application being made therefor at the Company's offices, No. 512 Fort Street, Victoria, or at the offices of the auctioneers, No. 637 Fort Street, Victoria, B.C.

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Tenders

Quebec Railway, Light, Heat and Power Company

SEALED TENDERS are requested from responsible contractors for the construction of an

Office Building

in the city of Quebec, for the Quebec Railway, Light, Heat and Power Company.

Also for the heating and ventilation of same. For the plumbing system.

The electric wiring, lamps and lighting fixtures.

The passengers and freight elevators.

Plans and specifications for any and all of the above can be seen at the office of the undersigned architect, or may be secured for the purpose of estimating, upon the deposit of a sum of \$25.50 as security for the return of the same.

All contractors tendering upon the above works must accompany tender with an accepted cheque, made payable to Mr. C. E. A. Carr, general manager of the Company, equal to fifteen per cent. (15 p.c.) of the amount of tender, which will be forfeited if any person tendering declines to enter into a contract as, and when called upon to do so, or fails to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

Tenders to be written on a special form, prepared by the architect, must be enclosed in sealed envelopes, plainly marked on the outside and addressed to Rene P. LeMay, Architect, 21, d'Aiguillon Street, Quebec.

Tenders will be received until four o'clock p.m., **FRIDAY, THE 4TH OF NOVEMBER, 1910**. The Quebec Railway, Light, Heat and Power Company reserves the right to reject any and all tenders.

By order,

RENE P. LeMAY, Architect,
21 d'Aiguillon St., Quebec.

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Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

WANTED, position as Superintendent of grading, rock work or concrete, experienced. Box 154 CONTRACT RECORD, Toronto, Ont.

44

New Companies

The Birtle Electric Power & Manufacturing Co., Ltd., Birtle, Man., capital \$50,000. Incorporators, E. J. Wilson, printer; A. L. Spalding, contractor, and Lewis St. George Stubbs, barrister, all of the town of Birtle, Man.

The South Bruce Rural Telephone Company, Limited, Belmore, Ont., capital \$10,000. Incorporators: Jos. Vogan, Jno. S. Inglis, and Jas. Hamilton, all of the County of Bruce.

John Martin Paper Company, Limited, Winnipeg, Man., incorporated, capital, \$100,000. Incorporators: John Martin, manager; R. Hillier, secretary-treasurer, and S. R. Flanders, barrister, all of Winnipeg.

Tilly, McKinley, Norton Company, Limited, capital \$100,000; incorporated to conduct a general wholesale and retail lumber, sand and gravel business.

The Dominion Roofing Company of Canada, Limited, Toronto; incorporated; capital \$40,000. Incorporators: E. A. Maltby, C. J. Oillee and W. Maltby, druggist, all of Toronto.

The North American Furniture Company, Limited, Owen Sound, incorporated, capital \$100,000. Incorporators: J. A. Minchner, Stratford, and J. G. Hay, Owen Sound.

Oakville Construction Company, Limited, Oakville, Ont., incorporated, capital \$25,000. Incorporators: W. West, manager, and W. Scott, carpenter, Oakville; and A. E. Cook, painter, Toronto.

The Excelsior Lumber & Construction Company, Limited, Toronto, incorporated, capital \$100,000. Incorporators: J. W. Heffernan, F. C. Carter and A. Fleishman, all of Toronto.

The Dupuis Pulp Lumber Company, Limited, Parish of St. Hermenegilde, Que., incorporated; capital \$100,000. Incorporators: A. Dupuis, St. Hermenegilde; G. Langlois, journalist; A. Handfield, manufacturer; H. Sauriol, financial agent, all of Montreal.

The Macintyre Plastering Company, Limited, Montreal, Que. Capital, \$10,000. Incorporators: R. B. Hutcheson, notary; A. Holden, A. Langlois, accountants, and F. L. Armstrong, engineer, Montreal.

The Manitoba Power Company, Limited, Winnipeg, Man., incorporated, capital, \$5,000,000. Incorporators: H. A. Lovett, K. C., P. F. Brown and W. B. Ford, Montreal, Que.

Bold Glass Company, Limited, Toronto, Ont., incorporated, capital, \$40,000. Incorporators: G. E. Gibbard and H. L. Yarnold, druggists, Toronto.

Steel and Radiation, Toronto, incorporated, capital \$5,000,000. Incorporators: C. L. Dunbar, E. A. Dunbar and N. Jeffrey, Guelph, Ont.

Deguisse & Richard, contractors, Montreal, Que., are stated to have dissolved.

J. Grant & Company, Montreal, Que., builders, etc., are stated to have assigned.

The Arnold Electric Company, of Canada, Montreal, Que., are registered as M. J. McLaughlin & G. F. Pratt.

Contract Record

ESTABLISHED 1886

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HUGH C. MacLEAN, Winnipeg, President

THOMAS S. YOUNG, General Manager.

HOME OFFICE - Confederation Life Building, TORONTO
Telephone Main 2362

F. W. SCHERBARTH, Representative

MONTREAL Telephone Main 2299 B34 Board of Trade
HERBERT B. MUIR, RepresentativeWINNIPEG - Telephone 224 - 404 Travellers' Bldg
J. R. HOOPER, Representative.VANCOUVER - Tel. 2010 - 26 Crowe & Wilson Chambers
J. V. McNAULTY, RepresentativeCHICAGO - 4059 Perry Street
E. J. MACINTYRE, RepresentativeLONDON, ENG. - 3 Regent St., S.W.
W. A. MOUNTSTEPHEN, Representative

SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

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Toronto November 2, 1910

No. 44

The Evils and Ethics of Contracting

The ethics of contracting, and the alleged evils of the competitive bid system, provided the inspiration for an interesting discussion at a recent meeting of the American Society of Civil Engineers. One of the members of that body, who has the reputation for being an authority on contractual relations, discusses the matter in the following paragraphs. His ideas are interesting, particularly in regard to suggested expedients, but we cannot say that we share his convictions. In our opinion the average contractor takes a pride in doing creditable work. He realizes his obligations and tries his utmost to fulfil them. The writer in question says:

"Anyone familiar with contract work knows that a tremendous price is paid, in shoddy work, inefficiency, and moral diseases, for competition, and yet we are told that it is a sacred thing, and that absolute freedom of competition is necessary to progress. The writer freely confesses that he is a heretic. In the first place there never has been, and never will be, free and perfect competition. In the second place, it has already become necessary to substitute regulation for competition among the railroads, and it soon will be necessary to do the same thing with the trusts. It is perfectly true that, in the past, much progress has come through competition. In the same way, much progress has come through savage warfare, but it does not follow that price competition is necessary or beneficial to-day any more than it follows that we should throw away our government regulation, arbitrations, and courts of law.

"Of course, something will have to take its place.

Most men still need a greater incentive to put forth their best efforts; but why not devise some method of securing a competition of excellence, instead of price? And such a method can be devised. The fee basis, modified perhaps so that profits below or losses above the estimated cost are shared in certain proportions, seems to offer a hint of the true method. The contractor is assured of a reasonable profit, and is also benefited by economy of operation. The interests of all parties are as near to those of the owner as it is possible to make them. The owner gets the benefit of the contractor's experience and equipment. The contractor has to depend on his reputation for honesty and efficient work, instead of a low bid, for getting his contracts, and, still more important, all parties can co-operate, after the contract is let, to obtain the best results for the benefit of all. Anyone who has done work fairly and honestly under this method will bear testimony to the way in which the difficulties, misunderstandings, and dangerous expedients vanish like mist before the sun. The expert or engineer of the contractor has a recognized standing at court. The designer is free to devote himself to the larger elements and relations of the work, and to avail himself of the full value of the expert services of the contractor or manufacturer, and the contractors will be selected because they are the best in their lines, and not because one happens to leave out enough in his estimate to make him a low bidder.

"The immediate self-interest of the owner, before the work is let, is to obtain the lowest possible prices by every means in his power, and after the work is let, to get as much as he can out of the contractor. The immediate self-interest of the designer is frequently to make the work cost as much as possible, and to slight it all he can. The immediate self-interest of the contractor before the work is let, is to underbid his competitors, and after the award, to get out as best he can. It is a state of war in which each party has many weapons, and neither can be blamed very much for using them. It is not much worse for the contractors to pool a job than for the owner or designer to play one bidder against another. Both are stratagems of war, and the only marvel is that things are no worse.

"A designer or an owner will often get a detailed plan of some part of the work from a contractor, cut off the name, and submit it to other contractors for bids. A contractor will frequently make use of his opportunities, when called into consultation by the designer, to load up the work so that he is able to underbid all competitors, and then cleverly unload again by offsetting one change against another, make a good profit, and perhaps do a most excellent piece of work where another contractor might have lost money.

"These are rather flagrant but none the less common examples. Going a step farther: How many engineers, and how many contractors, do their work as though it were their own and they were doing it for themselves? How often one hears the question: 'Who pays for this? Is it lump sum or unit price? If we have to pay for it, we'll leave it out: if the other fellow pays for it, we'll put it in.' How many times does the designer refuse to allow or to make a desirable change in his plans for fear the contractor will make a little more money. How often does the contractor fail to call attention to changes or modifications in methods of plans, which might benefit the owner or the work, because his own interest might suffer thereby. So it is all the way down the line, until one cannot help wondering what is really the matter."

The Training of the Engineer-Contractor

Is Adequate Attention Devoted by our Colleges to Methods and Cost of Construction? — Are we turning out Impractical Men?

By W. R. HARRIS*

Engineering has been defined as "The science of designing structure so as to resist the force to which they are subjected while performing their functions," and as "The art of so designing these structures that the interest upon their first cost, plus annual depreciation, plus annual operating expenses, shall be the least sum possible of attainment."

Engineering-contracting may be defined as the art of constructing structures at a cost closely approximating the original estimates for same. In short, an engineer-contractor should know what one dollar, either in energy or materials, will accomplish.

The time is passing when one can wait to obtain knowledge of engineering-contracting solely by personal experience. We must study the experience and results of others and those who reap the benefit of the experience of others are indeed fortunate.

The newly fledged graduate engineer is of small use to the contractor, for although he may be qualified to design structures, he is not always able to compute the quantities of labor and materials required in the proposed structure. He can very seldom suggest practical methods of operations, costs, etc., and hence, before he can attain to the position where he will be of much value to the contractor, he must pass through the school of experience.

It is possible to so arrange studies in engineering colleges that the graduate engineer will have some knowledge of engineering contracting such as to render his services of greater value to his employer.

An engineer or contractor is always judged by his experience, and if the student in college can gain some of this knowledge by instruction instead of experience he is saved just so many years of hard work.

A great many structures have incorporated in their design non-essential details which increase the cost of the structures beyond economic limits. This is caused by ignorance of construction methods and not by the desire to unnecessarily increase costs, hence a course in engineering-contracting will be of great assistance to an engineer as he would be able to omit non-essential details and to design his structure so that the minimum of energy would be expended in its construction. By non-essential details I do not mean the addition of lines that would beautify a structure where beauty is desirable.

Shortcomings of the "Theoretical Engineer."

An engineer instructed in simply the science of engineering, and one that the contractor usually refers to as a "theoretical engineer" would design a structure to resist certain forces and would probably not consider, due to lack of knowledge on the subject, that the contractor to secure certain lines called for by the design would expend more work than would be necessary by the modification of the design, which modification would not affect the ultimate strength. For example, I know

of several instances in concrete design and construction work where by a slight modification in the angles and lines a better, cheaper, and more beautiful structure was obtained.

An engineer who is familiar with everything that enters into the design and construction of the proposed structure, whether it be a sewer, a building, a bridge, a piece of machinery, or what not, can produce better results than one who is simply trained in the pure theory of the science.

The question will naturally arise as to how such instruction can be imparted to the student, and I will attempt to suggest some idea which I hope will be productive of discussion and bring out other, and better, ideas on the subject. I believe that any department of engineering, whether civil, mining, hydraulic, mechanical, electrical, etc., can be so handled as to provide instruction in engineering-contracting as applied to any particular branch of engineering.

When the student arrives at that part of the course of study, embracing designing, he should be required to make up a schedule of quantities showing a bill of materials with market prices on same, and also to include in his schedule the estimate of labor required to construct, manufacture, or erect each item or group of items. He could give a statement of what, in his opinion, would be the proper crew and proper tools required in the construction of the work. He could also suggest a plan of operation for the construction crew.

Again, at the proper period of the course of instruction, plans and specifications of actual proposed work, preferably in the immediate vicinity of the college, could be secured and each student in engineering-contracting be required to make up a detailed estimate on the proposed work and to submit a bid on same. With his detailed estimate and his bid, he could present a detailed plan of operation, including the list of outfit, crew required, etc. He could also estimate the time required to complete the work or certain portions of it. Copies of the bona fide bids on which the contracts were awarded could then be secured and compared with the students' bids. Where the work was in the immediate neighborhood, students could be detailed to observe the operations, methods of working, obtain costs, etc., and report all of this back to the class.

Each student could spend a day or several days' time on this work, and another student take it up where the preceding student left off. The result of each day's operations could be reported the succeeding day in open class in a very few minutes. Such a course of procedure would not only develop the student's power of observation but would also place him in a position where he would be in actual touch with construction work.

All colleges have more or less construction work which in most cases they let by contract. Every student in the branch of engineering involved in each contract could make up a detailed estimate, bid, etc., as

*Read before the American Society of Engineering-Contractors

outlined above, and the same method of procedure adopted as to inspection, reports and discussion.

I do not believe that this is practised in many colleges, at least I have never seen such a method of procedure adopted on any work on which I have bid. I know from my own experience that the study of any piece of work is of value to any engineer or contractor.

The most important part of such a course of study would be the open discussion in class of each day's work, methods, etc., as through discussion new ideas will be brought forth.

Value of Practical Knowledge.

I believe it would be easy to secure the services of practising engineers and contractors to lecture to classes in engineering colleges, and a few lectures from such men, engaged in actual work can be of inestimable value to every student in the class. Such lectures and discussions as would be produced by the system as outlined above would cause every student to consider plans and specifications from the view point of the constructor as well as from the view point of the designer.

The result of this could not help but eliminate unjust clauses in specifications, such clauses as would tend to increase costs without an adequate and necessary return in strength, beauty and utility.

The ethics of engineering-contracting should be taught and discussed, as well as the ethics of engineering. Engineering students should be taught that contractors are "worthy of their hire," and that the contractor is entitled to a fair profit on honest work. He should be taught that it is fair to ask only for what is possible and to pay a price that is based upon actual cost plus a fair profit. He should be taught to specify good work and to require good work.

He should so draw plans and specifications that intelligent contractors could arrive at a clear idea of what is required as well as to conditions governing costs. He should be taught to conceal nothing regarding conditions that would affect the cost.

He should be taught to make specifications as brief and plain as is consistent with a clear explanation of what is required.

The student would learn to draw specifications that would be better than many now drawn, for by studying the specifications of public works, he would himself, when called upon to prepare detailed estimate of cost and bid on these specifications, realize the unfair features that many times enter into contracts, and having impressed upon his mind the effect on the cost by these unfair features his tendency would be to eliminate these features after entering into the business field.

An Illustration in Point.

I have recently had the pleasure of meeting an engineer whom every contractor termed a "crank." Every contractor, however, stated that he was absolutely honorable and absolutely just, although in many things not practical. I was told that the specifications would have to be fulfilled to the letter. This engineer, I do not believe, ever did any construction work himself, and hence there were certain impractical features in some of his work that increased the cost of his structures unnecessarily. In fact, I understand that he had spent many thousands of dollars, due to impractical ideas, but he always got what was specified and his work, though costly, was always good from an engineering standpoint.

This instance simply emphasizes the necessity of

the engineer having a broad acquaintance with construction methods and costs, for I do not believe that engineer mentioned above had any idea that he was impractical in the slightest. I believe that he erred on the right side because every contractor who knew him figured absolutely on the specifications and took nothing for granted except what was specified. Therefore, every contractor figured on the same basis.

I also understand that the inspection on work under this engineer's charge is very rigid, but that the contractor is never called upon to do anything not specified in his contract.

It would be very much better if all engineers would consider a structure from both the standpoint of the constructor and the engineer, and then see that the specifications are obeyed strictly.

New Appliances—New Methods.

The engineering-contracting student should familiarize himself with tools and appliances used in work coming within his branch of engineering, and to this end every college should have a catalogue library, properly indexed. Each student should study the advertising columns in technical papers and should request such catalogues as interest him and place same in the catalogue library of the college, for many times new methods are suggested by new appliances.

The student should be taught to think of actual work, first, as so much human energy expended in periods of man-hours, whether this energy is utilized by men with the pick, shovel, or other hand tool, or by means of the steam shovel, crane, or other piece of machinery.

After the student learns that a gang of a certain number of men will accomplish with a certain tool so many units of work by the expenditure of so many units of energy, he will be able to approximate closely similar work in any part of the country no matter what the cost of labor, tools, and materials may be, provided he is acquainted with the local cost of same.

All the theory of design ever taught will not help the student to arrive at the man-hours required to excavate earth, rock, etc., nor will it show him the difference in man-hours required per unit of sand, clay, loam, gravel, loose rock, solid rock, in open cut, nor the difference in energy expended per unit in tunnel or in shaft.

This can only be guessed at by the ordinary engineering student, but it can be more nearly approximated by the same student after he has studied work near him and after he has, by actual observation, obtained some data along these lines. Such observation and study of the work near him will enable him to study with intelligence cost data compiled by engineers and contractors on work that may be done at a distance remote from the college.

I know that many contractors have been disappointed in the work rendered by graduates of engineering colleges, and I believe that graduates who have taken a course in engineering-contracting will be more gladly received by the constructors as well as by the engineering fraternity.

The above statement may be somewhat crude in its presentation, but this is such a broad subject that it cannot be properly handled by one man in one article, and I trust that what I have said above will be productive of discussion among our members, and that it will bring forth ideas that will assist in starting the establishment of a course in engineering-contracting in some of our engineering colleges.

The Contract System Versus Day Labor

Epitome of Boston Finance Commission's Report*—Comparative Costs—Significant Conclusions—Interesting Criticisms of Discussion by Readers† and Contemporaries

Among the various lines of investigation carried out by the late Boston Finance Commission were several which threw considerable light upon the relative efficiency of the contract and day-labor systems and some of the causes of the inefficiency of the day-labor forces of the city of Boston.

An effort was made to ascertain as nearly as possible the actual facts in all cases, and to reduce the conditions to figure, thus eliminating opinions. The results of these investigations are, therefore, interesting and important, as showing the results of conditions surrounding city departments, and not as exploiting theories of ideal conditions which are rarely found in any city.

While most of the data refer to the city of Boston, it is believed that the lessons drawn from them are typical, and that similar results would be obtained from like investigations in many other cities.

Comparative Costs of Day-Labor and Contract Sewer Work in Various Cities.

A comparison was made of the cost of building sewers in cities where work was known to be done by day-labor with that in other cities where similar work is done by contract.

Average Total Cost Per Foot of Comparable 12-inch Sewers Laid 10-Feet Deep in Various Cities.

"A" Built by Day-Labor.

City or Town	Prevailing diameter of sewer (Inches).	Actual cost per foot.	Total cost of equivalent 12" sewer without allowance for difference in wages	Subdivision of cost into Labor and teaming only.	Material and sundries.	Engineering.
Brookston	8	\$1.73	\$1.96	\$1.20	\$0.68	\$0.08
Cambridge	8	2.35	2.68	1.70	0.81	0.07
Everett	8	2.09	2.32	1.55	0.68	0.09
Fitchburg	12	1.80	*1.80	0.95	0.77	*0.08
Haverhill	10	1.68	*1.80	0.90	0.82	*0.08
Lawrence	10	2.38	*2.50	1.80	0.62	*0.03
Lowell	10	2.30	3.42	2.35	0.98	0.69
Medford	8	1.80	2.03	1.05	0.92	0.06
New Bedford	10	1.88	2.00	1.30	0.67	0.03
Newton	8	1.65	1.88	1.05	0.73	0.10
Quincy	8	1.54	1.77	1.00	0.68	0.09
Worcester	10	2.00	**2.00	1.20	0.70	0.10
Average	...	...	\$2.17	\$1.34	\$0.75	\$0.08
Boston	12	\$5.20	\$5.20	†\$3.50	\$1.55	\$0.15

*Engineering estimated \$0.08 per ft.

†Including office and shop charges as in other cities.

‡Owing to the fact that this figure is based upon a comparatively small number of examples, it should be used with caution.

§Not including proportion of undivided construction cost which amounts to about 5% of total construction cost.

"B" Built by Contract.

Brookline	8"	\$1.73	\$1.95	\$0.80	\$0.80	*\$0.25
Portland	10"	1.50	1.62	0.65	0.81	*0.16
Providence	12"	1.68	1.68	0.65	0.83	*0.20
Somerville	8"	1.75	2.05	0.90	0.91	*0.24
Average	...	...	\$1.82	\$0.75	\$0.86	\$0.21
Boston	12"	\$2.35	\$2.35	\$1.05†	\$0.90	\$0.40

*Engineering and inspection.

†Advertised contracts only.

Note: That no correction has been applied on account of differences in wages.

Note: That the day-labor cost shown in column 4, includes labor on man-holes, whereas the contract labor does not include this, but does include loss on sheeting, which substantially offsets it.

the number available for comparison was smaller than desired. As the difficulty in selecting work done under comparable conditions was fully realized, and as such selection could only be made by engineers familiar with local conditions, an assistant was sent from place to place to interview the local engineers, who always very kindly, and at times at considerable inconvenience to themselves, carefully considered the conditions surrounding a large number of pieces of work, and advised which should be selected for use in this comparison. The number of sewers selected in each city was small, but included all which could be classed as being built under conditions enabling fair comparison within the last few years. While it is realized that this study may be criticized as being based upon fragmentary and possibly insufficient data, it is presented as comprising the last data which could be obtained after a long and earnest effort to get at the truth. Unfortunately, in no city except Boston was this class of work found to be done both by day-labor and by contract, so that comparisons between the two methods in the same city were impossible, with the single exception noted.

These investigations were made in 17 cities, 13 of which do their work by day labor (including Boston which does part of its work by day-labor and part by contract), and 5 (including Boston) which do the work by contract. The average cost of building 12 inch sewers in 12 cities was found to be \$2.17 per linear foot, while in the city of Boston similar work appeared to cost \$5.20 per linear foot. Like work done by contract was found to cost on the average \$1.82 in four cities, while in Boston it cost \$2.35. The average cost of labor and teaming in cities, exclusive of Boston, where the work was done by day-labor, was \$1.34 per linear foot, while in the four cities doing work by contract this cost averaged \$0.75 per linear foot. Upon that done by day labor in Boston it was \$3.50 per linear foot, while upon that done by contract it was \$1.05 per foot, a reduction of 70 per cent.

The cost of sewers built by day-labor (not including Boston) averaged for labor \$1.79 per linear foot, while in the cities doing work by contract (excluding Boston) the average cost of labor was \$1.17. Treating in the same manner similar work done in Boston by day-labor and by contract, it is found that the labor cost was \$3.50 and \$1.32 per linear foot, respectively. It, therefore, appears that had the rate of wages been uniform in all cities the labor cost of the work done by contract would have been 35 per cent. less than the labor cost of that done by day-labor, not including Boston in this comparison. Comparing the work done by both methods in the city of Boston, it appears that had the work done by day-labor been done by advertised contract the reduction in the cost of labor would have amounted to over 62 per cent.

Comparative Cost of Sewers built by Day-Labor and by Contract in Boston.

The costs of eight pairs of sewers, so selected as to be as nearly comparable with each other as possible, have been compiled. In each pair one sewer was built

To make this investigation less difficult and reduce the element of uncertainty as much as possible, the inquiry was confined to small pipe sewers from 8 inches to 12 inches in diameter. Since most sewers of this class built in Boston have been constructed under contracts (largely "gift" or non-competitive contracts),

*Prepared by Harrison P. Eddy, Consulting Engineer, Boston.

by day-labor, and one by contract. The pairs were selected by engineers employed by the city, who had direct personal knowledge of the conditions under which the work was done. After reducing the costs to equal terms as to size, depth and wages, it appears that in the case most favorable to day-labor the cost of the sewer built by direct labor was nearly double that of the one built by contract, while in the case of the pair most favorable to the contract system the one built by day-labor cost nearly four times as much as the one built by contract.

From the information available, it appears that this study of cost and efficiency is based upon very full and reliable data, and that comparison from year to year can be fairly made, although of course a better and safer result may be obtained by averaging several years, and making a comparison on that basis. In whatever manner the comparisons are made, it is apparent that the efficiency of the day-labor force has dropped about 50 per cent. in the last 12 years. In other words, in 1907 the average employe did only one-half as much work in a given length of time as he did in 1895. In this connection it should be remembered that there are many causes for this decline in efficiency, some of which are entirely independent of the personal effort of the laborers, and for which they should not be held in any way responsible. It is also true that this decline is not necessarily an inherent result of the operation of the day-labor system, and that system has been in use in other cities for many years, where a decline of such proportions is not apparent.

Efficiency of Labor and Rate of Wages Paid.

An effort was made to ascertain the prevailing rate of wages paid by contractors in the vicinity of Boston for work similar to that performed by the city Water and Sewer Departments. Data were obtained from 35 different contractors.

The minimum rate of wages paid in this vicinity appears to be \$0.15 per hour, and the maximum did not exceed in any case \$0.30 per hour. Comparatively few laborers are employed at rates of pay exceeding \$0.25 per hour, while large numbers are paid as low as \$0.20. In general it may be stated that English-speaking laborers are paid more than others, and further that the rate of \$0.30 applies quite generally to building laborers or to laborers who possess rather more than average skill. In no case was it found that laborers were paid for legal holidays, and only in two instances were Saturday afternoons allowed. None of the contractors gave Saturday afternoons off with continued pay, and in no case were laborers paid in event of absence from work on account of injuries received.

The contractors furnishing data do not "carry" their employes through the winter unless they have work which must be done. In other words they do not "find" work for their laborers during the winter season as do the city departments, and consequently they do not give continuous employment.

From a comparison of the wages paid by contractors and by municipalities, it is evident that city laborers are paid considerably more than laborers employed by contractors, and that they work fewer hours per week. It is difficult to determine the relation existing between high wages and the efficiency of the employes. It is doubtless true, however, that higher wages are paid by municipalities very largely because of political influence.

From this tabulation it appears that the hourly wage, making due allowance for the Saturday after-

noons and holidays, has increased from \$0.175 to \$0.315, an increase of 80 per cent. in the cost to the city for the work done, assuming equal efficiency. In this connection it should be noted that while the cost of labor to the city has increased 80 per cent. per hour, the increase in daily wages received by employes has amounted to but 28 per cent.

It is further important to note that while the cost per hour to the city for labor has increased 80 per cent., the efficiency of labor, as already shown, has fallen 50 per cent. In other words, a dollar's worth of time in 1878 would to-day cost the city \$1.80, but the efficiency having dropped 50 per cent. the city is obliged to pay \$3.60 for the amount of work done in 1878 for \$1.00, an increase of 300 per cent.

While it may not be fair to draw the conclusion from these figures that labor is less efficient because of higher wages, it does seem to follow that higher compensation does not assure greater efficiency. The greatest efficiency was apparently obtained in the case of the city of Brockton, where the nominal wage is \$2.25 per day, although in Boston, where the same nominal wage is paid and holidays granted in sufficient number to increase the rate per hour over 12 per cent., the lowest efficiency was indicated. Averaging the results obtained in cities paying the same rate of wages, there appears to be a gradual decrease in efficiency as the rate of pay increases.

Holidays and Sick-Leave.

The effect of political influence is shown very clearly in the granting of holidays and sick-leave with pay to city laborers. The cost of holidays, half-holidays and sick-leave is an item the magnitude of which is not very generally appreciated. The Boston water department has very carefully compiled statistics relating to this source of expense. During 1906 the distribution division expended upon pay-rolls about \$450,000, and the amount charged to holidays, half holidays and sick-leave amounted to over \$34,000, or 7.7 per cent. of the total pay-roll. The lowest percentage for any month was 5.3, and the highest was a little over 10 per cent. of the respective pay-rolls. During the first eight months of 1907 the money paid for holidays and sick-leave amounted to 8.3 per cent. of the total cost of labor. During this entire period of 20 months the pay-rolls amounted to \$752,000, and nearly \$60,000, or 7.95 per cent. of the amount of the pay-rolls, was expended for holidays and sick-leave.

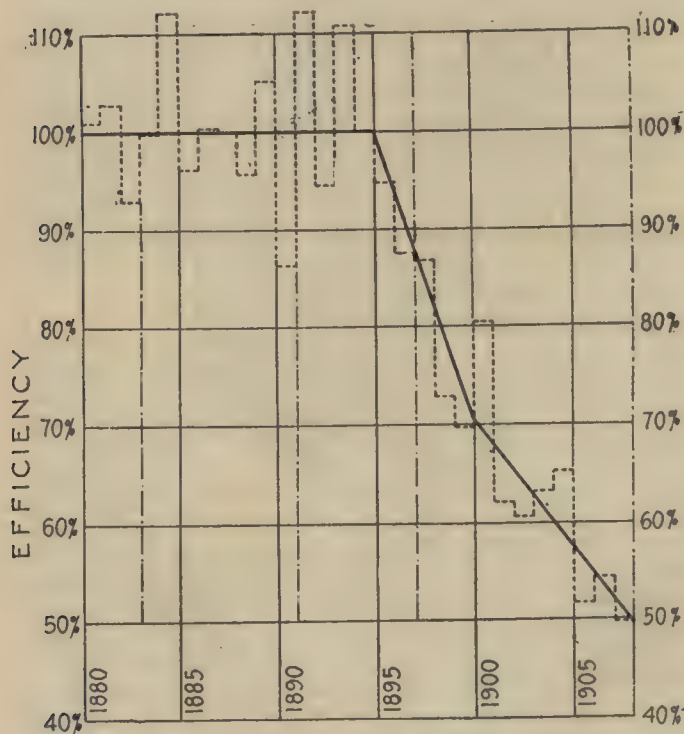
Age of Laborers.

Perhaps one of the most frequent criticisms by the public of day-labor departments is that the men employed are too old for the work they are required to do, and consequently that the amount of work done per man per day is ridiculously small. This appears to be the universal opinion, and unfortunately in many cases there is much to substantiate it. An investigation of the Boston sewer department furnishes considerable interesting information pertinent to this criticism. Of the employes of this department the investigation included 715 connected with the labor service. The ages of the various employes, as well as their terms of service, were obtained from the state civil service records and are classified in tables 8 and 9.

Considering these tables as of the date of their preparation (1907), it is found that of the 65 men who were from 60 to 64 years of age, four had seen less than 5 years' of service in the department, six had seen from 5 to 9 years' service, 20 between 10 and 14 years, 28 between 15 and 19 years, and only seven had

served the department 20 years or more. Of the 21 men from 65 to 69 years of age two had worked less than 5 years, two others from 5 to 9 years, six from 10 to 15 years, five from 15 to 20 years, and only six had been employed in the department 20 years or more. Of the nine men from 70 to 74 years old two had labored from 10 to 14 years, four from 15 to 19 years, and three only for 20 years or more. There was one man over 75 years of age and he had labored 40 years or more for the department. Sixty-one (9 per cent.) of the 715 employes had worked 20 years or more. There were 97 employes over 60 years of age, but only 18 of them (18.5 per cent.) had served the department for 20 years or more.

Many will maintain, and with much justice, that men who have worked for the city for 20 years are entitled to consideration, but from the following state-



Efficiency of labor in Boston water department—The average efficiency for the past 15 years 1880-1894 has been taken as 100%. Data for this diagram have been reduced to a uniform basis of wages and hours for the entire period.

ment of facts it appears that few are in need of charity. Of the 56 men who were over 40 years of age, and who had served 20 years, nine were employed as watchmen, which work they could perfectly well do. Four were filling positions for which they were not suited, and three were filling absolutely useless positions, leaving 40 men out of 56 men who were performing laborious work. Stating this matter in a different way, it appears that out of 715 laborers there were only 16 who were 40 years of age or older who had served the city 20 years and who were incapacitated for laborious work, and of these 16 nine were able to serve as watchmen. This condition leads to doubt as to the necessity for establishing a pension system for the labor force unless such system is to be established for the benefit of employes who have passed their years of usefulness in the service of other employers and who have late in life received, probably through political influence, positions upon city work.

The policy of appointing men upon the labor service

after they have passed their years of usefulness in the service of other employers had turned the department into a semi-charitable institution, where aged and infirm men were employed when they should have been the charges of relatives or of the public, and not placed upon the city pay-rolls at wages higher than first-class able-bodied laborers at similar work could command from other employers.

Experiment to Test Efficiency of Day-Labor Force.

All of the work upon which the previous comparisons and comments as to efficiency have been made was work done prior to the investigations, which were consequently studies of records of work already completed. It was not, therefore, possible to know accurately the conditions under which the work was done. At the request of the mayor of Boston a test was made at the Chestnut Hill stone crusher (a municipal plant which had been shut down) to determine whether or not it was possible for the day-labor force to produce broken stone at a cost fairly comparable with that of similar stone purchased by contract. The test covered a period of three months during the summer of 1908, and was under the observation of a disinterested engineer, who kept accurate record of what was done, but who did not in any way supervise or direct the forces. The work consisted of stripping and quarrying the stone, hauling it to the crusher and breaking it.

The test lasted a sufficient length of time to demonstrate with accuracy the cost of producing broken stone by day labor under the existing conditions. The force consisted of men apparently as skilled and competent as could be selected from the employes of the street department and certainly gave evidence of being reasonably skilful and competent. So far as will be observed, the foreman in charge was given an absolutely free hand to organize his force as he deemed best, and to adopt such methods of handling the work as he might desire. With slight and unimportant exceptions, tools and supplies were promptly furnished, so that there is no reason to think that the output could have been increased by the improvement of conditions depending upon the co-operation of the superior officers of the department. The net result of this test appears to be that broken stone was produced at a cost of \$1.075 per ton. These figures make no allowance for the cost of clerical service at the office or for the cost of administration, which items are estimated at \$0.05 per ton; and no allowance was made for the cost of the quarry. Depreciation of plant and the rental of tools were included in the cost of producing the stone.

The quarry and crusher selected were the most favorable of any of the eight which the city had worked in the past, and in 1895 produced broken stone more cheaply than any other of the city crushers. It is only fair to add that during the second and third periods of the tests, the time being divided into three periods, there was a marked increase in the efficiency of the force. A fair estimate of the cost of the output of broken stone during these latter periods was \$0.95 to \$1.00 per ton, no allowance being made for administration nor for owning and maintaining the quarry. For comparison, an instance was found where the operations of a large broken-stone company were started with certain temporary machinery which was rented to a contractor, who crushed stone for a period of four or five months. The physical conditions were fairly comparable with those at the Chestnut Hill plant. The crusher was similar, the output smaller, and rental was paid for the machinery. The cost to the contractor for this work was \$0.45 per ton, not including interest and de-

preciation, which would bring the cost up to \$0.50 per ton. It therefore seems fair to conclude that the work which cost the city practically \$1.12 per ton, including administration expense, would have cost a competent contractor about \$0.50 per ton.

Resume.

While the difficulties of such investigations are many, it is believed that the results recorded represent very conservatively the conditions existing. It is apparent that municipal work done by day labor is in general, under the conditions of to-day, much more expensive than similar work done under the same conditions by contract. It is also apparent that the labor force in city departments where work is done by the day-labor system is very inefficient as compared with similar forces employed by contractors and has, during the last ten of fifteen years, decreased greatly in efficiency, at least in the city of Boston.

Is Labor Working for a City More Efficient than Labor Working for a Contractor?

The city usually pays more for its supplies and labor than a contractor, but the greater efficiency of its labor under proper supervision, and due to the higher wages, affects to some extent this handicap.

The above statement extracted from a letter to the "Contract Record," written by Mr. George Powell, principal assistant city engineer of Toronto, and published in our issue of September 28, provides Engineering-Contracting, of Chicago, with the inspiration for some interesting criticisms in a leading editorial. Our American contemporary makes the following pertinent observations:

"We quote the above statement because it is unique among reasons for doing public work by day labor. Saving the contractor's profits, better work, avoidance of law suits, employment of local labor, adaptableness to changes of plans have all been named by advocates of day labor as reasons for its adoption. The claim that labor working for a city is more efficient than labor working for a contractor has not, however, come to our notice previously. Were the author of the quotation an American we should set him down as a bit of a wag, but he is Canadian and, as we happen to know, is very serious in his assertion. Therefore, and also because he has been examined at various times the other claimed advantages of day labor and work and may as well exhaust the list, we shall give this new claim attention.

"Looking at the question the strict logician might urge that it begged the question—'proper supervision' including only such examples as affirmed the assertion. What the author really means by 'proper supervision' is no more, we imagine, than honest and capable supervision. His assertion then is: Given honest and capable supervision, labor working for a city is more efficient than labor working for a contractor because the city pays higher wages. Let us look at this statement in the light of reason and experience.

"It is a reasonable assumption that better pay should bring better work, but experience proves that the one does not always follow the other. Under modern industrial conditions wage rates are the result of so many complex forces that they have ceased to be indices of the degree of efficiency of labor. We do not, however, need to depend upon abstract reasoning: there is the evidence of actual experience. American cities generally pay higher rates of wages than do contractors. This is undoubtedly true where account is taken of sick leave, holiday and vacation allowances of time under pay, which are universal in city work practice. Yet the investigations of the Boston Finance Commission's engineers showed that labor working for a city was decidedly inefficient. It was shown that not only was the unit

cost of say sewer construction by city labor greater but that city laborers did not, man for man, lay as many bricks per day as did contractors' laborers getting smaller wages. Substantially the same results were disclosed by the engineers of the Chicago Commission on City Expenditures. And there have been a score of other examples mentioned in these columns during the past eighteen months. So common is this experience that the inefficiency of labor working for a city as compared with labor working for a contractor or a private corporation is almost a by-word.

"The pertinence of this evidence can of course be denied: It is excluded, it may be claimed, by the proviso of 'honest and capable supervision.' It is not, it may also be said, the experience of Canadian cities. There is doubtless a point to these claims. Canadian experience with day labor work, while not wholly familiar to us, does, we are inclined to believe from what we know, afford greater justification of the system than does American experience. The Canadian city, we know, goes about its task in a different manner from American cities. For any piece of work plans and specifications are prepared with care and on these bids are asked and the city engineer puts in a bid in competition with the contractors who may bid. If the city engineer's bid is lowest or is low enough to make it seem to the city officials most economical of all the bids, he is 'awarded' the work and prosecutes it with city plant and forces. We are not certain that this is universal practice but it is frequent practice and it has decided merits if we may judge from reports. Apparently, too, Canadian cities are exceptional also for an absence in their public works of politics of a certain kind familiar in American cities. It may be admitted that these conditions count for efficiency in day labor work; labor working for a city where they exist will doubtless be more efficient than labor working for a city where they do not exist, but the question of the comparative efficiency of labor working for a city and labor working for a contractor is not answered.

"The statement that labor working for a city is more efficient than labor working for a contractor is certainly contrary to experience in American cities. It is contrary to reason to expect that it can as a general proposition be otherwise. There is something more than honest and capable supervision required to put the city manager on a parity with the contractor in securing efficiency. Unless the city's manager has been a contractor he seldom has the training and experience of the contractor. If his training and experience are equal he does not have the incentive that the contractor has to wrest efficiency from his men. The contractor is impelled by the incentive of monetary reward; every extra fraction of efficiency he gets is money in his pocket and every fraction that he loses is money out of his pocket. No mild desire of the city manager to 'make good' can equal this incentive of financial reward or failure."

Letters to the Editor

Toronto, Oct. 26, 1910.

Editor, Contract Record:

Mr. Powell, in his letter defending the day labor system, says that the contractor and the engineer bid on even terms, and that the engineer allows for all contingencies which a contractor has to meet.

Such as far from being the case. In the first place, a contractor has to guarantee his work from one to five years. Ask any contractor and he will tell you that a considerable amount is spent in this way, no matter how careful he may be about the work. He can not tell accurately what the job will cost him until the term of guarantee is up. Does the city engineer allow for the cost of guarantee? No; any repairs he has to make to a job come out of the general tax fund. This is not only unfair to the contractor, but to the taxpayer also. Suppose, for instance, that a contractor were to lay a pavement on Yonge street and the engineer another on King street. The contractor has to bear the expense of re-

pairing Yonge street, the contract price of which is charged to the ratepayer on that street, and includes repairing for five years; but the general taxpayers have to pay for repairing King street, in order to show an imaginary profit for day labor work.

Mr. Rust says the by-law will not permit him to allow for the guarantee. Why does he not state that in his report when he is estimating the profits for the year?

The city of Toronto has purchased an asphalt plant and about a half dozen storage yards. These were purchased because of the increase of work done by day labor, but the cost of purchasing them or maintaining them is not charged against any job; it comes out of the general fund. \$20,000 a year would not pay for maintaining them! This amount would not be required if it were not for the engineer doing the work by day labor. Such items as office expenses, employers' liability insurance, and legal expenses, which run into a considerable sum, are not included in the engineer's cost.

Yours sincerely,

AN OLD CONTRACTOR.

Montreal, October 24, 1910.

Editor Contract Record:

I wonder how many business men, or, for that matter, common sense men of any calling, Mr. Powell expects to convince by his letter published in your issue of October 12.

The engineer's honesty in carrying out day labor work, either in regard to the making of the estimate, or in the choice of materials that he uses in carrying out the work, is not questioned, but it is clear that his views are more likely to be biased if *seemingly* cheaper work (apart from the real cost) means more consideration and more pay for him.

That the foreman's interest is to scamp the work on his own responsibility, as long as his credit increases by it, is also too evident to discuss.

But Mr. Powell gives the greatest swing to his imagination when he writes: "The engineer is, of course, anxious to do his own construction work, and, with the facilities that can be provided by the city in the way of plant, he is unquestionably able to compete with the contractor on even terms. The city usually pays more for its supplies and labor than a contractor, but the greater efficiency of its labor under proper supervision, and due to the higher wages, offsets to some extent this handicap." In Montreal the contractor is now required to pay a minimum wage of two dollars per day to laborers, with the same working hours as the city. For *good* men, he will have to pay *more* than the minimum. The city also pays two dollars, but this is a maximum as well as a minimum, and the contractor's wage is, on the average, the higher. Yet with the same working hours and a higher wage, the average Montreal laborer keeps clamoring for the abolition of contracts, because he is sure to more than make up by working less, and cornering the labor market sooner or later.

Then, where does the "greater efficiency," which Mr. Powell speaks of, come in? I, myself, have had some experience in street construction work, and after reading the controversy in your paper I find unshaken the following points, made by the advocate of contract labor:

1.—The city engineer has no taxes, no office rent, no water rates, nor any other general expenses to pay.

2.—The city engineer gives no bonds, or guarantee, and his work has to be repaired at the city's expense.

3.—The city engineer lacks the practical experience of the average contractor.

4.—The city engineer and his subordinates will be tempted to scamp in order to boom their stock, and the controllers or aldermen will be tempted to approve of the scamping because of the patronage involved in day labor.

Mr. Powell contends that "all the contingencies for which a contractor has to provide are included in the city engineer's figures" and that, therefore, "the bid is on even terms," but I challenge him to quote one single instance where the general ex-

pense item—which, of course, directly or indirectly, the city, like the contractor, has to pay—has not purposely been left out of the city engineer's estimate to make his figures more acceptable!

As regards scamping, it can be practised by the contractor with the assent, perhaps, of incompetent officials, but then, will these same officials be more honest or more competent when working on their own account? Contract work has this at least in its favor, that the contractor is under check, while the city engineer is his own supervisor.

I may add the following notes from my own observation and experience:—

1st.—Day labor excludes competition; therefore it means less work and poorer work.

2nd.—The city engineer has a tendency to base his figures not on the actual cost, but on the wishes and whims of his employees, his first care being to hold his job.

3rd.—The private citizen cannot ascertain the real cost of day labor for the reason that the bookkeeping will be made to fit in with the game of patronage.

To summarize: even with the best of intentions, the city engineer cannot carry out the work with the same thoroughness that he can supervise it.

Very truly yours,

CONTRACTOR.

Editor's Note.—"Contractor" would appear to have had a somewhat bitter experience in the business. This doubtless is accountable for the feeling of intolerance for the day labor system communicated by the above letter. The reader must not overlook the fact that "Contractor" belongs to Montreal, a city with a past, in so far as the question under dispute is concerned.

Earth Roads in Ontario

Mr. W. B. Rittenhouse, of Beamsville, Ont., writes suggesting that pressure be brought to bear upon the Provincial Government in order to secure assistance in the work of building and improving earth roads throughout the province. He states that in spite of the efforts of the various associations the grants for highway improvements have not been increased. Mr. Rittenhouse thinks that there should be an apportionment for earth roads. "We must expect to have many miles of these earth roads for many years yet," he writes, "and they are deserving of being maintained in the best possible condition." The possibilities of road improvement have been discussed for many years but financial encouragement should be given by the Government. Mr. Rittenhouse concludes by emphasizing the importance of giving the farmer practical instruction in earth road building and maintenance, and suggests that a competent official be appointed to give such instruction, the idea being suggested by the excellent results that have been accomplished in this way, but in a wider sphere, by the provincial highway department.

Surety Bond for Architects

An ancient and unrepeatable law has been unearthed in a California town which stipulates that competing architects in a competition, shall file a surety bond, prior to being paid anything for plans and specifications. The law was drawn for a time when the plans were furnished by the man who put up the building, and was intended to afford a protection to the owner under those conditions. Architects are on a different plane and under different methods now, and a number declined to enter the competition, because of the conclusion of the district attorney that this forgotten law should be followed. Yet architects are not wholly free from some sympathy with the requirement, or rather

with the suggestion, that an architect should be held to some sense of responsibility as to plans which are offered on the basis of a certain cost. It is no uncommon thing for architects to declare competitions have been awarded on the basis of a plan which was far in excess of the expressed limit of cost, and that the intended building could not be brought within the limit of cost without a material alteration of the plan. And occasionally the outcome justifies the claim. It is not unknown by any means, for a plan when figured, to sadly overrun the limit of cost, and many a perplexed building committee has been at a loss to know what to do or where to turn for a solution of the problem of erecting the building which has been selected. In public and semi-public buildings, a committee frequently finds its position a most unpleasant one, for the design has been generally displayed and approved by the public, and any marked deviation therefrom, will arouse more or less discussion and criticism. Under these circum-

stances, it sometimes happens that the contractors afford a convenient scapegoat, and are accused of having formed a combination, to maintain high prices. Rejection of bids and refiguring, either upon the same plans or a revised plan, generally establishes about the same situation—that the prices quoted represented the views of contractors fairly.

It is not fair to charge the blame wholly to the architect, even under these conditions. The desire of so many building committees, boards and others, to get all they can for their money, presents a very strong temptation to present an alluring sketch in the competition. The architect who presents to such boards the sketch that they desire, is not doing more than going after the business, even though it does involve submitting a design which can only come within the limits of cost by the interposition of providence or the prevalence of an insane benevolence on the part of contractors.—*Improvement Bulletin*.

Notable Reinforced Concrete Arch

There is now under construction at Weston, Ont., what is, up to the present time, the longest arch span in Canada. An old wooden bridge is being replaced

Bonding Successive Layers of Concrete

Joints between successive layers of concrete which are considered very satisfactory by the maker have been obtained by the following treatment: The approximately horizontal surface of the concrete which is to be bonded to a subsequent layer is allowed to stand until any water which may have flushed to the top



Reinforced Concrete Arch at Weston, Ont.—Falsework for Arch Ribs

disappears. Then, while the mass is still moist, the surface is covered with about ½-in. of a 1:1 dry mixture of cement and sand, and protected if necessary with tarpaulins or boards. The moisture still remaining in the concrete suffices to produce a partial set in the dry mixture immediately adjacent to the surface of the concrete and above that to affect the mixture in a diminishing degree, the upper part of the mixture being unchanged. When it is convenient to apply the next layer of concrete the moisture in it completes the set through all of the unhardened dry mixture, interlocking the two courses, as it were. The joint between the two layers of concrete, although visible, is stated to make a much stronger bond than is usually secured.

A number of briquettes have been made of cement mortar cast in two parts and connected by a joint formed in this manner, and when tested developed a strength of more than 50 per cent. of the normal briquette of the same mixture made in a single piece.

This form of bond between successive layers of concrete was devised and has been extensively used by Mr. J. A. Jamieson, of Montreal, Canada, in the construction of a reinforced concrete elevator, a reinforced concrete conduit 10½ ft. in diameter and 8,000 ft. long, working under 33-ft. head, and for other works.

Scaffolding for Steel Frame Buildings

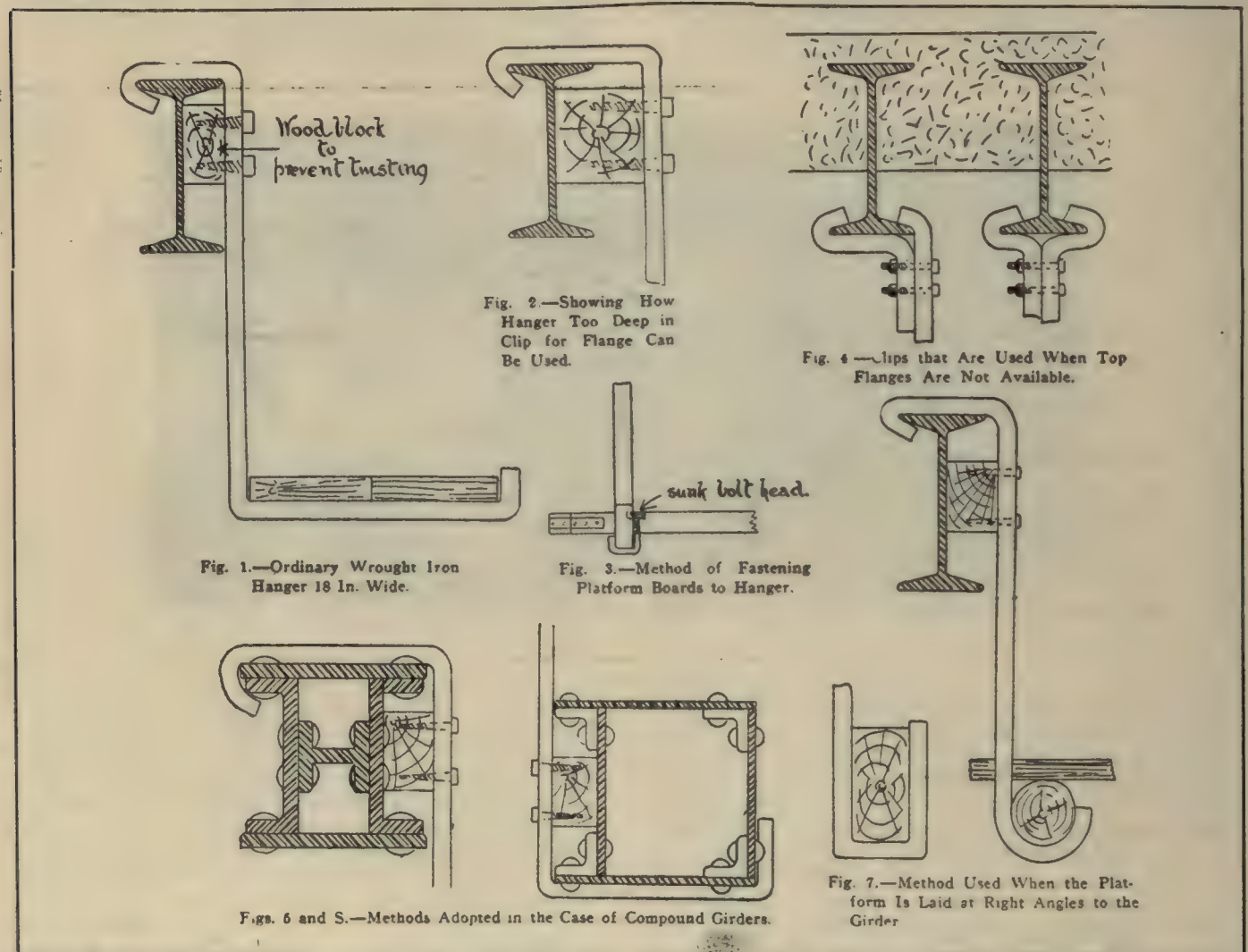
English Practice: Details of Design and Construction—Various Types of Portable Scaffolds—Methods of Interest to Canadian Contractors

BY A. G. THATCHER*

British scaffolding is diverse and complex. Broadly speaking, it may be divided into two classes, the northern and southern systems. The line of demarcation at one time was very clear, the northern method being confined to Scotland, but during more recent years the interchange of ideas due to the press and cheaper facilities in traveling as well as other ways has caused the northern system to obtain a vogue in

ing may be the sufficient cause of preventing the engineering development of a country.

In considering the matter of British scaffolding in general, we shall first discuss portable scaffolds as used in England for steel frame buildings. While structures of this nature cannot now be considered new, nevertheless they are so sufficiently modern that the scaffolding for the steel erectors is not yet systematized.



England. It is somewhat curious to note that pole scaffolding is chiefly used in England; that square timbers used in a type of scaffolding known as the Gabard is principally Scottish in application, and that this latter closely approximates to the French system greatly used in Paris. It is possible that the historical connection between Scotland and France which existed at one time to the exclusion of England may account for this. The history of nations may be read in their architecture. The impermanence of the means of build-

ing, however, as experience has guided, a general agreement has been reached that scaffolds supported on steel hangers afford the readiest means of carrying on the work.

The English practice is for the steel erection to proceed much in advance of the filling in, consequently pole scaffolding is not greatly in request until most of the steel is in its place. There are reasons for this, one of the principal being that steel is at all times difficult to handle. It is unsymmetrical in that the length of the members is considerable in proportion to the other measurements. This difficulty necessitates the builder giving space in order to move his material free-

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ly, and as it is obvious that pole scaffolding minimizes this greatly, the practice has developed of doing the work with the least possible extraneous erection.

Steel hangers can be practically of any design, as they are easily made and of great adaptability. A platform width of 18 in. is usually given, but this can be increased. The illustrations presented herewith show those most generally in use. Fig. 1 represents the ordinary $1\frac{1}{2}$ in. or $1\frac{1}{4}$ in. square wrought iron hanger 18 in. wide. The hook end in this case has just sufficient depth to clip over the top flange of the girder. If sim-

This method is often sufficiently secure, but if any doubt arises the boards can be fixed by means of a clip, as shown in Fig. 3. If the bolt projects at all it might prove a cause of tripping, and to avoid this in thicker timbers the bolt head can be sunk as shown.

In Fig. 4 are illustrated clips which are useful where top flanges are not available. As will be seen, the hanger need not be immediately under the center of the girder, but either to the right or left, as circumstances may require. In the diagram the haunching which supports the flooring is supposed to be cut away to

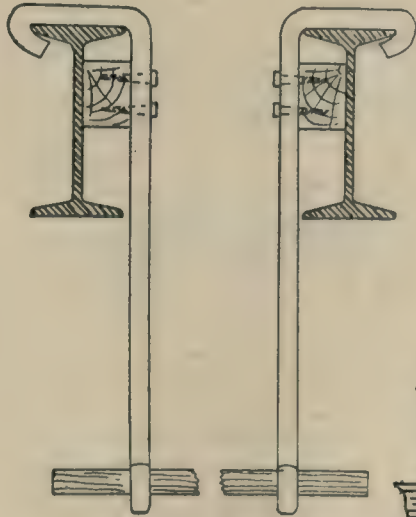
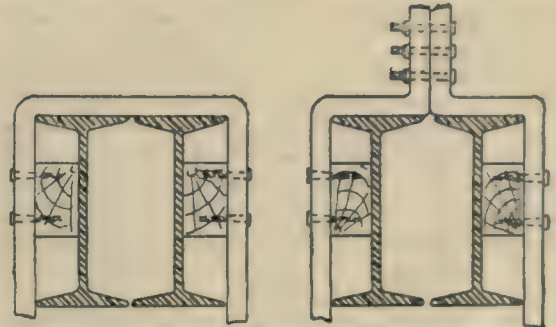


Fig. 8.—Method Adopted When a Platform Only 18 In. Wide Is Wanted.



Fig. 15.—Cross Section of Fig. 14. Showing Planking Resting on the "Needles."



Figs. 12 and 13.—Manner in Which Hangers Can Be Used to Cover Double Girders and Carry Platform on Each Side

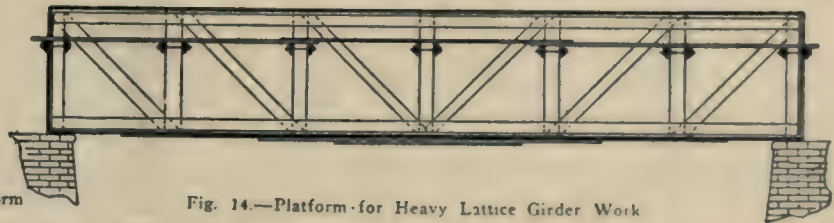


Fig. 14.—Platform for Heavy Lattice Girder Work

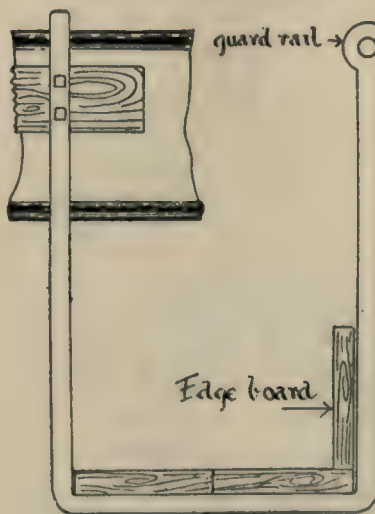


Fig. 9.—Sectional View of Platform When Arranged as Indicated in Fig. 8.

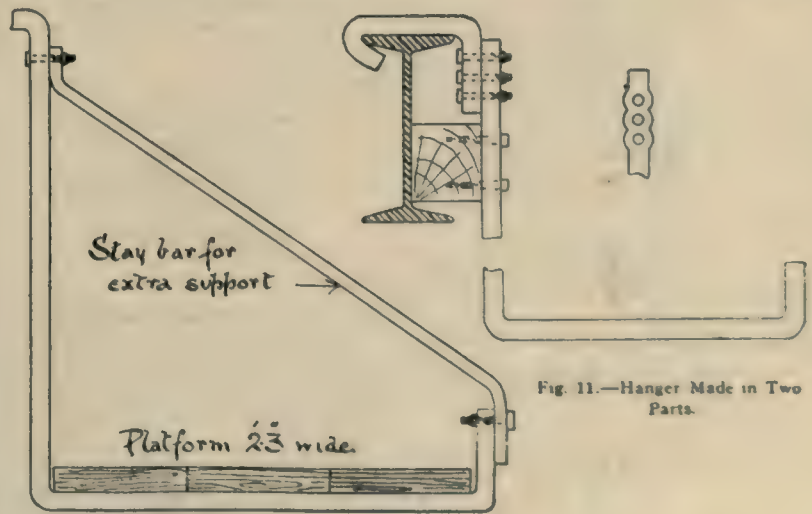


Fig. 10.—Hanger Provided with Stay Bar to Afford Added Strength.

Fig. 11.—Hanger Made in Two Parts.

ply hung in that position there would be a tendency for the hanger to roll or twist when loaded. To prevent this a wooden block is placed where shown on the sketch.

In Fig. 2 is shown a hanger too deep in the clip for the flange can be used and kept firm. This is achieved by using a block of sufficient thickness to take up the superfluous depth of the hanger. In this instance the screws are absolutely necessary, as the liability of the block to move is increased.

In many cases the boards for the platform are simply laid on the hangers, being lapped in their run.

free the lower flange. Similar methods can be adopted for compound girders, as shown in Figs. 5 and 6.

At times it may be found useful to lay a platform at right angles to the run of the girder. To enable this to be done the hangers can be made to carry a pole or a length of quartering of sufficient strength, as shown in Fig. 7. Two poles hung from different girders are necessary, and on these the boards can be laid. A particular advantage is gained by this method, which is useful in many cases. It allows of a platform being laid to a width which is only limited by the effective length of the bearer poles. If a platform of only 18

in. is wanted it can be gained by arranging the hangers, as shown in Fig. 8. A section of the platform when arranged in this manner is shown in Fig. 9, which also shows how the end of the hanger can be continued upwards to carry a guard-rail or rope and permit an edge board being fixed. The edge board is particularly necessary on steel construction work as bolts, nuts, spanners and other tools often fall, owing, no doubt, in part to the extremely narrow platform on which the men work. To prevent this in a practical way nothing

that it is cumbersome. It can, however, be made in two parts, as shown in Fig. 11. This also permits of differently sized clips being used to suit the flanges, the other portion of the hanger remaining of the standard size. Three bolts are wanted to make the connection, and the bars where joined should be slightly flattened out before the holes are drilled in order to give sufficient material around the bolt holes to withstand the stress that arises.

In Figs. 12 and 13 are shown the manner in which

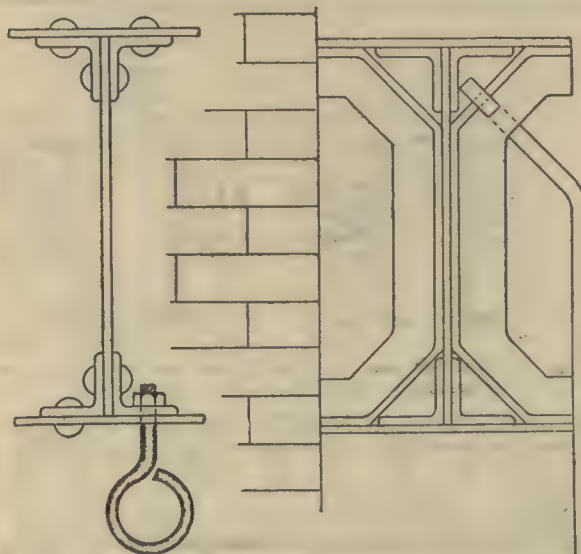


Fig. 16.—A Method Often Adopted to Carry Scaffolding.

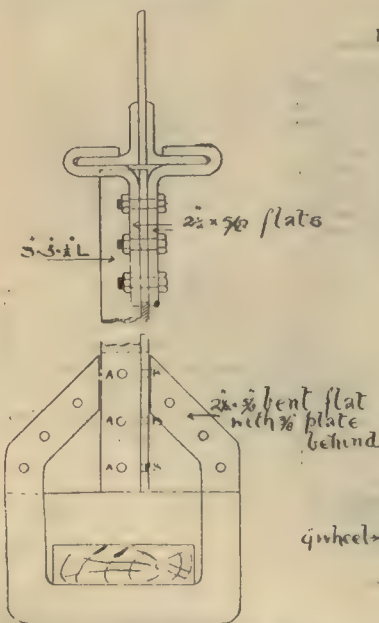


Fig. 19.—Hanger for Supporting Planks Laid Flat and Carrying Cross Planks.

Fig. 17.—Hanger Useful Where Girder of Type Shown is Hard Against a Wall or Other Obstruction.

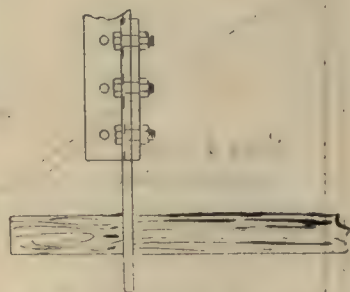


Fig. 20.—An Alternate Arrangement

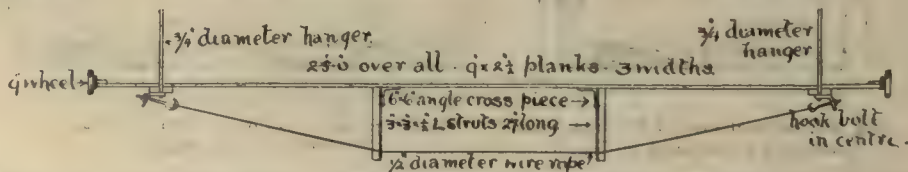


Fig. 21.—A "Trussed" Scaffold Capable of Carrying a Number of Men and Adapted for Use On Vertical Sides and Ends of Buildings.

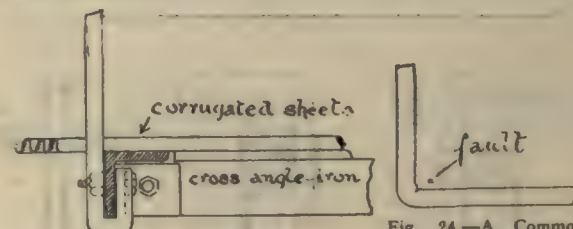


Fig. 24.—A Common Fault in Making the Hangers.

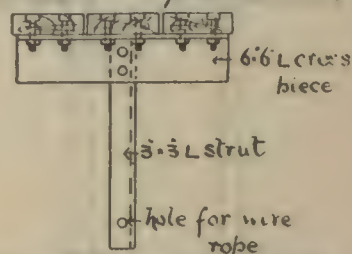


Fig. 23.—A Detail of the Lower L-Strut Shown in Fig. 21.

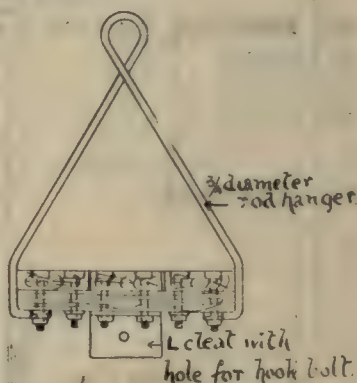


Fig. 22.—A Section of Fig. 21.

better than an edge board has been used in this country, although matting is used abroad—notably in Northern Italy.

The ordinary hanger, as already stated, is usually made to carry two boards, and this platform, with its loads, is considered sufficient for its strength. If, therefore, three boards are wanted, additional support must be provided, and this is given by fixing a stay bar, as shown in Fig. 10.

A disadvantage may be urged against the hanger in

hangers can be made to cover double girders and carry a platform on each side. Fig. 13 being in two parts is, of course, the most portable. When used in this way the wooden blocks keep the whole arrangement rigid.

Fig. 14 shows the method of erecting a platform for heavy lattice girder work. It will be noticed that on the top boom of the girder flange plates have still to be put on similar to those on the lower boom. These plates could not readily be put in position if ordinary hangers were used, therefore a method of glanding timber cross-

heads to the struts is found most desirable. In the illustrations the crossheads, or needles, as they are sometimes termed, are shown fixed at the required distance from the top boom in order to allow of easy reach by the workmen. Fig. 15 is a cross section showing the planking resting on the needles.

A method often adopted to carry scaffolding is illustrated in Fig. 16. Rivets are cut out of the bottom flange at suitable distances apart, say every eight feet, and ring bolts inserted in their place. From these depend chains or cordage to carry whatever scaffolding may be required.

A hanger which is useful where a girder of the type shown is hard against a wall or some other obstruction that will not allow an ordinary hanger to be fixed is illustrated in Fig. 17.

Fig. 18 illustrates a method of supporting a fireproof scaffold on which fires for heating rivets are to be used. The hanger carries angle irons covered with a deck of corrugated sheets.

Fig. 19 shows a safe hanger for supporting planks laid flat. By removing the plate and "bent flat" from the holes marked "A" to those marked "B" the planks can be placed at right angles to the position first indicated, as shown in Fig. 20.

In Figs. 21, 22 and 23 is represented a scaffold capable of carrying a number of men and is useful for various purposes. By trussing it, as in Fig. 21, with a half inch wire rope and two hook bolts, a fairly long platform is provided. Fig. 22 represents a section of the arrangement with the hanger entire, but without the lower T-strut, a detail of which is presented in Fig. 23.

The manufacture of these hangers is easily accomplished by any ordinary smith, but care must be used to guard against the common fault shown in Fig. 24.

Another record for deep caisson sinking has been established by the Foundation Company in caisson 123 for the new Municipal Building in New York, which was carried down to a depth of 110½ ft. below water level, or about 143 ft. below the curb. The caisson and working chamber are of concrete, 10 ft. 9 in. in diameter, and were built before sinking, above the surface of the ground, in three nearly equal successive sections, says the *Engineering Record*. The caisson was under pressure for 19 days and was sunk through sand into hardpan, through which the excavation was continued 6 ft. below the cutting edge to rock, which was leveled under a gauge pressure of 47 lb., diminished to about 45 lb. in the working chamber. This pressure was maintained until after the working chamber was concreted, when the collapsible steel shaft was removed and the interior of the pier filled with concrete to a height of 114 ft. above the rock. This pressure, which probably closely approaches the limit for human work, is the highest yet attained by the contractor and probably has not been exceeded in this country. Notwithstanding it, the caisson was sunk without any fatalities or any serious injury to the workmen, who were very carefully safeguarded by restrictions which they were compelled to observe. A hospital lock has been provided, although, so far, it has been used only for comparatively trifling cases of the bends, and a surgeon is in constant attendance. Under maximum pressure the working time of a man on this caisson was only 40 minutes for each of two shifts, with a 6-hour interval between them. About as long a time was required for entrance and exit to the caisson, the latter being ex-

tended to 30 minutes for the maximum pressure. The lock tender was instructed to make the compression as slow as possible, and effected it by allowing the air to escape only by leaking through the stuffing box, with the outer controlling valve closed tight. This reduced the pressure to about 3 or 4 lbs. when it was overcome by the weight of the door and the men were released at the expiration of about 30 minutes. Coffee was provided as usual for the men on emerging, and they ordinarily remained in the sand-hog house for some time after leaving the caisson.

An Iowa man, according to an exchange, experimented with laying dust on brick pavement in front of his dwelling, and found that crude oil sprinkled upon the brick served to lay the dust for some time. Much of the oil was absorbed by the brick and the filler, and served to make the street dustless at that point. The experiment cost about \$1.50 for the sixty feet frontage, including the wages of the men who applied the oil. The plan seems to be worthy of being followed up by further and more exhaustive experiments. If it can be shown that the dust can be laid for any length of time by this method, many merchants will be glad to have the paving in front of their places of business oiled, even if they have to bear a portion of the expense.

Complaint has been made in a Western city because the building department refused to issue a permit for a new manufacturing plant, and a charge was made of discrimination. The inspector shows that there was no discrimination, but the plans were so vague and indefinite that it was impossible to determine the kind of building desired. The plans were incomplete as to floor construction, spacing of beams and joists, lacking as to the roof construction, showed too weak a floor for the plant, and in other ways was too meager to check up. The inspector is entitled to credit for enforcing the requirements of the ordinance. In summarily rejecting the plans he did nothing more than he should have done.

Wood Pipes

Wood pipes made from full-sized logs have been in use for many years, says the *Ohio Architect*. Occasionally at the present time such pipes are dug up in the course of modern improvements and are found to be in a very good state of preservation. In several instances such pipes are still in use after a service extending over a period of 50 to 75 years.

The pioneers of the Atlantic Coast used wood pipes made by boring a hole lengthwise through a full-sized log. The pioneers of the Pacific Coast use wood for pipes also and with greater economy, because of the advantages gained by virtue of past experience and modern manufacturing methods. To-day wood pipes are made of staves so manufactured as to give a cylindrical shape which is absolutely uniform and waterproof. The pipes of small size, up to two feet in diameter, are made from staves of special pattern with grooved edges and are built up in the factory. The pipe is wound from end to end with steel wire and coated with a mixture of asphalt and tar for preservative purposes. The thickness of the staves and the pitch of the winding vary according to the pressure under which the pipe is to be used. Large pipes over two feet in diameter are generally built up at the point they are to be used, the staves being placed so as to break joints. These staves are made six inches wide and are shaped with plain, bevel edges, and a curvature to conform to the diameter of the pipe. Special patented bands girdle the pipe and are drawn up tight so as to close all joints.

Methods and Cost of Concrete Paving Work

Some Instructive Particulars from the City of Boise, Idaho—Practical Details from Inspectors' Records and Contractor's Estimate

The city of Boise, Idaho, has recently thrown open to traffic some $8\frac{1}{2}$ blocks of concrete pavement. The contract for this pavement was let nearly a year ago, but owing to the many unforeseen difficulties encountered by the contractor, it was not completed until late in July of this year. The pavement was constructed on Front St., and will be subjected to a slow but heavy traffic. The width of the pavement is $69\frac{1}{2}$ ft. The reason for this being that on the south side of the street no sidewalk or curb is required as teams drive directly to the warehouses located on that side. The street car track is laid in the center and the north sidewalk and curb are narrowed to $10\frac{1}{2}$ ft. The cross section of the pavement was made with a rise continually across the street of .02 ft., and with no crown except on three blocks. The concrete was mixed in the properties of 1-3-7. It was found that this mix produced a concrete that filled well, and which after thorough tamping could be smoothed off with a wooden float. There was no top coat, the specifications requiring only a uniform surface, with no stones larger than $\frac{1}{2}$ in. in diameter showing. After the concrete had set sufficiently it was covered with 2 in. of dirt and was left wet for seven days. The concrete was 8 in. thick, expansion joints, $\frac{1}{2}$ in. wide, were pointed at the curbing and at each 25 ft. at right angles to the center line of the street. The joints were made with $\frac{1}{2}$ in. boards, which were left in the concrete for two or three weeks, until it had set hard. Some of these boards were left in the concrete all winter. The contractor had much difficulty in securing these boards and found it an expensive task. It was also hard on the edges of the joints. A hook $\frac{3}{8}$ in. wide and 3 ft. long, gave the best satisfaction in removing the boards.

The joints were filled with a mixture of tar, pitch and sand, all heated together and poured in when hot. The joints had to be gone over at least twice to fill them full.

A good quality of river sand having 30 per cent. of voids was used for the concrete. The gravel consisted of crushed granite boulders up to 6 in. in diameter, porphyry, rhyolite and various other forms of river work in a mountainous county. These were received through a $2\frac{1}{2}$ in. mesh screen. The gravel was obtained from the bed of the Boise River and was all passed through a jaw crusher to crush the oversize. Tests showed that the gravel contained about 40 per cent. of void.

The mixing was done by two machines—a $5\frac{1}{2}$ cu. ft. batch mixer run by a gasoline engine, and a 7 1-3 cu. ft. batch mixer run by an electric motor. The larger mixer gave a much higher efficiency. Grading work was commenced on Sept. 13. The subgrade was fairly good, as little spongy material was found and sand was only found in a few places. As the sand will have little chance of moving, it was considered good foundation. The subgrade was rolled with a 16-ton roller and all spongy places refilled with gravel. The use of the roller was loaned by the city, but in the data given below the cost of rolling to the contractor is estimated at \$10, this estimate being for coal, engineer, repairs, etc. As the sub-grade was very good, very little rolling was required; in fact, the roller was in use for only 7 days. The total cost of the excavation was \$3,010. As the total excavation amounted to 5,594 cu. yds., the cost per cubic yard was 54 cents. As the bidding price for the excavation was 48 cents per cubic yard, the figures show that the contractor lost \$325.30 on this portion of the work. This loss, however, was reduced approximately \$150 by the sale of dirt from the streets.

Concrete mixing was started on October 7 and finished July 8. No concrete work was done from December 9 to April 21. Table I. shows the outputs of the mixers by months and the labor cost of mixing and placing the concrete. The total labor cost of mixing

and placing the concrete was \$5,452.74. As a total of 4,483.16 cu. yds. of concrete was placed, the cost per cubic yard was \$1.22. Included in this cost is the finishing of sub-grade after rolling. (The contractor sublet the excavation, but was to do all work after the subgrade was rolled). This he did with his concrete gang when the gravel supply was irregular, or when moving mixers, or when the gasoline engine was out of order. The covering and watering is also included in the concrete labor cost, and some of the uncovering is also included. The total number of batches of concrete was 22,298, the average cost per batch being 25 cents.

The total yardage of pavement was approximately 20,408. A summary of the cost of the work to the contractor, according to records kept by inspectors on the job, shows the following:

	Total.	Per sq. yd. Pavement.
Excavation, 5,594 cu. yds., at 54 cents.....	\$3,010	\$0.1475
Concrete labor, mix and place 4,483 cu. yds., at \$1.22	5,483	0.2686
Cement, 13,181 sacks.....	9,061	0.4440
Sand and gravel.....	3,900	0.1911
Roller, 7 days, at \$10.....	70	0.0034
Cleaning pavement and labor on expansion joints	451	0.0221
Paving pitch and tar.....	600	0.0294
Sand joints	6	0.0003
Extras, estimated	1,000	0.0490
Totals.....	\$23,581	\$1.5554

In the above summary the cost of the gravel is largely an erst-while, as only about one-half was obtained from the contractor's plant, the remainder being obtained from various other sources at about \$1.10 per cu. yd. The gravel obtained from the contractor's plant cost 80 cents per cubic yard delivered. The sand also cost 80 cents per cubic yard. The cement was contracted for at \$2.75, but the contractor was frequently forced to buy where he could and often paid more than the contract price for small lots. Labor was paid \$2.50 per 8-hour day and teams were hired at the rate of \$5 per day.

The following is the contractor's final estimate on the work:—	
4,483.16 cu. yds. concrete, at \$5.20.....	\$23,312 43
5,594.18 cu. yds. excavation, at 48 cents.....	2,685 20
30 cu. yds. subgrade, at 55 cents.....	16 50
30 cu. yds. refill, at 85 cents.....	25 50
9,988 lbs. gutter plates, at 5 cents.....	499 40

Total amount due\$26,539 03
This against his cost of \$23.58 shows a profit of \$2,957, which is 11 per cent. It was freely predicted among the contractors that this contractor was losing money.

Only a block and a half of the pavement was opened to traffic last fall, so it is impossible to judge as to its wearing qualities. However, the Board of Public Works of Boise this spring let a contract for nearly 60,000 sq. yds. of similar pavement, except that the thickness is to be 6 in.—*Engineering-Contracting*.

J. G. Kilt, of Ottawa, has purchased all the damaged iron and steel work of the demolished Quebec bridge, according to a despatch from Quebec. The price is said to exceed \$100,000. Mr. Kilt, it is said, has already turned over his purchase at a large profit and will begin shipping the metal to Montreal, Hamilton and Pennsylvania immediately.

English Experience with Dustless Roads*

The short word "tarring" can be usefully employed to cover the general subject of waterproofing our road surfaces so as to render the road impervious. The revolution in road engineering and maintenance therefore consists in waterproofing our roads by one or other of the bitumens, tars, pitches, whether natural or artificial, which offer themselves in ample quantity and at reasonable prices for waterproofing purposes.

Setting aside the temporary palliatives of watering our roads with chemical preparations which keep the road damp by the absorption of moisture from the air, the treatment which has been most successful in rendering our roads dustless has been by the surface application of tar applied either by hand or by machine. By this method great lengths of road have been rendered dustless for a whole summer season, the mud in the winter following has been reduced in quantity and in some cases the application has lasted for more than one season. Moreover there is almost unanimous testimony that the whole cost of the treatment is more than saved by the increased durability of the road, and already many surveyors are able to make a strong case for the extension of the treatment solely on the ground of economy alone.

In Fulham, where only a very light waterproofing dressing was given, Mr. Wood, the surveyor, stated that he had removed in 1908-9 only 190 (long) tons of sweepings and mud per mile, instead of 390 tons, as formerly, and this of itself shows that not only was the amount of material worn by the traffic from the surface greatly reduced, but that the working up of the subsoil to the surface was also prevented by the application of tar.

These satisfactory financial results, which were known to a certain extent in 1908, would have caused a very great increase in surface treatment during 1909 if it had not been for the exceptional nature of the season, as there were very few days during the spring and summer of 1909 which were suitable for satisfactory tarring.

The committee has already obtained a considerable number of replies to a circular letter sent out to surveyors of the South of England, and from those received up to date, and which relate to 4,513 miles of main roads in the home and southern counties, it is shown that the length of roads tarred and rendered dustless has increased from 393 miles, or 9½ per cent. in 1908, to 657 miles, or about 16 per cent., in the year under review, so that if the same proportion has been observed throughout the kingdom we should expect to find that nearly 4,000 miles have been dealt with, although, probably, as the rainy weather was more prevalent in the north than in the southern counties, the proportion of roads intended to be treated, but which were not treated, is probably larger in the north than in the south.

Use of Tar-Macadam.

As regards the second and more permanent mode of treatment, which is that of remaking the whole of the surface of the road with tar-macadam, this is undoubtedly the most permanent and satisfactory method, and when a road has to be resurfaced it is also the most economical in the end. A good deal of progress has been made in this direction; all over the country short lengths have been experimentally laid, and the results have been so satisfactory that the surveyors have signified their intention to increase this method of repairing at a rapid rate. Several surveyors, notably those in West Sussex and in the Staines District, have introduced an intermediate method, which is likely to be of great importance in improving our narrower second-class roads. In place of relaying the whole width of the road with macadam, the worn portions or tracks which have been made by the traffic have been cut out and filled in squarely and smoothly with the best class of tar-macadam, well beaten in and afterwards rolled, and the whole surface of the road afterwards tarred superficially. This gives two broad, smooth tracks, which offer the least resistance to the vehicles, so that automobilists, in common with the other traffic,

prefer to use these tracks, and the wear and tear of the rest of the road are thereby saved. It is probable that we shall see a considerable extension of this system for the remaking of the narrower and secondary roads of the kingdom.

During the year 1909 the club has been requested by many of its members and associates to use its best efforts to secure dustless roads throughout the country, and this desirable object has been furthered by meetings with those responsible for the construction and maintenance of the roads, and in many cases with conspicuous success. Road surveyors and others have shown themselves to be well aware of the national importance of the question, and some of them have already stated that it must now be taken as an accepted fact that automobile traffic is the traffic of the time and of the future, and that therefore no time must be lost in resurfacing the roads of the country to suit this form of traffic. It is satisfactory to be able to record that this resurfacing of the roads on a more scientific basis, instead of being a costly undertaking, as was thought at one time, will, if carried out in the manner that past experience dictates, prove a real benefit to the ratepayers.

Finally, it must not be overlooked that the application of tar to the surface of the roads is extremely valuable from the sanitary point of view. It is undoubtedly a fact that the very small quantity of dust arising from a tar-treated road is far less liable to carry disease germs than the ordinary dust from untreated roads.

Extensive Road Work in B.C.

An Outline of Government's Plan of Development throughout the Province—An Ambitious and Progressive Policy

There would seem to be a progressive policy of road improvement in British Columbia from the following resolution passed at a recent meeting of the Victoria Board of Trade:

"It is hereby resolved that this Board notices with appreciation the large amount of wagon road construction which the Provincial Government has under way in the various portions of the Province, and this Board, believing that a first-class system of roads is essential to the proper development of the Province, urges that the main trunk highways from north to south and from east to west on both Vancouver Island and the Mainland, be pushed to completion as quickly as is reasonably possible.

"Further, this Board is of the opinion that in the construction of all new roads that wherever reasonable, practical permanent locations should be followed with the most ample right of ways and moderate grades, and curvature and construction generally of a higher class than the standard formerly followed in such works.

"This board is also of opinion that the Provincial Government should construct and locate, widen, straighten or improve, regulate or control, and in every way administer at the cost of the Provincial Government throughout all parts of the main trunk highways that pass through any municipality.

"Copies of this resolution to be forwarded to the Hon. Richard McBride, Premier of British Columbia, and to the Hon. Thomas Taylor, Minister of Public Works."

Mr. A. E. Todd, Vice-President of the Board of Trade, who is taking an active interest in the question of good roads, not only in the Province, but also along the Pacific Coast, in fathering the above resolution gave an interesting address on the Pacific Highways Association, of which he is a member. He explained that this was composed of a large and enthusiastic membership drawn from Washington, Oregon, California, British Columbia, and Alaska. Its main object was the construction of a highway, if possible, from the Mexican boundary to Vancouver, the building of which would be carried out along the Pacific slope.

Mr. C. H. Lugin gave an outline of the Provincial Government's plan for road development through British Columbia. He stated that from conversation with the Hon. Thomas Taylor he had

*From the annual report of Dustless Roads Committee of the Royal Automobile Club of England.

learned that it was the Government's intention to extend the trunk road from here to Campbell River as far as the north end of the Island, as well as build a road to Buttle's lake, and, he hoped, one to Clayoquot from Alberni.

The programme of work for the mainland was a very ambitious one and practically comprised the building of trunk roads from the coast to Alberta and from the boundary of the Province as far north as Hazelton. The transcontinental highway, the proposal for which originated with Mr. Taylor himself, consisted in the joining up of existing roads. There was at present a road on the south bank of the Fraser as far as Port Hope. This it was proposed to continue up the valley of Roach Creek and over the Divide down the Similkameen and so on to Alberta.

This would provide for about 400 miles of road in a continuous line. A motor had already been driven from Kootenay Landing to Calgary, and when the Hope Mountains were crossed there would be only one gap to be filled. It was further proposed to connect this east and west road with a north and south trunk highway.

From Ashcroft the old Cariboo road would be followed along the east bank of the Fraser to a point opposite Fort George. From there it would be necessary to ferry across the river. From Fort George the road would follow the Nechaco valley to the Divide separating Nechaco from the Bulkley valley and then would follow the Bulkley valley as far as Hazelton. This north and south road would be from 500 to 600 miles in length, so that the Provincial Government's policy involved the construction of possibly a thousand miles of trunk roads. He also spoke of the excellent character of the work now being done on the Old Cariboo road, where the most modern appliances are being used and the operation of the "wide-tires" law has been found to be most beneficial.

The knowledge of such a road building programme ought to prove a great stimulus to the proposed scheme of the Pacific Highway Association, said the speaker. In the manner of road building now being employed in the Province up-to-date methods were being employed. The policy of the Government as outlined would provide for an excellent system of roads.

The Use of Concrete in Freezing Weather

Conclusions Reached after Complete Series of Tests Preventive Methods and Their Application—Effect of Salt Upon Strength of Material

By GEO. P. DIECKMANN

One of the most valuable properties of concrete or cement mortar is that it is not affected by frost after attaining its setting time. It is a well known fact that the temperature has a great influence on the setting and hardening of cement and concrete. A high temperature will accelerate the setting and a low temperature will retard the same, even a difference of ten degrees might change the setting time to quite an extent. The prevention of concrete from becoming frozen before it has had time to harden should be more fully investigated. It has been found that some concrete which had been made at a freezing temperature has not shown any defects, while on the other hand concrete made under similar condition become disintegrated and worthless.

It has been recommended that the materials be heated, especially the sand and stone, and also to use warm water. The use of soda ash and chloride of calcium mixed with water is also advocated. The warming of the materials is frequently used, but it is practically impossible to heat and mix a large body uniformly. The application of warm water is more practical. The addition of salt dissolved in the water seems to be of advantage for preventing freshly mixed concrete from freezing.

The following series of tests have been made to ascertain the amount of salt that might be used without affecting the strength of the concrete and are made in six different series, which are designated by the letters A, B, C, D, E and F. Each of this series consists of five different tests, which are designated by the numbers 1, 2, 3, 4, 5, and are made on briquettes of 2, 7, 28 and 60 days on neat cement and mixtures of 3 parts standard sand and one part of cement, using Northwestern States Portland cement and making a total of 480 different briquettes.

I will not go into these tests in detail, as it would take too much time, but will give briefly the results of each series.

The series A was made at normal temperature and with the materials and water having normal temperature. The resulting briquettes were stored in air at normal temperature for 2, 7, 28 and 60 days. The different tests which are numbered are arranged by numbers. No. 1 has been made on material without the addition of salt, No. 2 has 1 per cent. of salt added, No. 3 has 2½ per cent., No. 4 has 5 per cent., and No. 5 has 7½ per cent. The addition is calculated on the dry cement. The other series, which of course are treated under different conditions, are made with the same amount of salt and are numbered in like manner; that is, No. 1 in all of the series is made without salt, No. 2 with 1 per

cent., etc. The results obtained from series A show that the addition of from 1 to 2½ per cent. of salt has increased the strength.

The series B was made in the same manner as series A, everything at normal conditions, with the exception that all briquettes of series B were immersed in water at normal temperature. With the addition of 1 per cent. salt the increase of strength over the briquettes having no salt was considerable, for example: the briquettes without salt at two days showed 615 pounds and with 1 per cent. salt added showed 890 pounds. At seven days and without salt the briquettes showed 740 pounds and with 1 per cent. salt added showed 1,065 pounds on neat cement. The two series A and B were only made for study and to ascertain the behavior of salt at normal conditions on briquettes stored in air and water. It was expected the results on the immersed briquettes would be higher.

It was not advisable to carry on the tests with the addition of more than 7½ per cent. of salt, as the addition of 5 per cent. already showed to be detrimental, not only in strength, but the cement also became quick setting, attaining a disagreeable color and showed a white precipitate and streaky surfaces.

The series C was made at freezing temperature, 32 degrees F. All the materials and water were at freezing point. The briquettes were stored for their different periods at freezing temperature. The addition of 1 per cent. salt showed a high increase in strength, especially for the first forty-eight hours, which was, without salt, 60 pounds for the first forty-eight hours, with 1 per cent. salt 245 pounds, for 7 days without salt 277 pounds and for 7 days with 1 per cent. salt 980 pounds; at 7 and 28 days the results without any salt are about the same, which is most noticed in the sand mixtures. At 60 days the 1:3 sand mixtures without salt show the best results.

The series D were made at freezing temperature, all materials and water warmed up to about 75 degrees. The briquettes were stored in air at freezing temperature. The addition of 1 per cent. salt showed a high increase in strength as in series C. It was expected that the results on this series would be still higher as the materials were all warmed, which naturally accelerated the setting time and give a higher strength for the early stages, but such was not the case and might be explained by the fact that the temperature being at freezing point the materials were cooled quickly to the temperature of the atmosphere, which conditions would also exist in practice, and the warming of the



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materials would cause a good deal of expense and delay without paying results. Of course the materials should never be used in a frozen condition, the sand should be warmed to dry out the frost and it would be advisable to store the aggregates ahead in a suitable storage building.

The series E was made at freezing temperature, all materials and water were warmed to about 75 degrees F. Briquettes were stored in air at freezing temperature and then subjected to constant freezing and thawing for twelve hours each day until seven days, the remaining time stored in freezing temperature. The addition of the salt increased the strength for the first two and seven days. The alternate freezing and thawing affected the strength in all neat cement briquettes at seven days and decreased at 28 and 60 days over the seven-day briquettes, showing that the freezing temperature retarded the crystallization on the sand mixtures without salt and with 1 per cent. salt show no effects on seven days and increased at 28 and 60 days in a satisfactory manner, while the sand mixtures with 2½, 5 and 7½ per cent. salt show a marked decrease after 28 days over the seven-day briquettes.

Series F was made in the same manner as series E, subjected to alternating freezing and thawing, but instead of storing the briquettes after seven days in freezing temperature the briquettes of this series were stored at about 80 degrees F. for the 28 and 60-day tests. Up to seven days this series was treated under the same conditions as series E and the tests show the same results. At 28 days this series showed a general increase over the seven-day briquettes, the addition up to 7½ per cent. salt showed good results. At 60 days the neat cement briquettes showed a marked decrease. The test No. 4 with 5 per cent. salt and No. 5 with 7½ per cent. salt show an increase in strength. The sand briquettes show no decrease and give more uniform results, as in series E.

From these tests it seems that frost affects the hardening of neat cement, especially in the early stage, but with the addition of from 1 to 2½ per cent. of salt the cement showed good results. Neat cement is never used for practical purposes, but these tests are of interest to better understand the action of concrete and form a better knowledge.

Slight frost does not seem to affect concrete mortar to any marked degree. The addition of from 1 to 2½ per cent. of salt is of advantage, but over 2½ per cent. there is a marked decrease in tensile strength; also the excess of salt is deposited as a white precipitate on the surface and the mortar has a dead, unpleasant color. It follows that if salt is added to prevent freezing the amount ought to be weighed and dissolved in a measured volume of water, which should be reduced as much as possible and practicable.

Railroad Construction in B. C.

The C. P. R. and C. N. R. have extensive plans for the development of the resources of Vancouver Island, and there will be keen rivalry between the two companies.

The advantage of priority in possession through its recent acquirement of the Esquimalt and Nanaimo Railway, and the million and one-half acres of land grant which that railway carried, lies with the Canadian Pacific Railway, but the Canadian Northern Pacific, on the other hand, is assisted in its colonization and development programme by the Province, which has guaranteed the interest on the company's bonds at the rate of \$35,000 per mile from the eastern boundary of the Province, to its terminal on the west coast of Vancouver Island.

Construction of the mainland sections of the Canadian Northern Pacific is already under way, but the selection of the route from Victoria to the west coast of the island has been unavoidably deferred until now, owing to the paucity of dependable information regarding physical conditions and possibilities in respect to the development of traffic.

The line from Victoria to Barkley Sound which has been accepted by Premier McBride, provides for the construction of one

hundred and fifty-three miles, instead of the one hundred miles provided for under the legislation covering the bond guarantee, the location survey shows a maximum altitude of seven hundred and fifty feet and maximum gradient of 1.5 per cent., and a comparatively easy rise and fall.

The two lines will be largely parallel throughout the length of the island, the Canadian Pacific Railway having already invited tenders for construction from the present Esquimalt and Nanaimo terminus at Wellington, by way of Comox.

It is expected that by the first of May the rival companies will have 3,000 men engaged in construction on Vancouver Island. To guarantee itself against a possible labor famine the Canadian Northern now has four agents actively engaged in England recruiting unskilled workers, who are assured continuous employment at good wages during the next three years, this policy being in distinct contrast with that of the Grand Trunk Pacific, which recently announced its inability to proceed rapidly with construction in British Columbia unless permitted to employ Asiatic labor.

Industrial Training

Speaking at a banquet at Sault Ste. Marie, Ont., given by the citizens of that town and Steelton to Mr. William Franz, General Manager of the Lake Superior Corporation, Hon. Mackenzie King, Minister of Labor, declared that nothing was so essential at the present time, both in meeting the present competition of Europe and the future competition of the Orient, as development throughout the whole Dominion of a system of industrial training and technical education which would afford to every workman in the country an opportunity of realizing the utmost of which he is capable and which would bring to our industries and industrial processes an organization second to none to be found in any other part of the world. The Commission on Technical Education appointed by the Dominion Government is investigating the needs of the industries of this country, and will travel abroad shortly to ascertain the means by which similar needs are being met in other lands. It will then remain for the Provinces of the Dominion to supplement the work of this commission by helping the Federal Government to afford adequate training facilities for Canadian trades.

Personal News and Notes

Mr. William Turnbull has been appointed city building inspector of New Westminster, B.C.

The annual meeting of the Road Builders' Association will be held at Indianapolis, Ind., Dec. 6-9.

To rectify errors made in surveying the city of New Westminster, B.C., a re-survey will be made by Mr. A. E. Cleveland, of Vancouver, at an estimated cost of \$6,000.

Messrs. Weeks & Keefer, architects, of Ottawa, Ont., have dissolved partnership, and in future will conduct separate offices—Mr. Keefer at 229 Sparks street, and Mr. Weeks in the Canada Life Building.

Mayor Hopewell, of Ottawa, is persevering with his driveway scheme. Last week he took the members of the Ottawa Commission over the route. Accompanying the party were Sir Wilfrid Laurier and Hon. Mackenzie King.

The death occurred at Forward, Sask., on October 18th, of F. W. Brunskill, a well known contractor of Winnipeg, Man. The late Mr. Brunskill was born at Davisville, Ont., 27 years ago. He started contracting on his own account in 1907, and during the past two years has undertaken important works for the C. N. R. in Saskatchewan.

Mr. F. W. Macey, architect, of Vancouver, B.C., has been recommended to the Royal Institute of British Architects as examiner on specifications and estimating in the final examination for membership of that body. Mr. Macey is as yet uncertain if he can accept the invitation, as it involves his personal attendance in London during the examination.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Fredericton, N.B.

The city council has decided to begin operations on waterworks extension to Bailey's bridge next year.

Kincardine, Ont.

The ratepayers will vote in January on a by-law to spend \$7,000 on septic tank and trunk sewer.

Montreal, Que.

Tenders addressed to the Board of Commissioners will be received until Nov. 15 for construction of sewers in Tenth avenue, Rosemount, from Masson street to Cote Visitation road. Information with City Surveyor, I. N. Senecal, secretary.

Point Grey, B.C.

When the plans and specifications are completed the council will ask for tenders for the installation of waterworks system. Cleveland & Cameron are the engineers in charge. Their plans show a system of waterworks that is designed to serve the needs of the municipality for a long time to come. Tenders will be called for the construction of one of the reservoirs. The system will entail a total expenditure of about \$250,000. Steel pipes will be used. Mr. Bowser, reeve.

St. John, N.B.

The Canadian Fairbanks Company was recommended for the contract for the 8 and 4 inch pipes for the hospital at \$85.23 and \$30.20 per 100 feet, and T. McAvity & Sons, Limited, the 6 inch size for \$47.

St. Stephens, N.B.

Until Nov. 30th tenders will be received for \$25,000 36-year, 4 per cent. waterworks, and \$15,000 30-year, 4 per cent. consolidated debt debentures. J. T. Whitlock chairman finance committee; J. Vroom, town clerk.

Trail, B.C.

Until Nov. 21st tenders will be received for \$15,000 6 per cent. 20 year waterworks debentures. W. E. B. Monypenny, city clerk.

Toronto, Ont.

Tenders are being called until Nov. 15 for construction of sewers in various streets. G. R. Geary, chairman Board of Control.

Vancouver, B.C.

The ratepayers will vote on January 11 on the expenditure of \$500,000 for sewer extension.

Victoria, B.C.

Negotiations are on between the Columbia Bitulithic Company, Limited, and the owners of a private estate in Victoria, for the construction of 14,000 yards of bitulithic pavement. Frederick C. Beckett, representative.

Weston, Ont.

This municipality has under consideration the treatment for purification of the supply of water. Two methods have been

suggested, one of sand filtration, the other of mechanical filtering.

Winnipeg, Man.

A magnificent driveway belting the whole city, 24 miles in length by 120 feet wide, is being planned. The parks board would undertake the management of the enterprise, which it was estimated would not cost the city more than \$20,000. Mr. C. W. Sharpe, chairman.

AWARDED.

Belleville, Ont.

Messrs. Thompson & Donahue were given the contract for constructing a sewer on Pinnale and Church streets, the lowest tender.

Victoria, B.C.

The contract supply of brass goods, fittings, galvanized iron pipe, etc., was awarded to Miller, Limited, London, Ont., at \$12,636. Five other tenders were received.

Railroads, Bridges and Wharves

Burke's Head, N.S.

Tenders are being called until Nov. 22 for construction of breakwater here by the Public Works Department, Ottawa. R. C. Desrochers, secretary.

Lorneville, N.B.

Tenders are being called until Nov. 23 for extension to breakwater here by Public Works Department. R. C. Desrochers, secretary.

Montreal, Que.

A delegation composed of Messrs. R. W. Reford, Col. J. H. Burland, Mr. Geo. Hadrill, secretary Board of Trade, and others will wait upon the Federal Government to ask for a first class dock instead of the second class one which it is understood has been granted.

Regina, Sask.

In regard to apportionment of cost of subway under C.P.R. tracks, according to the order of the commission, the city is to do all the excavating and paving and erect all the substructures, drains and lights. The C.P.R. is to erect all the superstructures and to provide such land as is necessary for the approaches. A year is given as the time within which the subway is to be built. It is roughly estimated that the cost will be to the city about \$150,000 and to the railway company about \$100,000.

Sifton, Man.

Tenders are being called until Nov. 10th for erection of truss bridge, 42 feet, with approach, etc.; for erection of a 50-foot span of a Howe truss bridge, renewing part of a bridge now spanning the Assiniboine river on Sec. 36-9-24. Contractors to furnish material. Plans, etc., at Department of Public Works, Winnipeg. R. H. Hockin, secretary-treasurer.

Victoria, B.C.

The Indian Reserve having been taken over, it is stated, the C.P.R. will at once

arrange for extensive terminal facilities on the site to accommodate the E. & N. Railway.

The Department of Works is taking up the matter brought before Premier Mc-Bride of a railway from Banff into the upper Columbia valley and the undertaking will be rushed forward next year. This road will not only be a fine scenic route but will also open up a splendid section of country which will no doubt be quickly filled with settlers.

AWARDED.

Dipper Harbor, N.B.

Mr. Thomas P. Charleson has been awarded the contract for a breakwater and wharf extension here.

Goderich, Ont.

The contract for an extension of 600 feet to the breakwater outside the harbor has been let to Michael Connolly, Montreal.

Kingston, Ont.

The C.P.R. have given a contract for ten 10-wheeler engines to the Canadian Locomotive Works here.

Ottawa, Ont.

The contract has been awarded to Stewart & Hewitson, Port Arthur, for the construction of a steel and concrete bridge over the Ottawa river at Ottawa, \$300,000.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

This city in all probability will make application at the next session of the legislature for the establishment of a permanent Normal School here.

The Asylum for the Insane was destroyed by fire on the 4th inst.

Calgary, Alta.

The city engineer has been instructed to prepare plans at once for a \$50,000 market building to be built on the Birnie site. It is proposed to have the building two storeys high and with a full basement.

Calgary, Alta.

Building Inspector McClellan has been instructed to have plans prepared for the improvements to the high school which will cost about \$43,000. Tenders will be asked for 12 and 8-roomed schools. The erection of the cottage schools has been arranged for. Tenders close by the 16th November.

The advisability of erecting a modern incinerator is being considered. It is planned to have an incinerator with blast furnaces with a capacity of over 50 tons. The cost of such a one would be \$50,000.

Charlottetown, P.E.I.

C. B. Chappell, architect, this city, has plans prepared for the following: new city jail, brick and stone, \$20,000; addition to drill hall and armories.

Estevan, Sask.

When plans are completed tenders for new municipal rink will be called. Councillor Davies is interested.

Edmonton, Alta.

The following companies comprise the building committee of the Boys' Brigade Cadet Association: Mr. Withenshaw, Geo. Sucklin, and W. C. Watson. Major Griesbach and Archdeacon Gray are ex-officio members.

Montreal, Que.

The Stadium roller rink was destroyed by fire here on the 1st inst. Estimated loss, \$80,000. It is stated it will not be rebuilt. Manager, Mr. Gauthier.

The Y.M.C.A., Dominion Square, has secured a building permit for 3-storey building, St. Viateur and Park avenue, \$55,000.

The Board of Control have under consideration the acquisition of a site for a public library.

A committee has been formed, headquarters at Y.W.C.A., Dorchester street, for the purpose of erecting a business woman's hotel here. It is stated that the steamship companies will support the movement.

A new foundling hospital will be erected here. Estimated cost, \$100,000.

Melfort, Sask.

The by-law to erect a new town hall was carried and construction work has commenced.

Midland, Ont.

The ratepayers will probably vote in January to raise \$20,500 for a new school.

Ottawa, Ont.

Tenders for the new departmental building at Ottawa, estimated to cost between \$2,500,000 and \$3,000,000, it is stated, will be invited in December. The plans, which have been remodelled so that the building will not encroach upon MacKenzie avenue, are about finished, and notices have been served upon the tenants of properties on the site, to vacate by November 30.

Tenders are being called until November 10th for erection of building for testing laboratory, Cliff street, by the Public Works Department. R. C. Desrochers, secretary.

The Board of Control have again recommended the acceptance of the offer of Messrs. Laurie & Lamb to install an incinerator of the Heenan-Froude type, at a cost of \$34,650.

A committee composed of Sir Louis Davies, Mr. W. L. Scott, Col. Irwin, Mr. J. Keane and Mr. A. Dion were appointed to look after the building of an addition to the detention home for the Children's Aid Society.

Proctor, B.C.

The members of the Church of England here are arranging to build a hall.

Swift Current, Sask.

A committee was appointed to consider the erection of a new Presbyterian church here. Rev. J. G. McKechnie, finance, etc.

Toronto, Ont.

The following recommendation was approved by the Canadian National Exhibition Board: That the City Council be requested to immediately arrange for the wiring of the grounds and buildings, according to plans submitted, at an estimated cost for buildings of \$30,000 and for the grounds approximately of \$50,000.

The Toronto Hunt Club House on Scarborough Bluffs was destroyed by fire on the 6th inst. Estimated loss on building,

\$50,000. It will be rebuilt. C. W. Clinch, chairman of the executive. A. O. Beardmore, Master of the Hunt.

Building permits were issued recently to the Board of Education for the following: Board of Education, three-storey brick school, near Robinson, on Manning avenue, \$60,000; Board of Education, 2 storey brick school, near Quebec, on Humber side avenue, \$50,000; Board of Education, 2 storey brick school on St. Clair and Oakwood, \$150,000; Board of Education, 2 storey brick school, on east side Ossington, near St. Clair, \$60,000; 3 storey brick school on Elizabeth and Chestnut, \$57,000; 3 storey brick school near Clendennan, on Annette, \$60,000; also Victoria University, 3 storey brick dining room and students' residence, on Charles street, \$350,000.

Victoria, B.C.

The Order of the Eagles have under consideration the erection of a large 3-storey lodge building in the rear of St. Johns church here.

Vancouver, B.C.

The site for new theatre, corner of Seymour and Dunsmuir streets, is ready for excavation for the foundation. Tenders will be called for the construction of the building. G. J. Mackenzie, representative.

On January 11th of next year the ratepayers will vote on by-laws aggregating in value \$3,000,000; \$900,000 of which is for new schools.

The school board report that about \$800,000 will be needed in the coming year for school accommodation. A by-law for this amount will probably be submitted to the ratepayers in January.

The Order of the Sacred Heart has acquired a site south of Shaughnessy Heights, on which eventually an academy will be erected. Rev. Mothers Mahoney and Cosker, of Montreal, have been here on a visit of inspection. Archbishop McNeil, this city, is interested.

The Nuns of St. Paul's Hospital will commence building operations shortly on a new building of stone, with frontage of about 300 feet.

Wolfville, N.S.

Plans have been prepared for a new Baptist church here, brick and stone, cost \$35,000. C. B. Chappell, architect, Charlottetown, P.E.I.

Winnipeg, Man.

The school management and finance committees of the school board report the necessity in the coming year of three new schools on the following sites: Buell, Lenora and Ruby streets; district west of Wellington school; district between Strathcona school, and city limits.

It is thought that Mr. J. Stern, the noted hospital architect of Chicago, and Dr. A. J. Douglas, the judges appointed to consider the competitive plans for the tubercular hospital, will also act in the same capacity on the competitive plans to be called for the infectious disease hospital, of which the cost is reported as \$200,000.

Tenders are called until Nov. 16th for supply of labor and materials required in the erection of public bath house to be located in Selkirk Park. Plans, etc., at office of W. Bruce, architect, 222 McDermot avenue. M. Peterson, secretary.

Westholme, B.C.

Tenders are being called by Minister of Public Works, Victoria, until Nov. 14th for erection of one-roomed school here. F. C. Gamble, Public Works Engineer.

Weyburn, Sask.

The synod of the Presbyterian church discussed the advisability of establishing a church here.

AWARDED.**Diamond City, Alta.**

The contract for erection of new school here was awarded to James Patterson, \$14,758.

Ottawa, Ont.

The contract for installing electric light fixtures in the city hall was recommended by the board of control to the Ottawa Electric Company, the lowest tenderer. Its tender on the specification, which called for imported material, was \$2,270, but the company offered to supply Canadian goods, equally serviceable, for \$2,004.

Stettler, Alta.

The contract for erection of school here was awarded to W. L. McKenzie & Company, Lethbridge.

St. Thomas, Ont.

Some of the contracts for the new \$50,000 church to be erected here by the Holy Angels congregation has been awarded, as follows: Masonry work, Leslie & McNeil, of St. Marys; carpenter work, Pulleyblank, of St. Marys; slating, Chas. Riddell, St. Thomas.

Uxbridge, Ont.

We are informed that the following received contracts in connection with erection of public school here: carpentry, Jas. Snelgrove, Beaverton, \$6,246; masonry, L. W. Marquis, Toronto, \$5,600; heating, Kelsey Furnace Company, Brockville, \$1,030; painting, M. Middleton, Uxbridge, \$440; seating, Canadian Office & School Furniture Company, Preston, \$1,037. Architect, Jas. Walker, Toronto and Buffalo.

Welland, Ont.

The contract for the erection of the foundation of the new Welland Club has been let to the Builders' Lumber & Supply Company.

Residences**Charlottetown, P.E.I.**

C. B. Chappell, architect, has prepared plans for residences for C. D. Weeks, Esq., and W. S. Louson, Esq.

Hamilton, Ont.

Building permits were issued to W. H. Northcott, erection of a brick dwelling, Spruceside avenue, for Mrs. J. M. Spackman, to cost \$2,600, and J. M. Stirton, erection of two brick dwellings, corner Hazel and Cannon streets, \$3,400.

Ottawa, Ont.

The following building permits have been issued recently: Wolf Shenkman, brick veneer double dwelling, Clarence street, \$3,000; Fred Hunt, brick veneer dwelling, Preston street, \$2,200; T. J. Somerville, brick veneer double dwelling, \$3,000; single house, \$2,000, Mutchmor street; J. G. Davidson, brick veneer dwelling, Powell avenue, \$4,000.

St. Boniface.

Recent building permits include: J. A. Senecal, dwelling at the corner of College and DuMoulin street, \$9,800; house on Masson street, \$5,000, and an addition to another residence on Masson street, \$2,800.

Victoria, B.C.

Building permit has been issued to Mrs. Emma Marshall for a dwelling to be erected on Harrison street, to cost \$3,000.

Windsor, Ont.

The residence of Mr. J. Henry Smith on the river front above Walkerville was destroyed by fire on the 31st ulto. Loss, \$4,500.

AWARDED.**Montreal, Que.**

Contract for the masonry work in connection with an apartment house to be erected on St. Luke street for Messrs. L. W. Chaput & Fils, has been awarded to A. Filion & Frere, contractors, 347 Mountain street. Architect, G. A. Monette, 97 St. James street.

Business Buildings and Industrial Plants

Belleville, Ont.

The 3-storey brick storehouse, owned by ex-Mayor Graham, was destroyed by fire on the 6th inst. Loss, about \$25,000.

Calgary, Alta.

It is stated that an eight or ten-storey block, of brick, steel, stone and concrete, will be built here shortly, and that Mr. Jas. Ross, of Montreal, and Senator Lougheed are behind the project. street, \$21,500.

D. W. Rathvon is intending to build a business block to cost \$5,000 on the corner of Centre street and First avenue.

It is stated that the Ottawa Furnace Manufacturing Company have under consideration the location of a warehouse here.

The Board of Trade has received an inquiry as to local conditions from a Seattle firm that proposes to come here and establish an acetylene gas making plant.

Fort William, Ont.

It is stated that all preliminaries having been satisfactorily concluded for the taking over of the Superior Rolling Mills Company by the Steel Company of Canada, work on the plant will be started in the spring. James Murphy, president of the Board of Trade; G. A. Coslett, chairman Industrial Bureau.

Goderich, Ont.

The G.T.R. station here was destroyed by fire on the 6th inst. Estimated loss, about \$25,000.

Gilbert Plains, Man.

Damage to the extent of about \$10,000 was done to the postoffice block here. J. R. Hart was among the losers.

Gananoque, Ont.

The Ontario Wheel Works was destroyed by fire on the 3rd inst. Estimated loss, \$150,000.

Hanover, Ont.

The chair factory here was destroyed by fire on the 4th inst. Mr. Diebel, owner; estimated loss, \$8,000.

Harriston, Ont.

A by-law has been passed granting a free site and factory building to the Canada New Shoe Company, Limited.

Halifax, N.S.

The Union Bank of Canada will take over the Duffus building on Granville, Hollis and Buckingham streets and alterations will be made at once.

It is reported that the Royal Bank of Canada has purchased the building on the northwest corner of Buckingham and Barrington streets where a brick or stone branch building will be erected.

Ingersoll, Ont.

A new station for the T.L.E. & P. Ry. will be built on the corner of Carnegie and Thames streets. Estimated cost, \$3,000.

Midland, Ont.

It is probable that the ratepayers will vote in January on the granting of a fixed assessment to a flour mill company who purpose establishing a flour mill here.

Mount Brydges, Ont.

The flour mill near here, owned by Mr. Joseph Clark, was destroyed by fire on the 3rd inst.

Moose Jaw, Sask.

Application has been made to council by Mr. Williamson Clark for approximate prices on property on which it is his intention to erect an implement distributing warehouse, \$12,000.

It is reported that the Moose Jaw Pressed Brick Company will build a plant of which the estimated cost is, including machinery, about \$100,000.

Montreal, Que.

The preliminary plans for new station have been drawn up by the architects of the Grand Trunk Railway and will shortly be laid before Railway Commission for approval. All the property between the present station and Cathedral street has been purchased.

Mr. Hugh Paton, president of the Shedden Company, owners of the building on the northwest corner of Craig and Victoria square, will tear down the present building and erect a modern up-to-date structure.

Messrs. Findlay & Spence, architects, Guardian Association Building, have prepared plans for the new building to be erected on Notre Dame street. Work will not start until the spring. It is stated plans call for a large handsome building. Central Heat, Light & Power Co., owners (S. Carsley, president). Noted previously.

North Battleford, Sask.

The International Harvester Company will establish a distributing warehouse here, to cost \$40,000. P. Lanz is local manager.

Ottawa, Ont.

The plant and equipment of the Peerless Brick & Tile Company at Billings Bridge has changed hands. Merckley Bros., of Casselman, have taken an interest in the business and have been entrusted with the active management. It is understood the plant is to be enlarged so that the output will be nearly doubled. New machinery has already been ordered.

Port Arthur, Ont.

The Ironclad Company, a branch of the Ironclad Company of New York City, will shortly start building operations here. It is stated they will employ about 300 hands.

Prince Albert, Sask.

The basement for the new hotel on the Goodfellow property recently purchased by Dr. Tripp of Vancouver, will be put in this year so that building operations may start next spring.

Pembroke, Ont.

A company composed of Jas. Munro, president; J. G. Forgie, secretary-treasurer, will erect a box factory here at once, it is stated. Capitalization, \$100,000.

Sellwood, Ont.

The Moose Mountain Mining Company, it is stated, will erect a new refining plant here. D. D. Mann, Toronto, J. W. Gates

and Blair & Company, New York; Jas. Hutchison, Chicago, and Jos. Sellwood, Duluth, are among the directors.

St. John, N.B.

Plans for the proposed sugar refinery have been filed by F. R. Taylor, representing the proprietor, F. C. Durant. The plans show a group of five large buildings on an extensive scale.

It is reported that the Merchants Bank of Canada has secured an option on the Pugsley building at the corner of Prince William and Church streets. F. J. Shreve, local manager.

It is stated that the Thorne Wharf & Warehousing Company has purchased property situated on Walker's wharf, where a large warehouse will be erected to cost about \$10,000.

It is announced that the Edward Partington Company will build a big paper mill in the near future. H. W. Schofield, secretary-treasurer.

South Vancouver, B.C.

It is announced that Mr. H. S. Hallenbeck will erect a 2-storey building, with frontage of 31 feet.

Smith's Falls, Ont.

The Canadian Cooperage Company, of Chatham, are stated to have decided to locate a branch here and erect their own buildings.

St. Thomas, Ont.

The by-law to loan \$30,000, etc., to Monarch Knitting Company of Dunnville in return for locating a branch here was carried. The company will begin at once to erect a plant to cost \$10,000.

Victoria, B.C.

H. Dallas Helmcken, K.C., representative for the owners, is having plans prepared for the erection of the business block to replace the Five Sisters Block recently destroyed by fire.

Messrs. David Spencer, Limited, will rebuild their business block destroyed by fire recently. Thos. Hooper, architect.

Messrs. Henry Young & Company will rebuild their building destroyed in the recent fire. W. Ridgway Wilson, architect, Bastion Square.

W. H. Charlton & Company will rebuild their store lately destroyed by fire.

Messrs. Moore & Scott have a building permit for 3-storey block on Douglas street, \$21,500.

Vancouver, B.C.

Plans were filed by Capt. French with the building inspector for a three-storey block at the corner of Pender and Seaton streets.

Mr. D. H. McDougall has taken out a permit for a four-storey brick block on Hastings street east, between Westminster and Gore avenue, to cost \$26,000. The work will be commenced immediately.

The Cottrel Storage Warehouse here was badly damaged on the 31st ulto., estimated total loss \$100,000. Joint owners, G. H. Cottrel and C. M. Rolston.

Welland, Ont.

J. E. Cutler's lumber and planing mill was destroyed by fire on the 7th inst. Loss estimated at \$15,000.

J. Rattray Wilson, Niagara Falls, Ont., is the architect for the erection of the automobile factory here (size, ground floor 40 x 80 and 60 x 100 feet) with wing 60 x 80. Owners, United Motors, Limited. Box 184 Welland, Ont.

Winnipeg, Man.

The warehouse owned by A. Macdonald Company, Limited, on Market street

east, was badly gutted by fire on the 1st inst. Total estimated loss, \$125,000.

It is reported that Chas. E. Colling has prepared plans for a 6-storey business block here.

AWARDED.

Camrose, Alta.

W. E. Allen, local contractor, has received instructions from the Grand Trunk Pacific Branch Lines Company to proceed with the building of a station and freight sheds here.

Calgary, Alta.

The contract for excavation and foundation of business block for Wendell Maclean, was awarded to Hewson & Boney, Calgary, \$9,000.

Murray Bay, Que.

We are informed that the Bishop Construction Company, Limited, Montreal and Toronto, have been awarded the contract for construction of water power development and pulp mill for the Eastern Pulp & Paper Company here, \$296,000. Engineer, G. F. Hardy, New York.

Port Mann, B.C.

The tender of Messrs. John W. Moore and George H. Pethick, for the clearing of 1,000 acres of the townsite, was accepted. Work has commenced.

St. Stephen, N.B.

Ganong Bros., Limited, will have a new 4-storey wing added to their factory, giving additional space of 30,000 square feet. The new wing will measure 65 by 100 feet, four storeys high. E. B. Hanson has the contract for the erection of the foundation for the new building.

Windsor, Ont.

C. Howard Crane, 712 Ford Building, Detroit, Mich., has let the following contracts for a 2-storey automobile garage, 25 x 100 feet, for H. Trumbull, of Windsor: Masonry to Thompson Bros.; carpentry to W. Wallace; composition roofing, heating and plumbing to Blackman & Company; painting to O. Grandmaison. Contractors, of Windsor, Ont.

Winnipeg, Man.

The reported item in our last issue regarding the erection of warehouse in the rear of the Hudson's Bay stores is incorrect. According to the statement of John Woodman, architect for the Hudson's Bay Company, the work will be handled by the local firm, Carter, Halls, Aldinger & Co.

Power Plants, Electricity and Telephones

Creston, B.C.

A company, to be known as the International Electrical Company, Limited, with offices in Nelson and Portland, Ore., it is reported, has filed upon the waterpowers of the Pend d'Oreille river with a view of developing power from there. W. E. Moore, hydraulic engineer, of Spokane, reports favorably.

Coquitlam, B.C.

Coquitlam ratepayers will once again be required to vote on the Western Canada Power Company's light and power by-law, it having been discovered that a mistake was made in the wording of clause 3 of the by-law as submitted on Sept. 20th to a vote in the municipality. The vote will take place on the 12th inst.

Dunnville, Ont.

A committee has been appointed to meet the Hydro-Electric Power Commission and private companies with a view to finding the most advantageous arrangements for light and power for this municipality.

Maple Creek, Sask.

This municipality will receive offers until November 10th for erection and installation of electric light and power plant and flour mill. D. Paterson, secretary-treasurer.

Ottawa, Ont.

A company has been formed of which the provisional directors include R. McElroy, M.L.A., Carp; F. A. Heney, Westboro; Ald. J. S. McCann, Kingston, and E. P. McGrath, Ottawa. A charter will be asked for to construct an electric railroad between Ottawa and Kingston, passing through Smith's Falls, etc. Mr. F. B. Proctor, Trust Building, Ottawa, is the solicitor.

The Ottawa, Rideau Valley & Brockville Railway Company announces that it will begin work at once building its proposed 60-mile railway from Ottawa to Brockville. Andrew Haydon, president.

Sherbrooke, Que.

The plans being prepared by Messrs. Ross & Holgate, Montreal, in connection with the development of the "drop off" water power on the Magog river are about completed. If they are adopted the carrying on of the work will mean a large expenditure, but when completed the city will have one of the finest water power plants in the Eastern Townships.

Toronto, Ont.

The city architect has issued to J. C. Eaton a permit for a power house to be erected on Davenport road, near Spadina road, at a cost of \$5,800.

Tenders addressed to G. R. Geary, Chairman of the Board of Control, will be received until November 15th for supply of tungsten lamps. Specifications at office of Hydro-Electric System, Toronto.

Vancouver, B.C.

The B. C. E. R. Company will require about 122 cars of various types for their branches and the expenditure on rolling stock for ensuing year is estimated at about \$500,000. General Manager Sperling.

AWARDED.

Murray Bay, Que.

See "Business Buildings. Awarded."

Ottawa, Ont.

See "Public Buildings Awarded."

Miscellaneous

Fort William, Ont.

The council will consider the advisability of submitting a by-law for approval in the January elections by which \$60,000 will be appropriated for the purpose of giving the city better fire protection. H. S. Hancock, Jr., city engineer.

Montreal, Que.

Recent building permits include: Stewart Bottling Company, William street, a two storey factory building on William street, \$7,000; M. Rodrigue, 401 St. Emelie street, house containing three dwellings on Parc Cartier, \$5,008; E. Joioin, 82 Buller street, a two storey house on Buller street, \$2,000; George Nicholson, 1849 St. Catherine street east, house containing three

dwellings on Joliette street, \$4,000; Fabrique St. Stanislas, Boulevard St. Joseph and La Salle avenue, a church building, \$26,800; J. Charette, 1113 Notre Dame street west, house containing four dwellings on Cartier street, \$4,200; C. Desrochers, 1274 DeLorimier avenue, house containing three dwellings on Delorimier avenue, \$6,000; E. Lavoie, 2172 St. Lawrence Boulevard, house containing two dwellings on Laurier avenue, \$3,800; E. Comtois, 1896 Sanguinet street, two houses containing three dwellings and store on Cowan street, \$3,000; Mde. A. Caron, 303 Esplanade avenue, a two storey stable building, \$4,800; J. H. & J. E. Lafond, 2623 Esplanade avenue, four houses containing twelve dwellings on Mance street, \$10,000; J. Robin, 578 Rivard street, house containing three dwellings on Ninth avenue, \$3,000; C. Brunelle, 344 Beaubien street, two houses containing six dwellings on Parthenais street, \$5,000; E. Lesperance, 1303 Des Erables street, house containing three dwellings on St. Urbain street, \$7,000; W. A. Brown, 168 St. Andre street, house containing six dwellings on Melrose street, \$3,000; R. Moner, 662a Clark street, two houses containing six dwellings on Dorchester and Cartier street, \$4,000; A. Leonard, 2171 St. Urbain St., house containing three dwellings on St. Urbain street, \$4,800; Young Men's Christian Association, Dominion Square, a 3-storey building St. Viateur and Park avenue, cost \$55,000; Fabrique Notre Dame de la Defence, 966 St. Denis street, a church and school building on Sanguinet street, cost \$9,000; Jos. Laver, 194 Lariviere street, house containing five dwellings on Sheppard street, cost \$3,000; E. Sauriol, 291 Fabre street, house containing two dwellings on Messier street, cost \$2,000; F. Dansereau, 1211 Ontario street east, three houses containing nine dwellings on Chausse street, cost \$6,000; Babcock & Wilcox, College street, a three storey building on Richelieu street, cost \$10,000; Wm. Clark, 53 Amherst street, alterations to property to cost \$2,000; C. Desjardins, 163 Laurier avenue, alterations to property on Gilford street, cost \$3,000.

North Vancouver, B.C.

The specification for steam roller was 15-ton, and the estimates were as follows: Waterhouse Engine Company, Limited, Vancouver, \$3,500; Buffalo Steam Roller Company, \$4,250; Canada Foundry Company, \$3,900; Mussels, Limited, gas motor roller, \$3,290; Western Engineering Company, \$2,860. The engineer was instructed to report on the various quotations.

Ottawa, Ont.

The Department of the Naval Service are calling for tenders until Nov. 30th for supply of clothing and kit for the naval service of Canada. G. J. Desbarats, secretary.

Toronto, Ont.

Steam heating by districts, doing away with furnace rooms in public and private buildings may be a development for Toronto in the not too distant future. For about a year or more a proposal has been before the Board of Control in the form of an application for a franchise from the Dominion District Steam Heating Company. Mayor Geary, Controller Ward, and the late Mr. J. N. McKendry were a sub-committee to look into the scheme. On Controller Spence's suggestions the city engineer was asked to make report on the whole question of a central heating plant.

Recent building permits include: A. F. Schnaifer, 3 storey brick addition to warehouse, on 41 McMurich, \$10,000; Mrs. J.

D. Wright, 2½ storey brick dwelling near Glen road on Highland, \$9,500; E. G. Switzer, 2 pair semi-detached 2 storey and attic brick dwellings, near Sunnyside on north side Garden, \$9,000; Houghton & Breeze, 3 attached 2 storey brick dwellings, near Lappin, on west side Dufferin, \$7,000; National Electric Heating Company, 3 storey brick factory, near River on north side Queen, \$14,000; Y. W. C. A., 4 storey brick boarding house on 76 Pembroke street, \$25,000; Davidson & Company, 1 pair semi-detached 2 storey and attic brick dwellings, near Harbord on west side Crawford, \$4,600; Wm. Dunsoath, 2 pair semi-detached 2 storey brick dwellings, near Bloor on east side Shaw, \$8,000; W. J. Grant, 2 pair semi-detached 2 storey brick dwellings, on 18-20, 24 and 26 Virtue, \$8,800; A. D. Morrow, 2 storey brick dwelling on Balmoral avenue, \$6,000; J. C. Eaton, 2 storey brick superintendent's cottage on Davenport road, \$7,000; J. P. Hodgins, 2 storey and attic brick dwelling near St. Clair on Warren road, \$8,000; Elder Carriage Works, Limited, 3 storey brick automobile factory southwest corner Soho and Phoebe, \$12,000; G. A. McTaggart, 1 pair semi-detached 2 storey brick dwellings, on 402-4 Roncesvalles, \$5,000; Dr. W. A. Scott, 2 pair semi-detached 2 storey brick dwellings, near Bloor on west side Dufferin, \$5,000; Consolidated Optical Co., 4 storey brick warehouse, near Spadina on north side Richmond, \$45,000; R. Burkell, 1 pair semi-detached 2½ storey brick dwellings on 45-47 Havelock, \$5,000; Frank Taylor, 1 pair semi-detached 2½ storey brick dwellings on 182-184 Hepburne, \$5,000; B. J. Case, 4 pair semi-detached 2½ storey brick dwellings, near Brighton place an east side western avenue, \$24,000; Elliott Manufacturing Company, 1 storey concrete factory on east side Cherry, \$5,000; R. J. Anderson, 2 storey and attic brick dwelling, near Roncesvalles on north side Wright, \$5,000; Wm. Tucker & Bro., 3 attached 2 storey brick dwellings south of C.P.R. on east side Howland avenue, \$7,500; W. L. Bullen, 2 storey brick apartments, near Bloor on east side Montrose, \$8,000; G. W. Holmes, 2 storey and attic brick dwelling and office, on 430 Bloor west, \$5,000; F. G. McBrien, 3 pair semi-detached 2 storey brick dwellings on west side Perth, \$12,000; H. L. Kennedy, 2½ storey brick dwelling on 11 Edgar, \$5,000; Major A. A. Mulholland, 2 storey brick dwelling, near Glen road on north side Edgar, \$8,000; J. C. Eaton, 2 storey brick power house, near Spadina on Davenport, \$5,800; The Baraca Club, 2 storey brick club rooms, near Spadina on north side Orchard, \$11,500; Fisher Bros., 2 pair semi-detached 2 storey brick dwellings, southwest corner Perth and Wallace, \$8,000; Geo. A. Briggs, 1 pair semi-detached 2-storey brick dwellings on south side Gormley, \$4,000; John T. Colley, 2 detached 2½ storey brick dwellings on 812-814 Indian road, \$5,000; W. A. King, 2 storey and attic brick dwelling on St. Clair Gardens, \$6,500; A. J. Savage, 2½ storey brick dwelling on St. Andrew's Gardens south, \$5,000; J. H. Maguire, 2 detached 2 storey brick dwellings on south side Humberside avenue, \$4,000; Wm. Hodgkinson, 2 rows of 3 attached 2 storey rough east dwellings, brick fronts, on east side Boston avenue, \$10,000; G. Delamatter, 2 storey brick dwelling, near Brock on south side Neusham street, \$4,000; Peter Laughton, 1 pair semi-detached 2 storey brick dwellings, on east side Uxbridge, \$4,000; James Turner, 1 pair semi-detached 2 storey brick dwellings, on 123-5 Springhurst avenue, \$7,000; W. F. McCutcheon, 1 pair semi-detached 2 storey brick dwellings, near Brock on north side Wyndham, \$4,

000; H. P. Baird, 1 pair semi-detached 2 storey brick dwellings, near Fern on east side Roncesvalles, \$7,000; Jas. A. Stewart, 2½ storey brick dwelling near Heath on west side Dunvegan, \$8,000; Jolly & Martin, 3 attached 2 storey brick dwellings near Royce on east side Emerson, \$6,000; G. A. Howell, 2 storey and attic brick dwelling on Wychwood avenue, \$6,800; Fred G. McBrien, 2 pair semi-detached 2 storey brick dwellings near Perth on south side Ruskin, \$8,000; Harry J. Rea, 2½ storey brick dwelling near Roxborough on Glen road, \$4,500; Board of Education, 3 storey brick school near Clendenan, on Annette, \$60,000; J. G. & A. Churchill, 1 pair semi-detached 2 storey brick dwellings, near Shaw on south side Yarmouth, \$4,000; M. Dale, 1 pair semi-detached 2 storey brick dwellings near Pape on Dresden, \$4,000; W. C. Mathews, 2½ storey brick dwelling on 6 Chestnut Park road, \$12,000; McGowan & Wells, 1 pair semi-detached 2½ storey brick dwelling on Crawford, near Harbord, \$5,000; E. J. Crocker, 1 pair semi-detached 2 storey brick dwelling, near Queen on west side Booth, \$4,000; W. Grogan, 1 pair semi-detached brick dwellings, on 23-5 Grafton avenue, \$4,000.

Vancouver, B.C.

Recent building permits include: R. J. Baker, 1423 Eleventh avenue west, two houses, \$4,800; J. Morley, 2415 Seventh avenue west, \$2,000; James Mason, 3430 Third avenue west, \$4,500; Prudential Builders, 1945 Fifteenth avenue west, \$3,500; Prudential Builders, 1906 Fourteenth avenue west, \$3,500; Prudential Builders, 1925 Fifteenth avenue west, \$3,000; A. S. French Auto Company, 1027 Pender street, \$55,000; A. McLellan, 1149 Lily street, \$2,000; A. McLellan, 1563 Graveley street, \$2,000; A. McLellan, 1569 Graveley street, \$2,000; J. Morley, 2446 Eighth avenue west, \$2,000.

Winnipeg, Man.

The following building permits were recently issued: C. Keele, house, north side Athol, \$2,400; A. C. Keele, south side Lansdowne, \$2,000; P. Olson, two houses, west side of Home, \$5,000; R. Western, house east side Greenwood Place, \$4,500; City of Winnipeg power development substation on King street, \$40,000 (the engineer of construction has the contract; Sterling Bank of Canada, excavation and footings for bank, corner of Portage avenue and Smith street, \$12,500; D. Belinkow, house, south side of Redwood, \$2,700; C. McFayden, house, south side of Polson, \$2,600; A. G. Davidson, house, west side of Craig street, \$2,500; W. Tochack, house, north side of Cathedral, \$4,000; W. M. Baker, house, southwest corner Dorchester and Stafford, \$5,200; Elliott Brothers, house, south side of Aberdeen, \$2,000; C. Metcalfe, house, east side of Victor, \$2,800; N. Miller, house, west side of Home, \$2,700; The Hudson's Bay Company, warehouse addition, west side of Main street, \$9,300; Ratner Brothers, three house terrace, southeast corner of Pritchard and Salter, \$7,000.

AWARDED.

Toronto, Ont.

The Board of Control awarded contracts as follows for fire hose: Dunlop double jacket, 1,000 feet, price \$1.05 per foot, to the Dunlop Tire & Rubber Goods Company; Keystone double jacket, 1,000 feet, price \$1.05 per foot, to the Canadian Rubber Company; Magnet multiple woven, 1,000 feet, price 95c. per foot, to the Durham Rubber Company; Special high pressure multiple woven, 3,000 feet, price \$1.10 per foot, to the Gutta Percha & Rubber Manufacturing Company, Limited.

New Companies

The Cummings Brass, Iron & Wire Company, Limited, Winnipeg, Man., capital \$50,000. Incorporators: Thos. Cummings, manufacturer; Wm. J. Cummings, manufacturer, and Wm. M. Sharpe, builder, all of Winnipeg.

The Marine Construction Company, Limited, Toronto, Ont., capital \$40,000. Incorporators: Wm. P. Gillespie, broker; Jno. G. Robinson and Wm. Maybin, manufacturers, Toronto.

Cunningham Lumber Company, Limited, Toronto, Ont., capital \$40,000. Incorporators: James P. Cunningham, lumberman; Jno. D. Bissett and Theodore H. Peine, barristers, all of Toronto.

The Rock Lake Lumber Company, Limited, Superior Junction, Ont., capital \$100,000. Incorporators: Thos. N. Dunn, Strathroy, Ont., manufacturer; John Thomas, Inwood, Ont., banker.

The Bolton Light, Heat & Power Company, Limited, Bolton, Ont., capital \$40,000. Incorporators: Jos. F. Warbrick, banker; Edwin A. Jaffray, merchant, all of Bolton village.

The Schwab Boiler Heating Company, Limited, Ottawa, Ont., capital \$100,000. Incorporators: John Schwab, architect, Winnipeg, Man.; Alexander Campbell, mechanical engineer; Alfred E. Fripp and Thos. D. McGee, barristers, all of Ottawa.

Backway Pulp Timber Company, Limited, Toronto, Ont., capital \$250,000. Incorporators: Duncan D. McLeod, and James Aitchison, students, both of Toronto.

Beams in "Genuine" Mill Construction

"Mill construction of the genuine kind," says F. W. Dean, of Boston, in a recent paper, "and that which the mutual insurance companies seek to encourage, and as far as possible the only kind that they will tolerate, contemplates the smallest possible number of large wood beams for floors and roof, all running in one direction, covered with thick plank. A floor system with bays so wide that beams running at right angles to the main transverse beams are required, is not mill construction and is not desirable. It is not desirable because it is complicated, the supplementary beams are likely to be supported by non-fire-resisting connections, and sprinkling is less effective and more difficult and expensive to install than with the genuine kind.

"Mill construction contemplates the use of wood beams instead of steel, because in case of fire the latter when heated lose their strength and the floors fall with great loss to building and machinery. In the case of wood beams the fire is usually put out by sprinklers and otherwise before the beams lose sufficient strength to produce this result.

"The beams of wood floors are of long-leaf Southern pine or Northwestern pine, the latter being used only in the West, Northwest and Canada. The beams are usually planed on three sides and with the lower corners chamfered."

The Smart-Turner Machine Company, Limited, Hamilton, have received orders for the travelling crane, for the C. P. R. at Winnipeg, Man.; for supplying the Oliver Plow Company of Hamilton with two tumbling barrels, for their new works; for a vacuum pump, from the Royal Crown Soap Company, Limited, Vancouver, B.C.; for a centrifugal pump for the Peoples' Railway, at Berlin, Ont.

Tenders and For Sale Department



Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on TUESDAY, NOVEMBER 22ND, 1910, for One ten-ton, hand-operated travelling crane at the high level pumping station, and one fifteen-ton hand-operated travelling crane at the main pumping station.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council or officers of the Corporation of the City of Toronto, or, in lieu of said sureties, the bond of a Guarantee Company, approved as aforesaid.

The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto, Nov. 4th, 1910. 45

City of Winnipeg

Electrical Distribution System

Tenders for Wire and Cable, Poles and Line Supplies

Sealed tender, on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope, "Tenders for Overhead Wire and Cables," will be received at the office of the undersigned up to 11 a.m. on MONDAY, NOVEMBER 7th, 1910.

Sealed tender, on prescribed forms, addressed as above, and marked on the envelope, "Tender for Poles and Line Supplies," will be received at the office of the undersigned up to 11 a.m. on THURSDAY, DECEMBER 1ST, 1910.

Copy of specification and form of tender may be obtained at the office of Smith, Kerry and Chace, Carnegie Library Building, Winnipeg, Canada, or at the office of the firm in Toronto, Ontario.

Each tender must be accompanied by a certified cheque as set forth in the instructions to bidders, which cheque will become forfeit to the corporation under the conditions set forth in that document.

The city reserve the right to reject any or all tenders, or to accept any tender which shall appear advantageous to the city's interests.

M. PETERSON,
Secretary.

Office of the Board of Control,
Winnipeg, October 24th, 1910. 45

Positions Wanted

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra

ACCOUNTANT, six years with large American construction company, wishes position. Thoroughly experienced in contractors' detailed cost records. Excellent references. Box 159, "Contract Record." 46

Equipment for Sale

One Georgian Bay Hoist Engine, double cylinder, reversible, link motion, 15 h.p., new and complete with 150 feet of 1/2-inch steel cable.

One Steel Side Dump Car, 2-foot gauge, capacity one cubic yard; 400 feet of 20-pound steel rails, new, with bolts and spikes.

One 25 h.p. Second-Hand Locomotive Type Boiler, in good condition.

One Hand Derrick, with castings for both ends of boom and legs, 90 feet of 3/4-inch wire cable.

One Friction Horse-Power.

STINSON-REEB BUILDERS' SUPPLY CO., Limited.

Eastern Townships Bank Building,
Montreal, Que.

46

Carrying a Street on Concrete Brickets

Three years ago the Western Railway Company of France began to widen the gauntlet at the entrance to the Saint Lazare station, Paris. The work made it necessary to utilize the space under the Rue de Rome, a very busy street, and consequently it was decided to carry part of it on brackets for a length of 1,500 feet. The portion thus supported is 23 feet wide, of which 13 feet are taken up by the footpath, and 10 feet by the wagon way. The wall carrying the brackets rises to a maximum height of 63 feet. The following notes on the design and the reasons for its adoption are taken from the Engineering Supplement of the "Times," London:

"It was considered of importance to arrange the new tracks alongside the others in the open, on account of the numerous cross-overs that have to be constructed, and the probability that these, as well as the lay-out of the tracks themselves, will have to be modified from time to time in the future as they have been in the past. For the same reason it was desirable to keep the lines free from supporting columns, and hence it became necessary to adopt a system of projecting brackets in reinforced concrete. This solution of the problem was proposed by M. Charles Rabut, the chief engineer, who after rather long discussions secured its adoption. Apart from the reasons given above, M. Rabut urged that as the new tracks were intended for the Auteuil line, on which the trains run at intervals of three minutes, it was not advisable to place them in tunnel or in any location that would give rise to difficulties in ventilation. The authorities of the city of Paris on their side also welcomed this solution, which avoided the necessity for the railway to pass entirely under the public road and thus to interfere with the sewers.

"The reinforced concrete brackets which carry the road are spaced at 17-foot intervals. Each of them is supported by a member projecting from the wall and provided at its upper end with eight steel ties 3 inches in diameter. These are anchored in the base of the wall by means of a continuous longitudinal ferro-concrete beam, the purpose of which is to distribute along the wall the stresses exerted locally by the brackets. To counterbalance the thrust of the earth, so that it was un-

necessary to thicken the lower part of the wall. Except for this widened portion at the top, which extends downward for a length of 8 feet, the thickness is uniform, being 7 1/2 feet, or one-eighth of the height.

"In consequence of the criticisms directed against the design M. Rabut subjected the structure to severe tests, taking careful measurements of the deflections. The load with which the pavement was tested was increased from 82 pounds per square foot required by the plans to 123 pounds, and the load on the roadway, which was to have been furnished by a 33-ton steam roller, was aggravated by making the roller bump over planks of wood one inch thick, which were nailed transversely to the wood pavement at certain distances apart. In spite of the formidable shocks caused by the fall of this enormous mass the total of the loads did not suffice to deflect the extremities of the brackets by more than 1 mm. Finally a motor omnibus driven at full speed over the supported portion of the road produced no measurable deflection, although this kind of vehicle gives rise to strong vibration in earth and buildings.

"M. Rabut does not consider that these brackets represent any bolder method of construction than a bridge, and the popular impression to the contrary, he thinks is due to the fact that the unsupported portion alone is visible, the counterbalance being hidden behind the supporting wall."

The B. C. Gazette gives notice of the incorporation of the following companies. Poulin Lumber Company, Limited, capital \$100,000.

It has been officially announced that the C.P.R. has decided to build four new steamers for a fast direct steamship service between Nova Scotia ports and Boston and New York. This is one of the important developments that will follow the absorption of the Dominion Atlantic into the system in the spring. The new vessels will be the type of ocean liners, about 450 feet in length, with a carrying capacity of 5,000 tons, and able to make over 20 knots.

The Canadian Government are looking to the future in the extensive western park reservations they have made during recent years. According to figures supplied by Mr. Bysshe, of the accounting department of the interior, the Dominion now has a total of 11,000 square miles of parks. The biggest park is Jasper, in the Yellowhead west of Edmonton, which is now being opened, and which is 5,000 square miles in area. This park has hot springs that are finer than those at Banff, and the scenery in the park is said to be even more beautiful. Then there comes the Rocky Mountain park at Banff, with an area of 4,500 square miles. Yoho park in the Rockies has an area of 428 square miles, and Glacier park about 450 square miles. Wainwright Buffalo park has 162 square miles and Elk Island 16, with 54 square miles in Watertown lakes park. In addition to these parks, the Dominion controls 12 islands in the St. Lawrence river.

Contract Record

ESTABLISHED 1886

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

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Toronto November 9, 1910

No. 45

Victoria, B. C., in the Limelight

The writer who complained in a recent issue of this journal, that during recent years certain specifications had been revised and devised "apparently with the object of putting all contractors out of business," may find some consolation in a perusal of the conditions "devised" by the city of Victoria, B. C., for repairing the Smith's Hill reservoir.

Parenthetically, it is of interest to recall in this connection that Arthur L. Adams, the water expert of California, under whose supervision the reservoir was constructed in the first instance, gave it as his opinion, subsequently, that the necessary repairs could be effected for \$30,000. This sum was included in the estimates at the beginning of the year. Later, Mr. G. H. Bryson, acting city engineer, made a survey of the reservoir and reported that in his opinion the reservoir could be made watertight for \$15,000. Later again, Mr. Angus Smith, city engineer, gave the council an estimate of \$6,000. And a few weeks ago the Pacific Coast Construction Company made a bid of \$3,000. Somewhat enlightened by these circumstances the civic authorities decided that it would be interesting to call for tenders. The basis upon which these have been invited has been aptly termed "no cure, no pay."

The conditions to which we refer are as follows:

(a) The tenderer shall submit his own specifications.

(b) The successful tenderer shall give a guarantee bond, covering a period of five years from date of completion of the contract; that the work done by him under the contract shall effectually prevent any further leakage, even when the reservoir is filled with water to

its full capacity; and that if any leakage shall occur during the guarantee period he will repair the breach forthwith and make the reservoir watertight at his own expense.

(c) A sum equal to 25 per cent. of the contract will be paid to the contractor at the end of the guarantee period, providing the reservoir will then hold water at its full capacity without leaking.

(d) If, at the expiry of the guarantee period, the reservoir should not hold water when filled to its utmost capacity, without leaking, the said sum of 25 per cent. shall be forfeited to the corporation. The lowest or any tender not necessarily accepted.

Having in mind the facts set forth in our parenthesis, it is reasonable to suppose that the city council of Victoria expect to be inundated with offers for the work. Possibly they may think that some enterprising concern will come along and do the job at a nominal figure—for the glory of it! Certainly it would be an advertisement that could be obtained in no other way. But what kind of an advertisement? The question resolves itself into this; are there *any* contractors in or around Victoria, B. C., willing to submit to the imposition of conditions which require them not only to put up a guarantee bond, but also to leave 25 per cent of the total contract price in the hands of the city for a period of *five years*; and further, to make good any defects that may occur during that time. We hope not. Contractors who are alive to their own interests will give a wide berth to such conditions as these. After all, the issue is at their disposal. If they figure under such terms and get the job they encourage imposition and weaken their own cause. If they hold aloof, the work will be carried out by the city engineer. And certainly he should be welcome to it.

Inspection of Contract Work

The engineer's position as sole arbitrator on construction work has been discussed in recent issues of this journal. (See issues of Sept. 28, p. 35, and Oct. 19, p. 38). In a discussion the other day anent the subject of inspection, which has some bearing, one speaker, himself an engineer, got at the root of the whole matter by saying that contractors or their working representatives are, as a rule, older and much more experienced in dealing with others than the best of inspectors. If embryo engineers are to be given these positions, they must not be clothed with final and arbitrary authority. Continuing he said:

"If an inspector, incapable by lack of experience and maturity of judgment, is given authority and placed in a position to bind or hamper the decisions of the referee named in the contract, the result may be unfortunate or disastrous. Unscrupulous contractors undoubtedly exist, who do not fail to take advantage of such a situation. It is to be regretted that so many contractors seem to regard the obligations placed on them by their contracts as not mandatory and not matters to be lived up to in spirit because of the agreement that they shall be fully carried out. Many contractors, on the contrary, seem to regard the specifications under which they agree to do work as merely statements of the things which the owner or referee will try to accomplish: that it is the duty of the referee to enforce them if he can; and the privilege of the contractor to evade as many of them and as far as he wishes. To place a young, perhaps inexperienced, party in a position to decide the many points that may be raised by an experienced superintendent or foreman is almost

sure to prevent the owner, who pays for the work done according to the specifications, from getting what he pays for, to which he is entitled, and which the moral obligation on the contractor alone should compel the latter to deliver. I can recall numerous instances where, as the inspector's authority was not clearly limited in the contract, the contractor claimed that the referee and owner were stopped from finally securing the kind of work the owner was clearly entitled to and the contractor had agreed to give him, and had named his price for giving him, because the inspector had accepted the inferior work or had failed to condemn it.

"It is far fairer and better in every way, including all considerations of justice to the contractor and to other bidders, to provide that an inspector shall simply report the facts, and that the decisions shall be left to the owner or the experienced referee specified. Some greater delay may occur in securing final decisions under the latter method, but the decisions will undoubtedly be more just on the average, and except in those cases where questions are raised for the purpose of evasion or for making difficulty, when delay in the decision may be justified, they will be more in accord with the spirit of the contract."

Use and Abuse of Engineers' Cost Data

Sound Judgment and Experience Needed in Taking Records as a Basis for Estimating or Criticism Careful Analysis Essential

There has been a great interest aroused throughout the engineering profession in recent years over the collection and publication of so-called "cost data." The term is a convenient one, signifying the records of the cost of carrying out various classes of engineering work, such records being preferably given in prices per unit of completed work. In all well-conducted manufacturing establishments it is now considered indispensable to keep regular records of the cost of the labor and materials entering into any product. Such cost keeping in factories, properly carried on and properly used, has been the means of effecting enormous savings. It has furnished a guide through which the productive efficiency of many shops and factories has been revolutionized. We would say no word here to lessen the general appreciation of such cost accounting.

Now, just as the old-time factory knew little or nothing of cost keeping, so the old-time civil engineer knew little or nothing of cost data, at least in the shape of systematic records, and certainly nothing in the way of published records available for reference. In fact the civil engineer of 50 years ago had little need for such data. He was comparatively little concerned with question of cost. It was conceived to be his business to make his work strong and substantial. It was for the executive heads over him and the contractors who worked under him to deal with questions of the cost of work.

Old-time Idea Still Prevalent.

We find remnants of this old idea persisting even to-day. There are still to be found some among the older members of the profession who contend that the engineer should not concern himself with costs and economies except, of course, to the extent that they affect the larger problems that he has to solve. This does not apply, however, by any means to the rank and file of the profession. It is well understood to-day that an engineer is expected to know the commercial side of his profession; to know how to construct not only safely but economically. He should be able to estimate in advance what the cost of given work will be, and his professional reputation will be very largely measured by the accuracy with which he makes such estimates.

Now, all these matters of the cost of work cannot be evolved from a man's inner consciousness. They are problems which no mathematical formula can solve. They are matters of experience; and as no man's ex-

perience is broad enough to cover more than a limited range, we find engineers in all branches of the profession placing high value on published records of cost.

This demand of the profession is reflected in its literature. Within the past ten years, however, cost records in engineering literature have multiplied apace. A description of an engineering work is not considered complete to-day unless it gives something, at least, relating to the cost of the work with which it deals.

The things we have set forth above are, we assume, pretty well known to the engineering profession. It would not probably have been worth taking space to set them down here, except that what we have to say below should not be misunderstood. We have referred in our heading to the use and *abuse* of cost data. It is because the existing information on costs is susceptible of misuse that some words of warning appear to be needed at the present time. If all the published data on engineering costs were full and complete and reliable, an engineer could make use of them with perfect confidence in his results; but we have the best of reasons for declaring that this is far from being the case. A small proportion of published costs records are complete, in that they give all the essential facts regarding the conditions under which the work was carried on. They are presented in such a way that the careful reader will not misinterpret them, and they are full enough to enable the figures to be used with confidence.

A much larger proportion of published cost data, however, are lacking in some or all of these particulars. The information is by no means without value, but it needs to be used with great caution. The engineer must use it, as he uses many other tools, because he has nothing better to work with; but if he is a wise engineer he will be very careful lest he do himself an injury in handling what may prove a two-edged sword.

"Pocketbook Engineers."

If nobody made use of cost data but competent engineers, possessed of that good judgment which is the most valuable characteristic of the competent engineer, there would be no need of sounding a caution concerning the abuse of cost data. These records of cost, however, are spread abroad in published journals and are open to anyone to use. Every engineer of standing and experience is well aware of the existence of so-called "pocketbook engineers"—men who add to

a possible smattering of college training the information they have collected from published pocketbooks, and who, on the strength of such an equipment, but sadly lacking experience and good judgment, set out to do engineering work on their own hook. The misuse of cost data by such men often results most seriously for themselves and their clients.

We do not mean by this to undervalue in any respect the importance of published information, whether in pocketbooks, in more ample engineering treatises or elsewhere. What we do wish to emphasize is the fact that some breadth of information and sound judgment are absolute pre-requisites to successful work as an independent engineer; and if a man lacks these he is likely to bring serious discredit on himself and on the profession in attempting to carry out engineering work.

Cost records are extremely useful to the designing engineer; to the estimating engineer; to the contractor in making plans and estimates and following the work that he has in hand; to the superintendent engineer in following through a piece of construction. But when such records are made the basis of published criticisms of engineers or contractors, it is time to call a halt. We do not say that such criticisms may not be justified. We do say that the basis on which such criticisms are made is wholly insufficient to warrant any one in forming a judgment.

We do not undervalue either the possibilities which comparative cost figures may offer in the way of critical analysis. It is possible, for example, that some day we shall have municipal accounting on so uniform a basis that it will be possible to usefully compare the cost of street cleaning in one city with that in another, or the cost of pumping water in one city with that in another, and so on and all through the line of municipal housekeeping.

At the present time, however, the differences in methods of bookkeeping and accounting, and the differences in conditions, are such that without a most painstaking and thorough comparison and analysis of all these differences, no one is justified in making use of comparative cost data, without other supporting information, to hold any engineer or contractor up to public criticism.—*Engineering News*.

Finishing a Concrete Building Wall by Brushing

A brushed finish was required in constructing the concrete walls of the Tuberculosis Hospital at Rockville, Ind. The contractors, Brubaker & Stern, give the following data regarding the work in a paper before the Indiana Society of Engineers:

No special material was used to secure this effect. Precaution was taken, however, to make the mixture as uniform as possible, and the forms were well spaded to bring the pebbles next to the forms. The foundations of the various buildings ranged from 3 to 6 feet in height. The forms of the face were taken down when the concrete was 24 hours old, and the entire surface, thus exposed, was brushed immediately before the cement set hard. They used plain water for most of the work, and only a few times did they have to resort to acid. After the men were broken in they became quite expert, and they had no trouble in getting a good effect.

The contractor informed us that the work cost him approximately 2 cents per square foot in addition to the cost of the concrete wall; that is, the extra cost, in ob-

taining the brushed surface, was 2 cents per square foot. The specifications for the work follow:

Forms.—Forms are to be built in sections and so arranged that each section can be taken down at the proper time, to give access to the face of the concrete. Molds are to be nailed onto the face of the forms to carry out the design as called for in the details. Lintels over doors and windows are to be run separately, and the forms are to be built accordingly.

The proportions are to be as specified above. The gravel must be screened and the mixture must be absolutely uniform to get the proper effect. Concrete is to be dumped into the forms in layers and kept level. An entire section of the forms must be run at one time, and the forms must be well spaded to bring a uniform mixture to the face of the walls.

Forms are to be taken down in 24 hours, during warm, dry weather; otherwise, to remain as much longer as conditions require. The surface is then to be brushed with wire brushes and water till all of the cement has been washed off, leaving the pebbles or stones exposed and in good relief. If necessary, a small amount of muriatic acid should be added to the water. The best brushes for this purpose are a fine brush, No. 177, and a coarse brush, No. 1082. Care must be taken that the pebbles are not dislodged. If the concrete is too soft to permit brushing, the work must be delayed a sufficient length of time. The returns to the window and door jams must be treated in the same manner.

Caisson Sinking in Record Time

The sinking of the foundations for the mammoth municipal building which is in process of construction, opposite the Manhattan entrance of the Brooklyn Bridge, has involved a number of interesting engineering problems and at the same time has afforded opportunity for the contractors to establish a new record in the sinking of caissons. In the course of the work a caisson for one of the column piers was sunk through sand to bed rock at a depth of 112 feet 1 inch below water level, without accident or casualty of any kind. The caisson was of concrete, with a reinforced cutting edge and supporting a concrete shaft 10 feet 9 inches in diameter, which was cast before sinking. The construction of the caisson was commenced April 15, and the bottom was passed May 16. While under the maximum pressure of 47 lbs., the work was executed by 20 five-men shifts working about 40 minutes each, with a very long time for decompression and an interval of 4 hours between the two shifts each man worked daily. The men were under very strict physical and medical supervision, improved sanitary and hospital appliances were on hand and a competent physician was in constant attendance, and not even a single case of the bends occurred. This is believed to be the deepest pneumatic caisson ever sunk, and is expected to be the maximum for this building, which will have 106 caissons, over half of which have been sunk. The Foundation Company, of New York City, who have secured a number of important contracts in Canada recently, have the contract for the substructure.

The new Transportation Building at the corner of St. James and St. Francois Xavier streets, Montreal (Messrs. Carrere & Hastings and Ross & MacFarlane associate architects), will be constructed of Marmo Semi-glazed Terra Cotta. This contract, which is stated to be the largest terra cotta contract ever placed in Canada, has been awarded to Eadie-Douglas, Limited, 12 University street, Montreal.

The Sewage Disposal System of Toronto

Notes on Design and Construction—Recommendations of Messrs. Watson and Hering, the Consulting Engineers—An Economical and Satisfactory Solution

By C. H. RUST, City Engineer.

Toronto, up to the present time, has poured its sewage into the bay, and, whilst the question of disposing of sewage at one central point has been before the city council for many years, and a number of reports have been made by different engineers, all of which reports advocated the disposal of the crude sewage into Lake Ontario, at points varying from four to nine miles east of the water works intake pipe, it was not until 1908 that the sum of \$2,400,000 was voted to proceed with the construction of those works, and it was decided, in view of plans being adopted to filter the water, that the sewage could be safely deposited into Lake Ontario at a distance of about four and three-quarter miles east of the intake pipe.

There are two interceptors. Beginning at the screen house near the sewage tanks, the high level interceptor will extend westerly for a distance of eight miles. The sewer is circular in form throughout. Its maximum size is 9 feet 6 inches in diameter, and the size gradually decreases to a minimum diameter of 3 feet 6 inches. This sewer will collect practically all the sanitary or dry weather flow of sewage which can be carried to the disposal works by gravity.

The low level interceptor, commencing also at the screen house and pumping station, extends for a distance westerly of five and a half miles and varies in size from a diameter of 5 feet 6 inches to an egg-shaped sewer 2 feet 9 inches x 4 feet 3 inches.

The rate of fall of these sewers is such as to give us a minimum velocity of fall over two feet per second under present conditions, with a maximum velocity in the neighborhood of four feet per second.

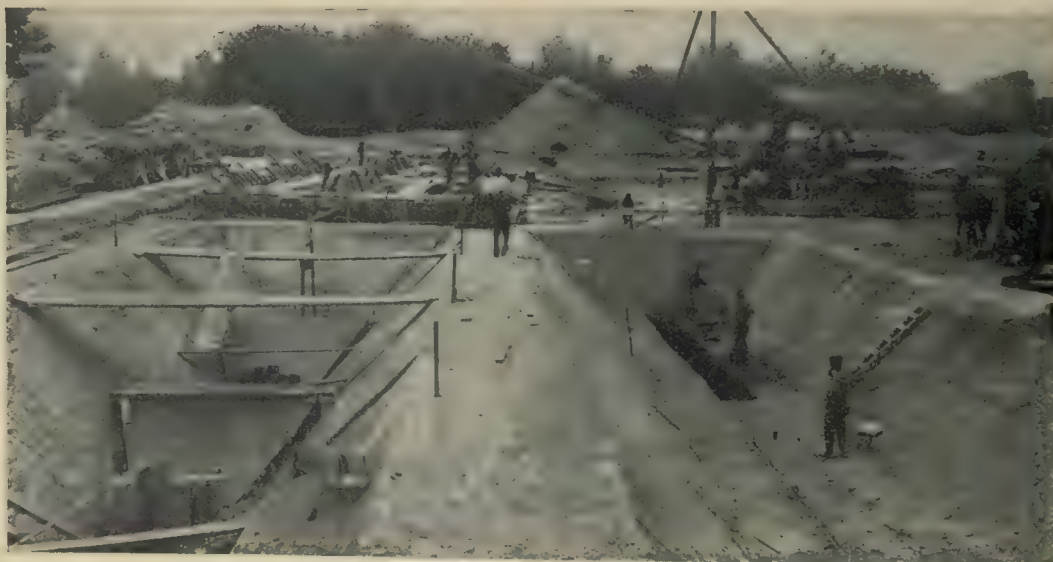
The sewage carried to the disposal works by low level interceptor is required to be pumped a height of about twenty feet.

The disposal works, which are situated in the east

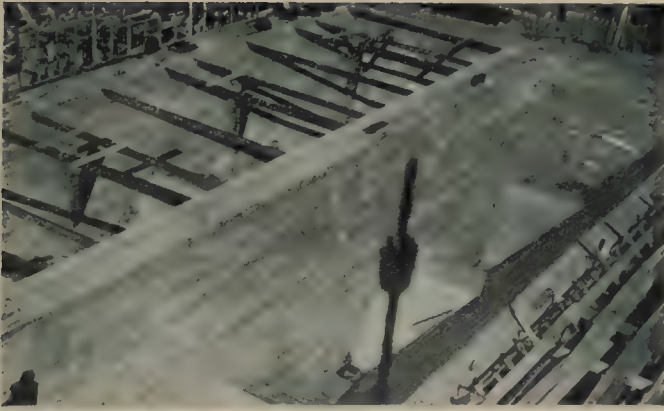
end of the city, a few feet above lake level, are intended to furnish for the sewage a partial treatment consisting of screening and sedimentation. A large building is to be erected west of the sewage tanks containing the screens for both high and low interceptors, four centrifugal pumps, electrically driven (having a combined capacity of nearly 100 cubic feet per second), an auxiliary gas engine, generator, etc., and a sludge well, through which is drawn all the sludge from the sedimentation tanks. The sludge is pumped from this well by means of two 6-inch centrifugal pumps and carried through pipes to points on the neighboring marsh, which will be enclosed for the purpose. It is intended that the sand pump will work in conjunction with the pumping of the sludge in order to obviate any nuisance. The screens are to be of one-half inch bars, having one half inch spaces between each and will be cleaned by a mechanical device operated by electrical power. Three bucket conveyors will be placed in front of the screens to remove such material which gathers in front of the screens and which cannot be removed by the rakes. This building will be equipped with two cranes, one in the screen chamber and the other in the pump chamber, for the purpose of handling the machinery, etc.

The sewage from the low level sewer, after passing through the screens is pumped into a channel, which thus conveys the high level and low level sewage to the tanks.

The sewage tanks are somewhat after the design of the "Dortmund" tank, modified to suit the conditions of this city, and were designed by Mr. John D. Watson, of Birmingham, England, one of the consulting engineers. The tanks are constructed of concrete—reinforced where necessary—and are each 100-feet long and 25 feet wide. The four upper side walls of the tanks are vertical, but for the lower twelve feet the four sides converge on 45 degree slopes. The bottom of each tank is divided into



Bottom of tanks at various preliminary stages of construction.



Bottom of tank concreted, showing sludge drain connection.

four hopper-shaped compartments by means of slopes placed at an angle of 20 degrees from the horizontal. which is opened and closed by a stem reaching above the roof of the tank. This valve is connected to the cast iron pipe, which is the outlet for the sludge from the bottom of the tanks.

The sewage from the screen house is distributed among the tanks by the main inlet channel and its branches.

The present scheme embraces the construction of twenty-four tanks. These tanks are placed under one roof, having two lying end to end in one direction and twelve tanks side by side in the other.

Inlet and outlet branches of the main inlet and collecting channels are placed alternately between the sets of tanks. At the side opposite to that on which the main inlet channel is placed in the main collecting channel. This conducts the tank effluent to the outlet chamber from which it is discharged into the effluent carrier. The height of liquid in the tanks is controlled by movable weirs between tanks and collecting channel.

The effluent carrier is a 60-inch circular pipe, of which about 1,800 feet is to be constructed in reinforced concrete, and the balance of 3,100 feet is a steel pipe. The total length being about one mile.

The concrete pipe whilst somewhat cheaper in first cost is not nearly as satisfactory to lay as the steel pipe. It is constructed in 24 foot lengths, each section weighing $16\frac{1}{2}$ tons. Cast metal flanges drilled for bolts are supplied at the ends, forming a part of the pipe. The pipe is lowered in place and bolted together by divers.

The steel pipe which is much more satisfactory to put in position, and is absolutely free from danger of fracture is built in 50-foot lengths. The contractor is laying two sections at a time, bolted together.

For the purpose of giving alignment, platforms were built on piles in the lake at each change of grade. For the control of the flow of the sewage at the disposal works, stop gates and penstocks are arranged in such a manner as to permit shutting off any tank or series of tanks, or the sewage could be discharged direct into the effluent carrier and the tanks emptied into the sludge well. A storm overflow into the bay is also provided at the entrance to the tanks.

At the time of writing the sewage disposal works and high level interceptor are about one-third completed and work is being commenced on the low level interceptor.

It is expected that a portion of the system will be in operation next summer.

Mr. John D. Watson, chief engineer of the Birmingham Drainage Board, England, and Mr. Rudolph Hering, of New York, consulting engineer, were consulted with regard to the general schemes of sewage disposal

in February, 1909, and the following are the conclusions they arrived at:

"After carefully considering the problem, which you have put before us, we believe that we can best present our report in the form of answers to the questions contained in the appended letter, addressed to us by Mr. C. H. Rust, and to follow same with our general recommendations.

Question 1.—"In your opinion, would any fouling of the shore in the neighborhood of the outfall works occur?"

"With the design presented to us and with such modifications as are suggested hereafter, it is our opinion that the sewage of Toronto could be disposed of satisfactorily, not only without fouling the shore at any point, but in a manner that will be unnoticeable on the lake itself."

Question 2.—"Would it be possible, after careful screening of the sewage and making the provision for tank treatment, to use the resulting sludge with safety for filling purposes? If not, what method would you suggest for its disposal?"



Bottom of concrete pipes, showing inside forms and reinforcement.

"We hold the opinion that the plans of the tanks proposed by the City Engineer should be modified so as to ensure greater efficiency in the elimination of solids. Septic action is bound to take place in the sewage before it reaches the tanks, and to that extent the proposed tanks will contain septicised sewage. But we suggest a provision for cleansing each pocket of the tank daily by utilizing electric current to pump the solids to the west end of the Ashbridge's Marsh.

"If this course is followed, the sludge will not be exposed to the atmosphere until it reaches the western end of Ashbridge's bay, where it will be mixed with the dry refuse and spoil which is being deposited there to fill up the marsh. This can be done, not only with safety, but with advantage, as in our experience city refuse is generally combustible, and when ignited on rubbish heaps frequently gives rise to nuisance. Admixture with wet sludge will obviate this, and if the admixture is not deposited in layers exceeding two feet in thickness at one time, nitrifying bacteria will very speedily reduce the whole to an inoffensive substance.

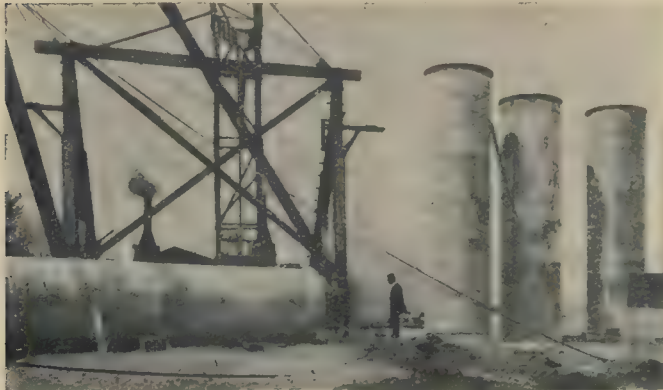
"We are of opinion that if ordinary care is exercised no

offensive odor will be perceptible more than a short distance from the site of the deposition."

Question 3.—"Provided proper ventilation is used with covered tanks, would there be any nuisance from odors?"

"Even without special ventilation no nuisance will arise from the tanks, if they are properly constructed and operated, but, as an extra safeguard, provision will be made to ventilate them by means of an electrically driven fan fitted with a suitable exhaust pipe."

Question 4.—"Would those residents in the immediate neighborhood of the works, or persons using Queen street as



60-inch reinforced concrete pipe for outfall.

a highway, experience any nuisance from odors from the existence of tanks upon the site proposed?"

"Residents in the neighborhood of the tanks will experience no odor from them, and if the tanks are covered with earth and planted with shrubs and flowers, the site would even be rendered pleasantly attractive.

"If the sludge were removed from the tanks and deposited in proximity to them in the ordinary way, we think residents might have occasion to complain; but by making the only outlet for sludge at Ashbridges Bay opposite Cherry street, this possibility is entirely obviated. The tank will not be more noticeable to a person passing it than would be a flush tank or chamber in a large sewer under a leading thoroughfare.

In view of the results of additional trial holes, which we have had made, we advise that the tanks be located close to the shore line, south of Eastern avenue, where we consider that there is sufficient area of suitable land for their construction.

"We recognize the validity of the objections to having the tanks placed on a site that would entail an alteration of the line of a thoroughfare from the centre of the city to a beautiful undulating district.

"The position of the outfall sewer meets with our entire approval, but we think the sewer should be extended at least another 1,500 feet further into the lake, so as to insure a discharge into deeper water."

Question 5.—"Having regard for the large body of water into which the effluent is to be discharged, do you think that the proposed method of disposal could be operated successfully and satisfactorily?"

"Sewage is finally purified by oxidation, whether this be on land or in water; on land, by percolation through beds of sand, or beds of stone; and in water by oxidation accomplished by dissolved oxygen.

"We are of the opinion that the large body of water into which the effluent is to be discharged will successfully and satisfactorily dilute and dispose of the sewage effluent.

"It is imperative that no visible particles of suspended matter should be allowed to reach the lake. The effluent, therefore, will consist of a liquid, the polluting

matter in which will be mostly in solution, and when issuing at the outfall will be discharged in about 30 feet of water, and at least 8,500 feet from the lake shore.

"We recommend that the sewage be made to issue from a number of small openings in the outfall sewer, extending over a length of several hundred feet, so that, instead of discharging the effluent at one point, it will be discharged through many openings to facilitate a high degree of dispersion and dilution.

"We are entirely satisfied that the proposed location of the outfall will not injuriously affect the water supply, which fact will again be referred to below."

Question 6.—"In your opinion, do you advise the use of brick or concrete for the proposed intercepting sewers?"

"We recommend the council to construct the intercepting sewers of Portland cement concrete, having the invert lined with a single course of hard, sharp-edged, vitrified brick. This method of construction will be equally durable and less costly than a sewer built entirely of brick."

Question 7.—"In your opinion, is the proposed adoption of water filtration advisable and necessary, and will it completely safeguard the water supply of the city of Toronto in connection with the proposed sewage disposal works?"

"It is our opinion that the proposed adoption of water filtration is both advisable and necessary, and that it will completely safeguard the water supply of your city, not only with reference to any possible pollution from the proposed sewage disposal works, but also from any pollution in the neighborhood of the intake, due to excursion boats or other shipping. It will also prevent the water, made roily by the stirring up of the lake shore



Inlet channel and pipes, and forms for sidewalls.

bottom by wave action during high winds, from reaching the city mains in a turbid condition.

Question 8.—"It has been considered by a great many of the residents of the east end that the disposal works should be situated upon the marsh in the vicinity of Cherry street. Will you please advise upon this matter, and if this site is selected, would you advocate the discharge of the sewage into the lake in its immediate vicinity, or should it be carried eastwardly to the point of discharge, as mentioned in the site already selected?"

"We have carefully considered the whole question of site, and have deliberately come to the conclusion that the Morley avenue site is the best.

"To construct the tanks at Cherry street would not offer any advantages in the treatment of the sewage over the plan above referred to, and in view of the sludge disposal at the Cherry street end of Ashbridge's bay, no advantages, from a hygienic point of view, would be obtained. Moreover, constructing the tanks at Cherry street would involve a much greater cost than constructing them at Morley avenue.

"Under any circumstances the outfall sewer should be located in the position shown on the plans, namely, about three thousand five hundred feet south of the shore opposite the Woodbine and upwards of four and a half miles from the water works intake.

After ten years consideration of the subject, the Royal Commission of Sewage Disposal came to the conclusion that the conditions of different cases vary to

such an extent that each case should be considered on its own merits. In dealing, therefore, with the problem which you have placed before us, we have endeavored to give due weight to local circumstances. We are perfectly satisfied that the plans of the work as proposed, amended as we have suggested, will not only effectually dispose of the sewage of your city, but do it without danger to health, without nuisance at any point and for a reasonable outlay of money, therefore, we recommend their adoption."

Contracts for this work were awarded as follows: Sewage tanks, F. H. Dickenson, Hamilton, Ont.; laying outfall sewer from tanks to lake, Miller, Cumming & Robertson, Toronto; steel pipe for outfall, Canada Foundry Company; construction of reinforced concrete pipe, E. W. Hyde, Toronto.

The Present Utility of the Septic Tank

Concerning Certain Fallacies Entertained long after the Initial Experiments at Exeter—The Limitations of the Septic Tank and its Value

By Professor H. N. Ogden, Cornell University

In 1896, Mr. Donald Cameron, City Engineer of Exeter, England, with two others, was granted patent rights in an apparatus or invention for the purpose of dealing with crude sewage bacteriologically and bringing it into such a condition of solution and liquefaction that it could be thereafter more easily treated by filtration or irrigation or any other suitable way. Before that time, tanks of various kinds had been in use not only in England, but in other countries. For twenty-five years previously, chemical treatment had been the prominent method of eliminating from sewage the suspended matters which had been found to be troublesome, both on irrigation fields and in rivers and tidal estuaries. The bane of every superintendent in charge of a sewage disposal plant has always been the vast accumulation of sludge which is generally produced faster than the land available can take care of it, and which does not readily lend itself to any other method of disposal. There was no great difficulty in purifying the liquid part of sewage sufficiently so that it could be discharged into streams after the solids were removed, but to dispose of the solids—that was the trouble.

The value of Mr. Cameron's invention, the feature of his scheme which appealed to the city officials generally, was contained in this statement. "By this invention it is possible to get rid of the sludge difficulty because the sludge portion of crude sewage is entirely thrown into solution." His claim was based on experiments made in Exeter on a small tank twelve feet wide, fifteen feet long and two and a half feet deep, and was expressed as above after seven months operation. Since that time, much has been learned about the operation of sewage tanks, generally dignified by the name of septic, and the recent lawsuits over the patent rights involved as well as the papers before learned societies have produced evidence and discussion covering, not merely every detail of construction and operation of the tank, but even its very name. Engineers have considered the length of time during which sewage should remain in septic tanks and many experiments have been made in order to arrive at some definite conclusion. There has also been a large amount of testimony presented from various parts of the world on the action taking place during the passage of sewage through the tank. That gases of various kinds were developed by this action was easily discovered

and one of the advantages at first claimed for this treatment was that the production of those gases would be a source of revenue to the municipality, replacing, to a large extent, the ordinary illuminating gas.

During the fifteen years since the patent was issued, many of the claims which originally were made for the invention have been disproved and more extended and scientific experiments on septic action have been made. Further than this, experiments and experience both have combined to establish certain definite appreciations regarding its value and it may be not out of place here to summarize, briefly, just what a septic tank may be expected to do and just what we know it will not do.

Wherein the Septic Tank Fails.

In the first place, we know definitely that it will neither purify sewage completely nor act as a panacea in eliminating sludge. Not long ago, the writer was much interested in the enthusiasm of a western salesman who was dealing in plumbing specialties. He had found that, in order to secure sales, he must be prepared to advise customers on the subject of sewage disposal and he was spreading broadcast recommendations, vouched for by himself as facts, to the effect that the installation of septic tanks would transform sewage of any degree of pollution into what, if not drinking water, might be considered equal to the quality of the average river. This is not true and no one who has followed the experiments on tanks believes it to be true.

Nor does the septic tank do what Mr. Cameron thought it did, namely, eliminate the sludge difficulty. Inasmuch as the septic tank is after all a tank, there is inevitably brought about a certain sedimentation so that the liquid passing out of the tank is usually freed from a certain amount of suspended matter. To this extent the sewage is purified and if filtration follows, the surface of the filter and possibly the interior of the filter is relieved of the usual clogging.

It was at first thought that the liquid carrying material in solution was itself affected by septic action and that certain anaerobic changes taking place in the liquid were desirable as being necessarily preliminary to later filtration. The English chemists and biologists have been inclined to cling to this idea and to divide all bacterial processes of purification into two parts, namely,

one occurring in the septic tank where liquefying and anaerobic bacteria should transform the crude organic substances into ammonias and nitrites, the other the aerobic filter bed where these organic matters already started on the road to purification might be fully nitrified. The Massachusetts State Board of Health pointed out ten years ago that this theory was not always tenable since in their experiments it happened very often that no better results were obtained on filters dealing with septic sewage than filters dealing with crude sewage. Further than this, it was pointed out by them that if the action in the septic tank proceeded too far, subsequent filtration was thereby more difficult and less complete and this belief has extended until to-day the original claim of Cameron has been almost forgotten and the fact that so far as the liquid portion of the sewage is concerned septic treatment is immaterial if not objectionable has been fully substantiated.

Its Value as a Sedimentation Tank.

What, then, does the septic tank accomplish? Simply this. It manages to exert an action upon the material which is settled out of the sewage as it passes through the tank, not to the extent of destroying it all, as Cameron claimed, but to the extent of liquefying or gasifying about one-third of those solids. It was, and still is by some, believed that a septic tank never requires to be cleaned out; that in some mysterious way the bacteria destroy all the precipitating solids. This is far from being a fact, since no bacteria can act on mineral matter of which some is always present in sewage; nor can they destroy the humus-like material into which the organic material is converted. There is inevitably in a septic tank an accumulation of solids proportionate in volume to the flow of the sewage, provided such solids are retained in the tank. One can be very sure that where such an accumulation does not take place the solids are being carried out of the tank by the flow of the sewage and are being deposited in a finely divided state of the surface of the filter beds where they do more harm than if they had been carried out in their grosser and coarser condition.

The septic tank, then, is valuable in that it acts as a sedimentation tank, incidentally equalizing the flow of sewage and in that it may eliminate about one-third of the precipitated solids. Unfortunately, if the flow of sewage through the tank is so slow as to permit the destructive action to reach its maximum effect, there has been found a resulting action in the liquid of the sewage which poisons it so that subsequent treatment of the sewage is made more difficult. The odors of the plant are always increased also if the septic action is pronounced. Therefore the designer of the tank is almost at a loss to know whether the tank of small size which minimizes the action on the liquid or the large sized tank which emphasizes the action on the solids is the more desirable. The most intelligent management to-day seems to tend toward the use of small tanks through which the velocity is comparatively high and where sedimentation takes place without, however, allowing room for any accumulated solids. Such tanks are made with inverted conical bottoms at the vertex of which the deposited material is found. By connecting this vertex through a pipe with another tank at a slightly lower level, the solids may be drawn off into a special receptacle where septic action may be continued on the solids alone as long as the capacity of the second tank allows.

In the Travis tank at Hampton, this division of solid and liquid is accomplished by dividing the tank by a horizontal partition so arranged as to leave a slit or opening between the sides of the tank and the partition. By

means of two valves, one opening from below this partition and the other from above, the velocity of flow through the two parts is controlled and it is managed so that the velocity through the upper part, comparatively free from suspended matter, is much greater than the velocity through the lower part which contains the organic matter on which the tank is expected to act.

In those cases where continuous operation is claimed for a period of years without any accumulation of deposited material, one may be sure of finding in the effluent small black particles which represent the inevitable loss of deposit to make up for the accumulation of new material. This fine material, as is generally the case with the solid matter acted on in the tank, is comparatively free from odor and may be dealt with far more easily than the raw sludge, and this may be said to constitute another advantage of this tank treatment. Altogether, the value of the septic tank has been much modified since its invention, and inasmuch as the present feeling among engineers and managers is that septic sewage is not desirable for treatment and that in every case a tank should be emptied of sludge at least once a month provided subsequent filtration is practised, the claims of the holders of the septic tank patent rights are not of as much interest as when the value of those patent rights was more highly considered.

Cost of Treating Sewage Chemically

Chemical precipitation of sewage at Providence, R. I., during 1909 required 700 lbs. of lime per million gallons. The volume of sludge produced was 4089 gallons per million gallons of sewage treated; the sludge is pressed and the cake carried away on scows. The cost of treatment per million gallons of sewage, as given in the last annual report of Mr. Otis F. Clapp, city engineer was \$3.36 for chemical precipitation and \$4.42 for sludge disposal. An average daily flow of 19,791,000 gallons of sewage is received at the plant; the settling basins have a capacity of 11,130,000 gallons. The machinery for removing and compressing the sludge consists of two Shone ejectors, which discharge into four storage reservoirs, each 8 feet in diameter and 12 feet long. Thence the sludge is forced under from 60 to 80 lbs. pressure into the presses. The ejectors and forcing receivers are run by air pressure generated by one 150 horse power and one 50 horse power electrically-driven compressor. Eighteen filter presses are used, each with from 48 to 54 plates with 6-inch centre holes, forming cakes 36 inches square and from $1\frac{1}{4}$ to $\frac{3}{4}$ inches thick between filter cloths which surround the plates. On the average 99.6 tons of sludge cake are produced daily. The pressed cake contain 28.6 per cent of solids. The cost of operation per ton of solids is \$2.85.

The Manitoba Clothing Company's store at Winnipeg collapsed recently, owing to the undermining of the walls, caused by excavating for the basement of a new hotel at the corner of Rupert and Main Streets. The contractor for the last named work, Mr. C. W. Sharp, has undertaken to pay for the damage, which is estimated at \$25,000.

Tar macadam pavement in Ottawa, Canada, aggregating 1,625 square yards was laid last year by day labor, at a cost of \$1.88 per square yard. In the last annual report of Mr. N. J. Kerr, city engineer, it is stated that 8 to 10 inches of spalls were used for the foundation, above which were placed a 3-inch layer of 2-inch broken stone, a 3-inch layer of 2-inch tarred limestone and a 1-inch top coat of $\frac{5}{8}$ -inch tarred limestone.

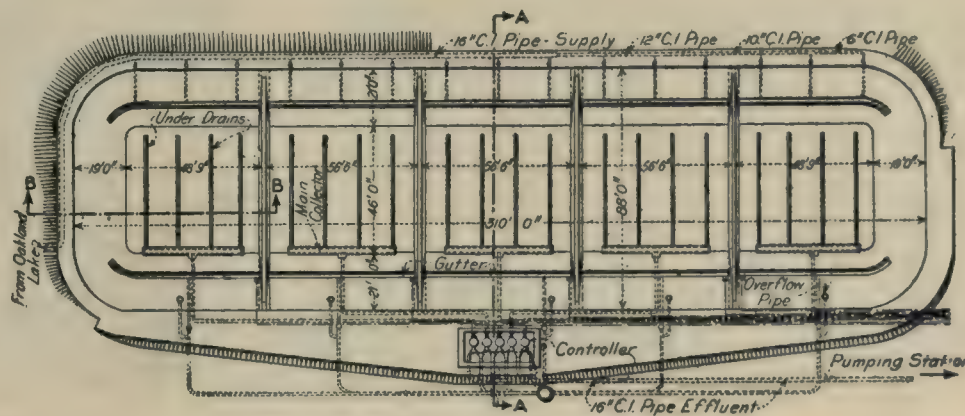
Slow Sand Filtration at Oakland Park, N.Y.

Features of Design of an Interesting Plant at Long Island— Notes on Operation and Cleaning—The "Brooklyn Method"

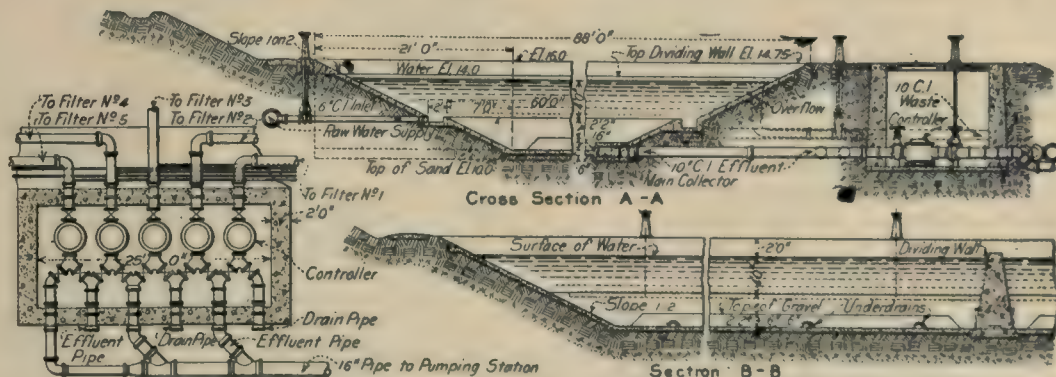
In order to reduce the shortage of the water supply in the third ward of the Borough of Queens, New York City, the flow from Oakland lake, located about one mile east of Bayside, Long Island, is to be made available for use by the installation of a slow sand filtration plant, on which construction is now in progress. The general plans for the work were formulated in 1907 by Mr. I. M. DeVarona, chief engineer of the Department of Water Supply, who submitted a report in which two

which could be made available by using the entire drainage area of the lake instead of the small portion at its southern end would be from 1,000,000 to 2,000,000 gallons per day and the purification plant was, therefore, designed to handle this daily quantity of water.

The plant comprises five uncovered slow sand beds, contained by concrete-lined earth embankments, separated from one another by plain concrete division walls, with battered sides, 4 feet wide at the base. The row of



Plan of the Oakland Lake Sand Filters



Transverse and Longitudinal Sections of Filters and Plan of Regulating Chamber

tentative slow sand filtration schemes were outlined. One of these involved the use of the Blaisdell machine for cleaning the sand and the other provided for hand washing; the latter method was the one finally adopted, and a site for filters chosen near the present Oakland lake pumping station.

Oakland lake has an area of about 17 acres and a drainage of 1.8 square miles. The lake is fed by springs at its northern end, which consists principally of marsh land. An embankment had been built across the upper end of the lake and the water collected behind it carried by gravity to the pumping station. The taste and odor of this supply, however, were rendered objectionable by growths of algae and there was always present the danger of contamination from a number of buildings on the watershed. It was estimated that the total supply

five beds is about 310 feet long and 88 feet wide, measured to the inside top of the embankments. The latter have a slope of 1 on 2 and the lining has a uniform thickness of 6 inches. Water from Oakland lake enters an intake at its northern end and flows by gravity through a 16-inch pipe to the filters. This pipe runs along the entire west side of the five units, reducing from 16 to 6 inches in diameter, and from it three 6-inch branches are taken off for each bed making 15 in all. The lateral lines are each controlled by a 6-inch gate valve and all of them are carried through the sidewall embankments so as to discharge into a concrete gutter cast in the lining of the basin. On the opposite side of the basin a similar gutter is cast, its top being just at the elevation of the sand surface.

These gutters are to serve as carriers for the removal

of the dirty wash water during the cleaning of the sand. The method to be used is the Brooklyn method, employed successfully at Hempstead, L. I. When the clogging becomes excessive the water above the sand is to be drawn off, the gates on the effluent pipe closed and the one on the waste pipe leading from the concrete gutter to a nearby creek opened. Raw water from the inlet pipes will then be turned onto the bed and allowed to flow across the sand and into the waste gutter. The depth of water will be limited to an inch or so and the sand surface will be raked by hand. This dirt thus loosened will be carried off into the waste channel by the transverse stream of water and the raking continued until a clear effluent has been obtained. The bed will then be smoothed over and its regular operation resumed. The chief advantage of this method of cleaning is that it does not require the removal of the sand from the bed.

The filtering material will consist of 26 inches of sand and 16 inches of gravel, the latter covering lines of 10-inch split tile pipe which serve as the lateral collectors. The depth of water above the sand surface is to be 4 feet. The lateral collectors, of which there are four to each bed, discharge into a main concrete collector from which a 10-inch effluent pipe leads to the regulator chamber.

The regulator chamber measures 11 x 25 feet inside and contains five rate controllers of the balanced valve type. The general arrangement of the piping is shown in one of the drawings. The water leaving the controllers passes into a Y-branch with valves on either leg so that the filtered water may be passed either into a 16-inch cast-iron pipe leading to the pumping station or into 10-inch waste pipes which discharge into a creek nearby. It is expected that the filters will be operated at a rate of about 4,000,000 gallons per acre daily.

A Small Re-inforced Concrete Roof

A building in course of construction in South Bend, Ind., has on the top storey a public hall covering the full size of the building, about 62 x 66 feet, and the owner conceived the idea of a roof garden in connection with this hall and called on the writer to design a roof which would answer his purposes, not only to take the live load desired, but which would be waterproof and at the same time sightly.

The framing of the roof skeleton consists of three roof trusses which set about 16 feet on centres and transversely to the roof trusses are lines of steel beams resting from hangers attached to the top chord of the trusses, the beams being about 6 feet on centres. The concrete roof beams are therefore supported on four sides, 6 feet one way and 16 feet the other, but the roof is designed and built as a monolith, reinforced in both directions.

The entire concrete floor slab rests on its outer edges on the brick wall and expansion is provided for by an annular space 1 inch wide, extending entirely around the slab, the slab itself resting on galvanized strips which were heavily oiled. The slab in $3\frac{1}{2}$ inches in thickness for 6-foot spans and the reinforcement consists of cup bars $\frac{3}{8}$ inch in diameter, spaced 6 inches on centres and lapped about 50 diameters, while transversely, to take care of expansion, are also placed cup bars $\frac{3}{8}$ inch in diameter, spaced 12 inches centre to centre, and having the same efficient lapping.

The concrete was composed of a natural gravel, which was practically free from loam and dirt and graded from coarse sand to pea gravel and larger, but no large stones or pebbles were found.

As tested, the gravel showed about 20 to 22 per cent. voids and, in order to use a concrete uniform through

the entire thickness of $3\frac{1}{2}$ inches, so that a mortar coat could be worked up and made a smooth finish when floated and troweled, the mix decided upon was 1 part of Portland cement and $3\frac{3}{4}$ parts gravel.

The concrete was thoroughly mixed in a mechanical mixer, using what may be termed a wet mix, and when floated and troweled presented a fairly good sidewalk finish, and after the forms were removed from under the slab, a good smooth surface was found.

The excess of cement to fill the voids was used not only for the purpose of making a strong concrete, but also to have the natural concrete as nearly waterproof as possible.

In addition, however, to this condition of providing against leakage, the surface will be coated with a waterproofing compound called Liquid Konkerit, which has the natural cement color, but so far no leakage of any description has been discovered.

The roof has a pitch of about $\frac{1}{4}$ inch to the foot, which is the same pitch as is commonly used in sidewalk work, and the result is practically a flat surface, making a desirable floor for the roof garden.

As the contractor had named a minimum price of 35 cents per square foot for the roof exclusive of the trusses or beams, it was decided to do the work by day labor, allowing the contractor \$5 per day for his general supervision.

The cost of the roof is covered by the following items, which under more favorable conditions, could be materially reduced as, on account of scarcity of labor, some carpenters had to be impressed for this work.

Common labor was paid 25 cents per hour; carpenters were paid 35 cents per hour; cement finishers and engine men were paid 50 cents per hour.	
Labor erecting scaffold and forms	\$ 146.35
Cost of labor on cement roof	230.45
For use of mixer, hoisting engine and supplies	69.85
Lumber for forms and galvanized iron	122.28
Contractor's time	115.00
Steel bars	97.46
Gravel	49.50
Cement	141.75
Waterproofing	60.00

Total	\$1,032.64
Credit for flooring	30.00

Total	\$1,002.64
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Based on 4,000 square feet of roof surface, this shows a cost of 25 cents per square foot, or a saving of \$400 on the contractor's bid.

A meeting of the Metropolitan Parks Commission, of Montreal, was held in that city recently, when several questions affecting general improvements were discussed. The principal of these were the advisability of acquiring certain portions of land adjoining the western part of Mount Royal Park, the construction of parkways along the line of the new aqueduct at present being built by the city, and the acquiring of land in Maisonneuve for the erection of a public park, after the lines of the Lafontaine Park. It was decided that the members of the commission should take a trip to Boston and New York, to study improvement work in those cities.

The Canadian Bridge Company, Walkerville, Ont., are commencing the erection of the steel work for the new Cambie street bridge at Vancouver. Resident Engineer Moss is in charge of construction. The sub-structural work, which is being carried out by Messrs. Palmer Bros. & Henning, is nearly completed.

Albert Street Subway, Regina, Sask.

This work was ordered by the Railway Commission, who apportioned the cost between the Canadian Pacific Railway and the city of Regina as follows:—The Canadian Pacific Railway to pay for all the concrete work and the steel work; the city to pay for the earth excavation, pavements and side-walks; the land damages to be assessed equally between the company and the city.

The work involved over 4,000 cubic yards of concrete, 3,500 yards of earth excavation and 8,000 lineal feet of piling, in addition to the steel bridge to carry four

is by far the largest sub-way west of the Great Lakes. The contractors for the work are the Parsons Construction & Engineering Company, Limited, Regina, Sask.

Live steam for cleaning forms is employed by the Stewart-Kerbaugh-Shanley Company on the stretch of the Catskill aqueduct known as contract two in the town of Olive and Marbletown, N. Y. The forms are of steel of the Blaw type and the steam is played on them with a hose each time they are stripped from a section of finished aqueduct. The steam is said to be more ef-



Construction of the Albert Street Subway, Regina—Contractors: Parsons Construction & Engineering Co., Ltd.

tracks. Operations have been carried on continuously since the date of commencement, without interruption to railway traffic, by means of the construction of two temporary pile bridges, as shown in the photograph. The subway has approaches from Albert street, South Railway street and North Railway street. The total length on Albert street is 682 feet, on South Railway street, 325 feet, and on North Railway street, 225 feet, making a total length on all streets of 1,230 feet. This

is more efficient than a stream of water and has the additional advantage of drying the surfaces quickly so that the man who oils the forms follows only a short distance behind the one with the steam hose.

The total for building permits issued at Hamilton, Ont., last month was \$324,500, and for the year to date, \$2,552,700. Unusual activity is expected in all branches of the building trade next year.



Progress view of above work—Total length of Subway and Approaches, 1,230 feet.

The Evolution of Rapid Sand Filtration

**Application and Functions of the Mechanical Filter—Details of Settling Basins
— Automatic Operation Desirable — Coagulants — Architectural Appearance**

BY F. B. LEOPOLD.

Rapid sand filtration is the result of an evolution from what was originally known as the mechanical filter, a closed steel tank, in which was installed a system of gathering pipes and strainers covered with $2\frac{1}{4}$ feet or 3 feet of sand; the water was applied directly to this tank after the injection of a coagulant solution and passed through the sand and gathering pipes on to the distributing system. These mechanical filters used on a turbid water soon clogged with the contained silt, and required frequent washings with the consequent waste of large quantities of water. The gradual filling of the entire sand bed with deposit necessitated repeated renewals of it at considerable cost, the results were generally indifferent and often unsatisfactory.

The next step in this evolution was the wood gravity filter, with a mechanical rake operated by power to assist in the cleansing of the sand. Following this the addition of tanks for sedimentation, and treatment before application to filters, and gradually to the fully developed plant of to-day as exemplified at Harrisburg, Wilkesburg and McKeesport, Pa.; Lorain, Toledo, Cincinnati and Columbus, Ohio; New Orleans, La., and many other cities. There are to-day upward of 325 plants of this type in operation representing practically every stage of development up to the present state of perfection.

The size, shape and arrangement of settling basins at the present time are probably subject to more divergence of opinion than any other feature of the plant. Advocates of different arrangements advance arguments and results of experience to back their views.

The object to be attained is, of course, such shape or arrangement as will insure as nearly as possible a movement of each particle or drop of water from the inlet to the outlet at the same velocity, and this is much more difficult to accomplish than it seems to the ordinary observer.

In the writer's experience he has reached the conclusion that the shape of the basin may be varied to best suit the location, but the travel from inlet to outlet should be as long as possible without increasing the velocity flow sufficiently to overcome the gravitation of the suspended matter beyond the point of a nearly uniform settlement over the surface of the floor of the basin. The flow should in all cases be horizontally, and the depth of the basin should be as little as economical construction will permit.

A deep basin of any shape is to be avoided, and a round basin of any depth equally so; the size or flow capacity will depend upon the character of the water to be filtered.

The inlet distribution and the outlet gathering from the basins are important considerations and will materially affect the uniformity of displacement as well as the application of coagulants. The next part to consider is the filter beds themselves. The general design of these is now practically established, and except in details, some of which may be advantageous over others, do not materially vary in principle. These consist of rectangular reinforced-concrete boxes in the bottom of which are built an underdrain system, above which is placed a layer of gravel; on top of this the sand bed, and above the sand bed distributing troughs.

The method of conveying the water from the sedimentation basins to the filter beds will vary with conditions, but the general principle should apply to keeping the velocity in the conduit as low as possible and avoiding whirls and eddies due to numerous sharp bends.

The essential feature in design is to render the plant as nearly automatic as possible in the performance of its functions, thereby avoiding the element of error or neglect on the part of attendants. To this end all possible mechanical appliances for the proper control of operation should be taken advantage of, such as the installation of level controllers in basins, rate of flow controllers on effluent of filters, for maintaining uniform flow, loss of head gauges for recording the friction head lost in operation and indicating the proper time for washing beds, the continuous flow of visible samples from each individual bed, devices for electrically or hydraulically operating valves, the regulation and recording of coagulant, methods of application of wash water and compressed air where used.

These devices are manufactured in a wide range or variety and limitations corresponding to cost by the standard filter builders and it only requires proper knowledge to select such as the size, type of plant and water to be treated may render most suitable or desirable.

In the matter of coagulant, the character of the water will, in a large measure, determine the substance to be used, but plants generally should be equipped for the use of either sulphate of iron and lime or sulphate of aluminum in connection with hypochloride of lime.

Passing the filter, we now come to the clear water storage; the only thing to be considered here is the capacity of storage required, and this must vary with individual conditions. In any case it should be in concrete-covered basins, whether at the location of the plant or as a distributing reservoir located at a distance.

Every water supply, whether purified or not, should have in connection with its supply plant a properly equipped laboratory, and, of course, a purification plant could not be considered complete without one. Here careful daily tests and examinations should be made and complete records of all operations kept.

There is one point where improvement can and should be made, and it is up to the municipalities to do it. That is in the architectural appearance of construction. Probably no public improvement attracts more visitors, both local and transient, than a purification plant, as it is permanent construction. More attention and money should be devoted to appearances. It would be repaid many times over in advertising effect alone.

Filter Plant Operation

In a paper before the Central States Water Works Association Mr. Paul Hansen, State Sanitary Engineer, of Kentucky, discussed the obligations of water-works superintendents to furnish the public with water of a sanitary quality; and in this connection made the following suggestions concerning filter plants:

"It is unfortunate that the spur of competition, combined with a desire on the part of many municipalities and water companies to secure an installation at very minimum expense, has resulted in the erection of many filter plants unworthy of the name, and which have done much to throw discredit upon the process of filtration in general. Added to this, there is often a lax and unintelligent operation of filter plants, under which conditions even the most carefully designed and constructed installation will fail to give acceptable results. The

first duty, therefore, of the water-works superintendent with respect to the improvement of a surface water supply that cannot be adequately protected against the possibility of pollution by patrolling the watershed is to use his influence with the people, the city officials, or his company (should the water-works be privately owned), to install a suitable filtration plant; and he should, furthermore, see to it that competent engineering advice is obtained to insure a design that represents the very best in filtration practice, for he it remembered that the filter plant stands as a bulwark between disease and the consumers.

"This much accomplished, the superintendent should set about to secure intelligent and reliable operation of the plant. In large installations this is best accomplished by employing a trained filter operator, who should be an analyst. When the size of the plant does not warrant this expense the superintendent should himself master the operation of the filters, and should acquire such knowledge of analytical methods as will enable him, with the occasional assistance of an expert, to maintain daily analytical control over the performance of his plant. Such analytical control would involve at most the following determinations: (1) Turbidity; (2) alkalinity; (3) total number of bacteria, and (4) the presumptive test for the colon bacillus. There are now engineers and other experts having laboratories who are prepared to undertake just this sort of co-operative control over filter plants with local water-works superintendents."

In case filter plants can not be or have not been installed for one reason or another, Mr. Hansen suggests the use of disinfecting by hypochlorite of sodium or of calcium. The writer is not prepared to state to what extent definite treatment may take the place of filtration, but it should be observed that disinfection does not remove any of the objectionable physical characteristics of the water; and, moreover, it is apt to impart a medicinal taste to the water which is almost certain to give rise to popular complaint. It should also be observed that different waters require different treatment, and under no circumstances should the hypochlorite treatment be adopted until an expert has been consulted."

Sewer of Interlocking Concrete Pipe

Interlocking, pre-cast concrete pipes are used by the city of St. Paul, Minn., in the construction of an extensive system of sewers known as the Portland-Aldine system. This system embraces about four miles of tile laterals, varying from 9 inches to 24 inches, which discharge into the trunk sewer of concrete pipe. There is about 8,000 feet of this pipe, varying from 3½ feet to 6 feet in diameter. This section runs in open cut to a point near the Mississippi Boulevard, on the high bluff above the Mississippi River, where it terminates in a shaft, dropping the grade 130 feet to a concrete lined tunnel, 1,400 feet long, which discharges into the river.

The interlocking reinforced pipe was made on the ground. The pipes are made uniformly in lengths of three feet. The ends are designed so that they key into each other, similarly to a bell and spigot, with the reinforcement interlocking between sections. A small space is left for a mortar joint, which produces a continuous water-tight pipe line when sealed. The pipe sections are cast in steel molds.

The reinforcement consists of flat steel hoop bands, spaced about 1 foot apart, and longitudinal flat bars, slotted into the bands at the intersections, and projecting slightly beyond the face of the concrete in the ends of the pipe to form hooks into which the corresponding bars of the next pipe lock. The number and size of reinforcing bars vary with the size of the pipe, but the steel runs in general about ¼-inch thick and from 1½ inches to 2¼ inches in width.

The steel forms for the pipes are made of several sections of sheet metal, which are clamped up on a cast iron base and bound by steel hoops at the top. The cast iron base is shaped to form

the socket of the pipe on the bottom, while the key in the top is formed by a shaped ring, which is clamped on and concreted after the body of the pipe has been cast.

Concrete for the pipes is mixed in the proportion 1 cement to 5 pit gravel. It is mixed in a Smith mixer and delivered to wheelbarrows which are lifted and emptied into the forms by the barrow-men. The concrete is compacted and worked in the form with a narrow tool. The forms are thoroughly cleaned and oiled before being erected. They are removed in one day, cleaned, and set up at another point further along the line of the sewer. In this way, the pipe work precedes the excavation, and pipes are distributed along the line of the work as needed. They are kept far enough in advance of the pipe laying to permit a thorough curing before they are put in the work.

The excavation of the sewer trench is being handled by a steam shovel and a cableway. The material is clay, underlaid by sand and gravel. A Vulcan "Little Giant" shovel with a long boom is supported on timbers laid across the trench. It takes out the bulk of the material. The trimming is done by hand, and the material loaded into buckets on the cableway. The trench is from 18 to 21 feet in depth.

The concrete pipes are rolled to the side of the trench on timber runways, and then picked up and carried to place by the cableway. The trench is back-filled over the pipe by means of a large scraper, and with the aid of the cableway.

The tunnel section of the sewer is elliptical, with diameters of 4½ feet and 6½ feet. The top of it is in rock, and requires no lining. The lower half is lined with concrete, with a granite block paving in the bottom. The shaft leading from the pipe section to the tunnel is lined with glazed brick.

According to information received from Penticton, B.C., thirty-five miles of the Kettle Valley line between Midway and Bull Creek are now under construction, a gang of some 200 men being employed. The preliminary survey line from the hydraulic summit of the divide between Penticton and the Kettle River district to Penticton has now been run for ten miles, and will, it is expected, be completed before snow falls.

At Victoria, B.C., a dispute over the city's method of awarding tenders has resulted in the resignation of the city solicitor. The facts as reported are that the Worswick Paving Company have submitted a number of tenders for street paving. The company's tenders have been based (a) upon the specifications of the City Engineer and (b) upon specifications prepared by the company itself. In every case, as we understand the circumstances, the concern has obtained its civic contracts upon bids based upon its own specifications. The question as to the legality of contracts so awarded was never raised until other companies entered the field and asked for equal treatment with the Worswick Company. Only when a rival paving company appeared and secured a contract upon precisely similar conditions as had been accorded the Worswick Company did the city solicitor make the belated discovery that the whole thing was irregular and that ratepayers could not be held liable for the cost of works executed under such a system. He resigned on account of his inability to convince the city council of this "irregularity."

The J. I. Case Threshing Machine Company, of Racine, Wis., have hit upon a practical plan for furthering the interests of the good roads cause in Kenosha County, Wisconsin. With a view to giving this and the neighboring County of Racine an object lesson, the company has made an enterprising proposition to the authorities, namely, to furnish the necessary machinery, consisting of 10-ton road rollers, engines, scrapers and other equipment, together with a full complement of men, for the construction of a model road between Racine and Kenosha, the only condition being that the authorities deliver and spread the necessary gravel and supply culverts for drainage. There is general confidence in J. I. Case products, and it may be ventured safely that the proposition made by this progressive concern will be taken up.

The Contract System vs. Day Labor

Some Pertinent Observations by a Toronto Paving Contractor—Concerning Various Civic Expenses that should properly be Charged to Day Labor

Toronto, Nov. 3, 1910.

Editor, "Contract Record":

I have read with interest all the articles and communications appearing in your recent issues under the heading of "The Contract System vs. Day Labor" in the carrying on of civic work. It appears to me that there is much yet to be said against day labor, particularly as it is worked out in Toronto, where the Local Improvement law prevails.

Assistant Engineer Powell in his communication, speaking no doubt for the department, says: "The engineer is, of course, anxious to do his own construction work." I quite agree with him that he is anxious to do his own construction work. But why should he be? Would it not suit him just as well to have it done by contract so long as he had the making of the specifications and the supervision of the work? What a lot of trouble it would save him, and how much more time he would have to devote to his legitimate engineering duties! And how much more would be the saving to the city in this way! How frequently has he been brought on the carpet by the City Council and Board of Control, charged with delay and inefficiency with regard to his engineering duties! And the burden of his excuse has been: "too many duties;" "too much to do;" "overworked." What a saving there might have been to the city in fees for expert engineering advice if our engineer had devoted his whole time to these duties instead of chasing after this day labor business! Take for example his having to send to Chicago for an engineer to come to Toronto to tell us where our street cars should turn after delivering their passengers down town, or in what direction the currents of the lake run in the vicinity of the city, and other such local matters. Who should be the best expert in these matters but the engineer, who has spent most of his life in the service of the city? And he would be, were not so much of his time taken up with looking after the detail work connected with the carrying out of his desire to do his own construction work. These arguments apply equally to day labor in other large cities.

However, my primary object in this communication is to point out some of the reasons why civic paving work under the local improvement provisions of the Municipal Act should not be allowed to be done by day labor—and **would** not be allowed, for one instant, to be so done, were the works carried on under a commission instead of under the municipal system.

The Local Improvement Act demands that the whole cost of the work be levied against the property benefited, the city paying its proportion on the frontage at street intersections. This intention is carried out in all cases where the work is let by contract, but not where the work is done by day labor.

Take the streets that have been previously paved and paid for under the Act. The material on it belongs to the property owners who paid for it; yet, under the specifications, where a new pavement is being put down, the contractor is bound to carry all this material to the city's yard, and the property owners on the street are thus not only deprived of the benefit of its value, but they are charged (as part of the cost of the new pavement) with the expense of hauling it away. The city afterwards uses the material in day labor work, instead of giving those who paid for it the benefit of it.

Take for instance the pavement now being laid on Yonge street, from King to Front. It was previously paved with stone blocks. These blocks are being hauled by the contractor to the city's yard at Frederick street, and the cost of

hauling is part of the expense of the new pavement. Now if the specifications provided that this material went to the contractor, the tenders for the work would be that much less, and the property owners would thus rightfully get the benefit of their own material in the reduced cost of the new work.

But following up what becomes of this material: those of these blocks fit for use are again used by the city engineer in his day labor work, or if they are unfit for use again as blocks they are crushed by the city into broken stone and are worth \$1.10 a ton at the crusher for this purpose. Thus the engineer gets broken stone for the cost of crushing it—about 20 cents a ton, while the contractor pays \$1.30 for his crushed stone. Thus the ratepayers on one street are being robbed of their material, while those on another street—if they are fortunate enough to have their pavement laid by day labor—get a corresponding benefit, and the engineer comes out at the end of each year and reports that he has saved the city so many thousands of dollars by the use of day labor. This is going on continuously with regard to all kinds of valuable material that is taken off the streets where the old work has been done and paid for under the local improvement system. And yet the engineer persists in saying that he competes with the contractor on equal terms.

But this system of robbing Peter and dividing up with Paul is not the only objection to the day labor system as applied to Toronto.

The city, several years ago, at a very great expense, purchased and paid for out of the general tax, an asphalt plant, ostensibly to make repairs to asphalt pavements on expiry of the contractors' guarantee period—and to this extent may have been justified. But to what use has it been turned in connection with the engineer's pet day labor business? Not merely to enable him to compete for new work on most uneven terms with the contractor, but to distribute unfairly the cost of the work. Why should he have Jarvis and other streets re-surfaced with asphalt as a local improvement to be paid for by the ratepayers on the street, and give the ratepayers on other streets, such as Dupont street from Avenue road to Walmer road, a new asphalt surface at the general expense? The ratepayers on one street are not only made to bear the whole of the expense of their own improvement, but to contribute to the cost of the others? If these streets had been resurfaced under contract let by tender, the cost would necessarily have been done as a local improvement, but under the system as operated in Toronto the engineer is enabled to slip the cost through under the guise of asphalt repairs.

These are only some of the instances of how the day labor system is being worked out at the City Hall, which justifies one in asking whether these liberties do not constitute one of the reasons why the engineer is anxious to do his own construction work.

It would be interesting to figure out how much of these "savings to the city," reported by the engineer from year to year under his day labor system, has been taken from the city at large by reason of the city's bearing the cost of civic yards, office accommodation, material, plant, implements, wages, insurance, repairs and daily expenses, etc. The contractor has to provide for these items, but they are not included in the making up of the cost of work done under day labor. What a complex set of books and accounts would have to be kept in the Engineer's Department to make each local improvement bear its own proper share of the cost

of all these various items that should properly enter into the cost of the work!

If the city is going to carry on a contracting department, why not have it separate and distinct from the engineering work, and run on business principles? If this were done the contractor would have little to fear so far as the cost of the work is concerned from the competition. But then, this would be illegal, as the city has no power or authority under the Municipal Act to carry on any such general business. As well might it undertake to go into any other line of business, such as constructing the people's houses or running a departmental store to supply them with goods so as to reduce the cost and incidentally drive the legitimate business man to the wall.

These are only some of the objectionable features of the day labor system as against legitimate contract work, but I will not take up more of your space now. In my next I will give you some more observations, and also some further reasons that appear to me to indicate why the engineer and some of the civic representatives are so strongly in favor of day labor.

Yours truly,
James Pearson.

Trade News from Winnipeg

It is estimated that perhaps 7 to 8 per cent. of construction awaits completion, and with a plentiful supply of labor and material, the chances are good for this.

In the statement that the building year has practically closed, reference is made only to new works of magnitude, of which there appear to remain these two bank structures.

The season has been marred with only one labor dispute of any consequence. There have been no undue inflations of the supply market. Everything is in excellent shape for 1911, the prospects of which are discussed freely. Probably at no other like period of the city's history has an optimistic outlook been more justified.

With the active building season practically closed, contractors may well look back upon 1910 as a banner year. With the great influx of building activity, the supply houses have increased and manufacturing concerns have had to enlarge their plants in order to obtain a larger output. While everybody predicted a good building year at Winnipeg, few expected to see last year's total exceeded by five millions! Of the exceptions may be mentioned Building Inspector Rodgers, who made a forecast of fifteen million dollars. With nearly two months to go, there is something more than a million dollars required to make up this total. Of this amount the Bank of Commerce permit will supply more than \$700,000 and that for the Sterling Bank the remainder.

We have received from the Manitoba Bridge and Iron Works, Limited, Winnipeg, a copy of their latest catalogue on structural steel and iron products. In this catalogue various illustrations and tables will be found which enable any architect or contractor to determine just which sections and weights for the different members in the design can be used to best advantage.

To the Robb Engineering Company, Limited, Amherst, N.S., we are indebted for catalogues of steam boilers and steam specialties and also an illustrated description of the Robb-Mumford water tube boiler. Readers of the "Contract Record" interested in these lines do well to investigate the claims made for these goods.

Building permits issued to date at Brantford, Ont., represent a total of \$519,000. The previous record was \$509,000 for the whole of 1907.

Canadian Railroad Development

The Canadian Pacific Railway is to construct a dam on Bigstone Creek, near Red Deer, to form a 1,000,000-gallon reservoir.

McMillan Bros., Winnipeg, Man., have started work from the Entwistle end of their 70-mile contract on the main line of the Canadian Northern Railway, west of Edmonton. Work is to be carried on all winter. Sub-contractor Phillips now has 300 men at work near Entwistle.

The members of the Transcontinental Railway Commission and C. M. Hays, president of the Grand Trunk Pacific Railway, recently spent some time in Quebec looking over the proposed site of the Transcontinental terminals and the available localities for the erection of work shops for wharf extensions.

The Canadian Pacific Railway, according to a statement of William Whyte, Vice-President, will probably not take up the building of the proposed Sedgewick-Stratheona cutoff on the Winnipeg line, which now joins the Calgary and Edmonton at Wetaskiwin until next year. This is one of the important branches to be constructed, owing to its reducing the distance from Winnipeg to Stratheona on the C. P. R. to within twelve miles of the new connection of the Grand Trunk Pacific.

Assurances have been given that at the forthcoming session of Parliament an appropriation will be made for the commencement of the construction work on a new Welland Canal. The original idea was to enlarge the present canal from Port Colborne, 10 miles, and then construct a cutoff. Surveys, however, are said to have disclosed a dangerous bed of quicksand on the route of the cutoff, and an entirely new canal is now proposed. It would start about 6 miles west of Port Colborne and have its outlet at the mouth of the Jordan river, a distance of 22 miles.

A case of interest to sub-contractors on the Transcontinental railway was that of the Traders Bank vs. Swan Swanson, of Dryden, Ont. The bank sued and secured judgment on a note made by Swanson for \$32,000. Swanson admitted the debt, but said that the arrangement with that bank was that the note was to be renewable until he secured the money for his sub-contract from the government contractors. This amounts to about \$68,000 and is held back on account of the dispute between the engineers of the Transcontinental Commission as to classification. Mr. Justice Latchford held, however, that the note was due and rendered judgment accordingly.

Good headway is being made by the Dominion Government in determining the final route of the proposed Hudson Bay Railway, from The Pas to Hudson Bay. Survey party No. 1, in charge of Engineer W. J. Clifford, has returned from its work on that section of the line known as the first section, located between The Pas and Landing Lake, a distance of about 200 miles. The two other survey parties in the field, in charge of Engineers F. P. Moffat and J. P. Gordon, are rushing the work in their respective sections as fast as possible and before another year has passed the Government hopes to be in possession of enough detailed information to allow the commencement of construction on the railroad.

The Portland Canal Short Line Railway Company, a MacKenzie & Mann project, is to apply to the legislative assembly of British Columbia at its next meeting for amendments to its charter. The legislation now sought is to authorize the company to extend its line from the terminus at present provided for (some 16 miles out of Stewart, B. C.) in a general easterly direction to the eastern boundary of the province, at or near where the Peace river intersects the boundary, from which point it would naturally be extended under an Alberta charter to connect with the existing Canadian Northern services at Edmonton. A Dominion charter will also be sought for this new road.

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Personal News and Notes

Calgary spent over half a million dollars in new buildings last month, the exact total being \$568,490, as compared with \$403,050 for October, 1909.

At London, Ont., building permits issued to October 31, represent a total of \$710,315, compared with \$780,504 for the corresponding period of 1909.

Mr. C. W. Sharpe, chairman of the Winnipeg Parks Board, has submitted to the Board of Control a proposal for a fine boulevard encircling the city. The cost is not expected to exceed 20,000.

Mr. F. W. Morse, of Montreal, formerly vice-president and general manager of the Grand Trunk Pacific, has been appointed general manager of the Alton and Clover Leaf Roads, with headquarters at Chicago.

Mr. W. P. Tierney, of the railway construction firm of Tierney & Company, reports good progress on his ten-mile contract for the C. N. R. in British Columbia between Matsqui and Sumas river. Labor is reported by Mr. Tierney to be fairly plentiful now that work on the coast is easing up for the winter months.

A recent visitor to Montreal was Mr. J. W. Stewart, of Foley, Welsh & Stewart, the well-known railroad contractors. The objective of Mr. Stewart's visit was a conference with President Hays in regard to G. T. P. construction work. During the past year Mr. Stewart has been almost constantly at the coast supervising the construction from Prince Rupert to the Yellowhead.

Mr. Peter Lyall, Jr., of the Lyall-Mitchell Company, Winnipeg, returned to that city last week from Toronto, where he had been to make final arrangements for the erection of the new Bank of Commerce building in the western capital. The proposed structure will have a frontage of 104 feet on Main street, and will cost approximately \$750,000. The building will rest on thirty caissons, approximately 50 feet deep to rock. It will be fireproof throughout, and is to be ready for occupancy by June, 1912.

Over a square mile of buildings has been demolished in the construction of the new terminal facilities at Montreal for the C. P. R. Remarkable progress has been made with this work, upon which some 300 men are engaged. Twelve of the twenty new tracks are already in use. Work on the Notre Dame street viaduct is proceeding rapidly and all the concrete foundations are in place. The new station building itself is beginning to take shape and much of the necessary steel work is already up. Great changes are contemplated for the Place Viger hotel, which will be considerably added to, making it one of the finest hotels on the continent.

Dr. J. A. Waddell, of the firm of Waddell & Harrington, consulting engineers, Kansas City, paid a visit recently to Vancouver, B. C. This firm designed the Granville Street and Westminster Avenue bridges, at Vancouver, and are at present at work on the Cambie Street bridge, the construction of which is progressing favorably. Messrs. Waddell & Harrington have submitted plans to the Burrard Tunnel and Bridge Company for the Second Narrows bridge, which is in the vertical lift class. The firm have just completed two small plain bridges at Portland and have two larger ones under construction. One of these is to cost a million and a half dollars, while Mr. Waddell estimates that a bridge across the Second Narrows would cost about \$1,300,000. We understand that there are only three vertical lift bridges in America at the present time, and that the Kansas City firm have built all three. They anticipate great activity in bridge construction in British Columbia, and are making every effort to develop their business in that province.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Chatham, Ont.

Tenders for excavation of the Sinn Cooper Drain Raleigh will be received until Nov. 21st. P. R. Clark and S. S. Gilhulah, commissioners.

Coquitlam, B.C.

The clerk has been instructed to write to New Westminster city council regarding the laying of the new water pipes along the roads in Coquitlam.

Eastview, Ont.

A petition will be presented to the Eastview village council at its next meeting asking that drain be built along Montreal road, which would empty into the Ottawa trunk sewer.

Gleichen, Alta.

A new system of waterworks is being planned by R. B. Owens, provincial engineer.

Montreal, Que.

Waterworks Superintendent Janin in his report on the cost of filters estimates the cost as \$2,000,000, of which \$1,680,000 is for the filtration system, the rest for land. Further expenditure in the near future to make the water supply adequate for the growing needs would amount to about \$2,300,000.

Oshawa, Ont.

The town has purchased a sewage farm near here.

Rosemount, Que.

The Board of Control will be asked to provide for the laying of new pavements, of new concrete sidewalks, and fire service.

Sault au Recollet, Que.

The ratepayers will vote on an \$80,000 by-law for a municipal water system, etc.

South Vancouver, B.C.

The council resolved at its meeting to ask the city of Vancouver to join with them in engaging the services of an engineer to take up the special work of planning a sewerage system covering both districts.

St. Stephen, N.B.

Until Nov. 30 tenders will be received for \$25,000 36-year, 4 per cent. waterworks debentures. J. T. Whitlock, chairman finance committee; J. Vroom, town clerk.

Trail, B.C.

Until Nov. 21st tenders will be received for \$15,000 6 per cent., 20 year waterworks debentures. W. E. B. Monypenny, city clerk.

Toronto, Ont.

The city engineer will allow a trial of 3-inch asphalt blocks instead of 4-inch in paving down town business streets.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until Nov. 22nd for 1 10-ton hand operated travelling crane at high level pumping sta-

tion and one 15-ton hand operated travelling crane at main pumping station.

A by-law will be submitted to the ratepayers next January to raise \$100,000 for the improvement of roads leading into Toronto. \$100,000 has been appropriated by both the County of York and the Ontario Government for a similar purpose.

St. John, N.B.

At a special meeting of the board of works, it was decided to recommend to the council that the work of the Hassam Company in Main and Water streets be taken over. The engineer's certificates were before the members. The entire cost of the Main street contract was set down at \$18,266.23 and of the work in Water street at \$7,549.20.

Victoria, B.C.

The advisability of the extension of View street through to Government street now made possible by the recent fire, is being discussed.

The bylaw for the expropriation of the holdings of the Esquimaux Waterworks Company will in all probability be submitted to the ratepayers December 1. A. Smith, city engineer.

Wolseley, Sask.

The ratepayers will in the near future vote on a by-law to issue \$24,000, 5 per cent. road debentures.

Weston, Ont.

The pumping machinery for the mechanical pressure filter here will probably be placed in service about the first of the year. The American Water Softener Company is supplying the filters. The same company has supplied the T. H. & B. Railway with a water softening plant at Smithville, Ont., to be used in connection with the purification of locomotive water. A. C. Tomlinson, treasurer.

Winnipeg, Man.

The city council adopted the following: It being agreed that for the present the artesian water supply, with its possibilities of extension, is quite adequate, it was decided to obtain full information in regard to a satisfactory water softening plant. In view of the possibilities in the future, it was decided to have an exhaustive and accurate survey made of the possible sources of a permanent visible supply of water from the Winnipeg river, in order that the city may have all necessary information in readiness. Thirdly, it was decided that this is not an opportune moment for asking the people to vote on an expenditure of many millions for the immediate installation of a permanent, visible water supply plant.

AWARDED.

Chatham, Ont.

The Warren Paving Company will construct the bitulithic pavement on Queen street for \$2.38 per square yard and 55 cents for concrete curb and gutter.

New Westminster, B.C.

The Hassam Paving Co. received the contract for paving Third street, \$44,760,

being considerably lower than the next lowest tender.

Toronto, Ont.

The contract for laying the asphalt block on College street between Dovercourt road and Lansdowne avenue at \$40,720. Four tenders ranging from \$42,412 to \$48,811 were received.

Victoria, B.C.

The Worswick Paving Company will lay the asphalt on portions of Fernwood road, Rockland and Richardson streets. Completion called for by January 1st.

The tenders for waterworks supplies were received as follows and awarded: Brass goods, Miller Limited, London, \$12,636 (accepted); Andrew Sheret, \$14,338; Robert Mitchell Company, \$15,261; Crane Company, \$1,486; E. G. Prior & Company, \$15,826.25; Canadian Fairbanks Company, \$16,008; Galvanized iron pipe, A. Sheret, \$1,483.83 (accepted); Findlay, Durham & Brodie, \$1,486; Canadian Fairbanks Company, \$1,486; E. G. Prior & Company, \$1,497; A. J. Forsyth & Company, \$1,740; Galvanized fittings, A. Sheret, \$1,931.02 (accepted); Canadian Fairbanks Company, \$1,974.54; Findlay, Durham & Brodie, \$2,470; Lead pipe per 100 pounds, A. Sheret, \$4.10 (accepted); E. G. Prior & Company, \$4.19; Findlay, Durham & Brodie, \$4.48½; A. J. Forsythe & Company, \$4.97½.

Walkerville, Ont.

The Windermere road sewer will be put in by Thos. Chick, Windsor. Engineer, O. McKay, Walkerville.

Railroads, Bridges and Wharves

Fredericton, N.B.

The C. P. R. management have under consideration extensive additions and improvements to their yards here.

Chapel Cove, N.S.

Tenders are called until December 5th for construction of breakwater here by Public Works Department. R. C. Desrochers, secretary.

Montreal, Que.

Plans laid before the Metropolitan Parks Commission by Sir William Van Horne and Controller Wanklyn for increase of local transit facilities are as follows:—(1) A four-track subway under St. James street from the east side of the City Hall to a point to the west of the congested area; this subway to carry the through car service now using Craig, St. James and Notre Dame streets. (2) A three-track tunnel under Cote des Neiges Hill connecting the rapidly-growing residential district beyond the mountain with the west, and centre of the city; it was estimated that this could be done for a million dollars. The Commissioners will give the proposals the earliest possible study, and were evidently favorably impressed.

Owen Sound, Ont.

Town Engineer Macdowall has been authorized to prepare plans and submit estimates for a new bridge to replace the Tenth street bridge.

Ottawa, Ont.

City Engineer Ker has been given authority to recommend an expert engineer to act in conjunction with him in consideration of plans of entrance into Ottawa and general question of railway entrances into this city. The Government will have the appointment of another engineer to act with the city engineer and his nominee.

In regard to the high level bridge over the Rideau canal at Bank street, for which the deputation waited upon Hon. G. P. Graham, Minister of Railways, the estimates of bridge by Mr. Bowden, chief engineer of the Department of Railways and Canals, were \$165,000; that of City Engineer Ker, \$125,000. It is stated that in all probability estimates for the construction will be passed by Parliament at next session.

Red Deer, Alta.

The Alberta Central Railway Company has given notice of application to Parliament for power to construct, operate, etc., a line of railway in common, or as may be defined by the proposed act, from Saskatoon, easterly to Hudson Bay, with terminals at both Fort Churchill and Fort Nelson. The Alberta Central Railway Company has now under construction a line of railway seventy miles westerly from Red Deer, and forty miles easterly towards Moose Jaw. Solicitors, Smith & Johnston.

St. Joseph de Letellier, Que.

Tenders are being called until December 6th for construction of wharf by Public Works Department, Ottawa. R. C. Desrochers, secretary.

Stratford, Que.

Tenders are called until December 5th for construction of Landing Pier here by Public Works Department. R. C. Desrochers, secretary.

St. Thomas, Ont.

The G.T.R. purpose extending their yards which has necessitated their refusal to the request of the city for the opening of Inkerman street.

Toronto, Ont.

It has been decided to incorporate in one by-law the two schemes for the viaducts, instead of submitting the two by-laws on January 1. The combined schemes will cost approximately \$1,000,000.

It is reported that the entire south side of Macpherson Ave., from Poplar Pains Rr. to Avenue Rd., purchased two weeks ago ostensibly for the purpose of establishing a packing factory, has been transferred to the C. N. R. This will serve as a connection with their Electrical Development Company right of way with their Ottawa line.

Victoria, B.C.

At the coming general civic elections it is a foregone conclusion that a money by-law will be submitted covering the cost of an overhead viaduct affording an avenue of communication between Granville street and Westminster avenue at a point south of Pender street. The estimates for various proposed locations vary from \$281,000 to \$350,000.

The report of the city engineer, Angus Smith and A. M. Bannerman, chairman Streets Committee, for the construction of another public wharf on Dallas road in conjunction with the Victoria Chemical Company, was adopted by the committee.

The following were named on the committee to consider plans for the new bridge across the harbor connecting Johnson street with the Indian Reserve. Mayor

Morley, Ald. Bannerman, Mable and Sargison, J. S. H. Batson, A. E. Todd, George McCandless and T. C. Sorby.

AWARDED.**Lindsay, Ont.**

The contract for C. P. R. section commencing near Cambray and extending west of Lorneville has been awarded by the Toronto Construction Company to Johnston Bros., that for section between Cambray and Lindsay to Perry & Stewart.

Winnipeg, Man.

Wm. Newman & Company were awarded contract for new bridge on C. P. R. Pheasant Hills branch.

Public Buildings, Churches, Schools, etc.

Bellevue, Alta.

The Methodist Mission Board have decided to erect a church in the Crow's Nest Pass.

Battleford, Sask.

The ratepayers voted for building a \$25,000 municipal building.

Bassano, Alta.

The contract for erection of a school is to be let by the school trustees. They have been authorized by the provincial board of education to raise \$15,000 to erect a first class school.

Brandon, Man.

City Engineer Speakman is preparing plans for the installation of a steam heating system in the city hall and opera house. It is planned to use the steam from the Brandon Electric Light Company's plant.

Creston, B.C.

The Anglican Church here will erect a new church. Mr. J. W. Dow is interested.

Calgary, Alta.

Messrs. Hodgson, Bates & Butler are the architects in charge of the erection of the 8-room school mentioned in last issue.

Messrs. Lang & Dowler are the architects in charge of the erection of the 12-roomed school mentioned in last issue.

Carleton Place, Ont.

Mayor Cram and Reeve Pattee of Carleton Place waited on the minister of militia in Ottawa, asking that the site on which the former drill shed in Carleton Place stood be exchanged with the town for another site. If granted the old site will be converted into a park. The minister of militia said that the government may build an armory instead of a drill hall in Carleton Place.

Earl Grey, Sask.

\$35,000 will be expended for new town hall.

Edmonton, Alta.

The Methodists are to have an Austrian mission church erected.

J. A. Ruddick, Dominion Dairy Commissioner, wants the provincial government to subsidize a cold storage plant to be erected here.

Fort William, Ont.

Tenders were called until November 16 for installation of heating plant for central fire hall. H. S. Hancock, city engineer.

Grand Falls, N.B.

Tenders are being called until November 30th by the Public Works Department, Ottawa, for erection of public building here. R. C. Desrochers, secretary.

Grand Forks, B.C.

Tenders will be called for school house when Architect Lawrence, of the Public

Works Department, Victoria, has prepared the plans.

Hamilton, Ont.

The congregation of Chalmers' Church, Mt. Hamilton, will erect in the spring the proposed addition.

Hull, Que.

The city council of Hull has been considering the advisability of erecting a new hospital to cost \$35,000. The council is agreed about the construction, but the site has not yet been decided on. It will come up for final action at the next meeting.

Hamilton, Ont.

The members of the county council have taken first steps towards establishing a county House of Refuge, as required by an Ontario statute. It was decided that the council purchase the John McNiven farm, near Ancaster, consisting of 72 acres. It was also decided to have plans prepared for an institution costing not more than \$30,000.

Kindersley, Sask.

Tenders are being taken by H. C. Hutchinson for erection of Anglican church.

London, Ont.

The police station has been condemned as unsanitary by Dr. T. V. Hutchinson, M.H.O.

Mr. John M. Moore, architect, is preparing plans for the remodelling of the police station.

The movement to erect new Masonic Temple gains headway, the stock beting taken up readily. C. W. McGuire, president. Noted in issue of October 12th.

Melville, Sask.

The town is to have a municipal hockey, curling and skating rink.

Medicine Hat, Alta.

W. T. William, architect, is completing plans for a new school building.

Montreal, Que.

Seventeen tenders were received for tracts of land to be used as an exhibition ground. These were referred to a special committee. Ald. L. A. Lapointe is interested.

The Board of Control have recommended that \$40,000 be spent in rebuilding the smallpox hospital situated on Moreau St.

Nelson, B.C.

Tenders are being called until November 28th for additions and alterations to the public building here by the Public Works Department, Ottawa. R. C. Desrochers, secretary.

Nanaimo, B.C.

Tenders are being called until November 28th for additions and alterations to the public building here by the Public Works Department, Ottawa. R. C. Desrochers, secretary.

Ottawa, Ont.

The building committee have decided to call for tenders for the building of an addition to the Detention Home. H. A. Hazelgrove, architect.

The Children's Aid Society of Ottawa will ask the Provincial Government to build a hospital for weak-minded children in eastern Ontario.

The directors of the Central Canada Exhibition Association have appointed a committee to prepare a plan for the drives and location of new buildings in the grounds. The machinery and carriage buildings are unsafe to be used again and the horticultural hall is in need of repairs.

Portage la Prairie, Man.

Plans for the new Indian school are under way.

Port Arthur, Ont.

Judge O'Leary condemns the court house here severely.

Phoenix, B.C.

Tenders addressed to T. A. Love, secretary, school board, will be received until November 26th for the erection of a four-room school here. Plans, etc., at city hall, Phoenix; at offices of the Superintendent of Education, Victoria.

Quebec, Que.

It is stated that new permanent immigration buildings and sheds are contemplated to replace the ones in use now. W. D. Scott, superintendent of immigration. Hon. Frank Oliver, Minister of the Interior, will bring the matter up in Parliament.

Rosetown, Sask.

A 4-room brick school to cost \$14,000, will be erected.

Regina, Sask.

A delegation composed of J. A. Allan, W. E. Mason, J. H. D. Stevens and R. B. Ferguson, waited upon city council with a request for financial support in the project to erect a suitable home for the Young Women's Christian Association.

Stratford, Ont.

On January 2nd the ratepayers will vote on the expenditure of \$15,000 for a market building, the site to be selected by the ratepayers.

It has been found necessary to secure options on suitable sites in the north ward for the erection of a new ward school next year.

Saskatoon, Sask.

L. M. Wilson is erecting a \$12,000 rink here.

The Third avenue Church have under consideration the erection of a new church. Estimated expenditure, \$100,000.

Sault Ste. Marie, Ont.

The Soo skating rink was totally destroyed by fire on the 9th inst., and several buildings in the vicinity burned. The total loss will be \$30,000. It is stated the rink will not be rebuilt this year.

Toronto, Ont.

The council have selected sites on Claremont street, Birch avenue and Markham streets for police stations, and adopted the report from the property committee for an expropriation of a site on Greenwood avenue.

Plans are being prepared for the new clubhouse for the Hunt Club to replace the one recently destroyed by fire. Estimated cost, \$100,000. Architects, Darling & Pearson. Building committee includes Messrs. Edmund Bristol, A. O. Beardmore, Hume Blake, R. W. Christie, Gordon Osler and George Beardmore.

The Board of Education have authorized the purchase of the Gandier property adjoining the school for the purpose of enlargement of the Parkdale public school.

City Architect McCallum has issued the permit for the administration building of the Toronto General Hospital. It is a 4-storey structure, facing on College street, and will cost \$300,000.

The Board of Control has authorized Mr. W. Randolph Sweany, business manager Toronto Hydro-Electric Department, to take full charge of the wiring of the buildings at Exhibition Park.

The executive of the Ontario Club has decided to buy the Standard Bank Building. Messrs. Sproatt & Rolph have been appointed the architects to remodel the whole interior, which consists of five floors and a basement, the dimensions of which are 60 by 80 feet. \$100,000 will be spent.

Vancouver, B.C.

The old City Hospital, the present home for aged men, has been condemned as unsanitary, and the health committee is seeking a suitable site for erection of new buildings. Dr. Underhill, M.H.O.

At the next meeting of the health committee it is stated tenders for new isolation hospital on Admiralty reserve will be considered. Architect Dalton.

At the meeting of the South African campaigners in the drill hall it was announced that a new armory would be erected here. Mr. J. W. Warden is interested.

Victoria, B.C.

The ratepayers will probably be asked shortly to authorize the expenditure of about \$50,000 on improvements to the fire department. Of this, \$12,000 will be spent on halls at Oaklands and Fairfield, the rest on equipment.

Walkerville, Ont.

It is stated that plans are being prepared by Burrowes & Wells, Trussed Concrete Building, Detroit, Mich., for a two-storey, 45 x 60-foot custom house which is to be erected by the Canadian government.

Wynyard, Sask.

The new skating and curling rink will be started at once, to cost \$10,000.

Winnipeg, Man.

The following by-laws will be voted upon at the coming December election: General hospital, \$400,000; municipal hospital, \$400,000; two suburban police stations, \$60,000; and others, bringing the total up to \$1,635,000.

The Methodist Mission Board have granted \$6,000 for erection of a kindergarten institute with the condition that the city raise \$6,000 more.

A new school will be built at Sturgeon Creek by the municipality of Assiniboia.

It is officially announced that the new Agricultural College will be built in St. Vital.

Plans for a new court house, four storeys, have been approved. Tenders will not be called for some time yet.

Tenders addressed to the chairman of the Board of Control will be received until November 30th for supply of labor and materials required for the erection of public baths in Selkirk Park. Plans, etc., at office of the architect, Wm. Bruce, 222 McDermott avenue. M. Peterson, secretary.

The Winnipeg Amateur Athletic Association have secured fifteen acres from Main street to the river. The large brick building on the grounds will be altered, and a grand stand erected in the spring.

AWARDED.**Bassano, Alta.**

Wm. Hood secured the contract for erection of a fire hall.

Crossfield, Alta.

Geo. Becker secured contract to erect brick school here on a bid of \$13,900.

Dubuc, Sask.

Snider & Sutherland, Regina, were awarded contract to erect solid brick school. Storey & Van Egmond, architects.

Hanover, Ont.

We are informed that the contract for the erection of town hall and public lib-

rary has been let to J. L. Youngs, Stratford, \$20,400. Architects, Forster & Clark, (Owen Sound town hall); W. E. Bunning, Listowel.

Kindersley, Sask.

The contract for the material for the new Methodist church has been let to the Colwell Lumber Company and the work has been awarded to Contractor Mackenzie.

Moose Jaw, Sask.

Brown Bros. secured contract to build new Methodist church, 32 x 60 feet.

Next year will see an addition to the post office, the building of the armory, and the mammoth works of Gordon & Ironsides, built.

New Westminster, B.C.

The contract for construction of fire hall was given to Sloan & Harrison for \$2,500.

Ottawa, Ont.

The council gave the contract for supplying electrical fixtures for the city hall to the Ottawa Electric Company. Noted in last issue.

W. F. Vilas, of Cowansville, Que., was awarded the contract for the desks for the new public schools as his was the lowest tender.

Plunkett, Sask.

G. E. Delgarus was awarded contract for new school building.

South Vancouver, B.C.

The contract for addition to Mountain View school has been awarded to Harrison & Hall, \$1,645.

Strathcona, Alta.

The contract for the \$75,000 post office building in this city has been awarded to Wm. Garson, Calgary. The structure will be a handsome one of pressed brick and stone, two storeys high with a clock tower.

Wainwright, Alta.

John Berry secured the contract to erect the new Presbyterian church. Stimpson & Cook, architects.

Residences**Montreal, Que.**

A company, to be known as the Garden City Company of Canada, has been organized and it is stated a charter will be applied for. The purpose of the company is to purchase a large tract of land close to the city and erect thereon model dwellings as soon as plans are prepared. Capital stated to be \$1,000,000. President, Lt.-Col. J. H. Burland; solicitor, C. H. Holt, K.C.

North Battleford, Sask.

N. S. Glass will have a \$6,000 residence erected.

Nelson, B.C.

John Maybury has purchased two lots at the corner of Latimer and Josephine Sts., on which he proposes to erect a modern residence at once.

Ottawa, Ont.

Allan Keefer, architect, is preparing plans for a residence for C. K. Graham on Aylmer road. It will be of brick and stucco.

Barrett Brothers are intending to build a row of stores and an apartment house on the corner of Bank and Carling avenue.

Toronto, Ont.

Mr. T. A. McTaggart, the purchaser of the corner of Sherbourne street and Wilton Crescent, will erect thereon ten modern up-to-date buildings.

Wainwright, Alta.

N. E. Girard will build at once a \$5,000 residence.

Winnipeg, Man.

J. Moxam has plans under way for another apartment block on River avenue. Fully fireproof, six storeys. Excavation starts at once.

The following have purchased sites and contemplate building: G. W. Markle, jeweler; V. Fischer, of Grain Exchange; A. E. Gibson, of Dominion Bank; Rev. S. G. Bland; Dr. Gordon Bell, W. Martin, president Gypsum Company; Prof. W. A. McIntyre, Dr. J. E. Jones, U. S. consul; T. D. J. Farmer, H. T. Swart.

R. H. Kelly is to erect eight more cottages on Merriem street.

AWARDED.**Brandon, Man.**

The contract for construction work on the cottages to be erected for the Home Building Company, which includes N. J. Matthews, barrister, and G. W. Jones, of the Empire Securities Company, both of Winnipeg, has been awarded to H. G. Fletcher of this city.

Cardston, Alta.

H. D. Folsom has contract to erect residence for Mayor J. T. Brown.

Medicine Hat, Alta.

Geo. Worthy has the contract to build a new parsonage for the Century Methodist Church.

Montreal, Que.

Mr. J. Seath Smith, architect, 207 St. James street, has awarded the general contract for the erection of two residences on Sherbrooke street west, to J. C. Hague, contractor, Montreal.

Business Buildings and Industrial Plants

Battleford, Sask.

A. E. Brown has plans prepared for hotel building for Mr. Angle.

Beauport, Que.

The citizens, it is stated, have approved of the by-law providing for the erection of a factory here for the Canadian Cotton & Silk Manufacturing Company.

Carstairs, Alta.

A new hotel will be built by T. E. Driscoll.

Calgary, Alta.

T. J. Skinner will erect a 7 storey building.

H. Haskins is to have a \$13,000 store erected, with apartments above.

Churchbridge, Sask.

E. E. Lewarton is to erect a store at Buffalo Valley. J. W. Vernon will also build a large block at the latter place at once.

Hamilton, Ont.

J. M. Lyle, architect, Toronto, is calling for tenders for new bank building to be erected at 39 James street south.

The Standard Sanitary Company, which located its Canadian branch in Toronto some time ago, has decided to build a big warehouse here.

Lethbridge, Alta.

Concrete work is under way on T. S. MacKenzie's new \$20,000 warehouse. W. R. Virtue has the general contract.

London, Ont.

Plans for a new warehouse, 85 x 48 feet, 2 storey and basement, have been prepared

by J. M. Moore for the Queen City Oil Company. Tenders will be called for shortly. Estimated cost of building, about \$50,000. C. W. McQuire, local manager.

Lethbridge, Alta.

F. Sisk, manager of the Lethbridge Brewing & Malting Company, states that another huge addition to the brewery will be constructed early next year, to consist of five storeys, cost \$150,000.

Lindsay, Ont.

Work will commence at once on the factory for the Thomas Shoe Company, with factory in Cleveland, Ohio. D. E. Thomas, representative.

Melville, Sask.

The Imperial Oil Company will build a warehouse here.

Medicine Hat, Alta.

Plans are being made for a large addition to the Cosmopolitan hotel. W. T. Williams, architect.

Montreal, Que.

The C.N.R. have purchased the building on St. James street adjoining the old Sovereign Bank building, which will be used as headquarters for the railroad, steamship and other interests of this province. Extensive alterations will be made.

Negotiations are under way for a suitable site for the Southbridge Spectacle Company of South Bridge, Mass.

The Pringle factory in St. Henri Ward has been purchased by the Walter Baker Company, Limited, of New York and Boston, on which, it is reported, an extension will be made.

The Boxer estate, which owns the condemned building on the west side of St. Francois Xavier and St. James Sts., have announced to the Board of Control their intention to pull the whole structure down and put up on the site one of the finest office buildings in the city. The work of demolition will be started without delay.

The Steel & Radiation, Limited, Toronto, have purchased a site on the banks of the Lachine canal here, where they intend to erect a large foundry plant. It is expected that construction will be begun as soon as possible. Sir Henry M. Pellatt, president.

New Westminster, B.C.

A. R. Snelgrove will erect at Columbia and Highbie streets, a 6 storey store and office building.

Nelson, B.C.

The Taylor Milling Company, of Calgary, Alta., have purchased four lots on Vernon street, upon which, it is stated, they intend to erect a business block.

Outlook, Sask.

A \$15,000 building is under way for the Canadian Bank of Commerce.

Ottawa, Ont.

J. E. Cox has written the board of health that he is preparing to build a \$50,000 building on Nelson street, to be completed early next year.

A building permit has been issued to the Slinn-Shouldis Company, Limited, for a new bakeshop and stables on Catherine street; also to the Ogilvie Milling Company for a new office and warehouse on Botellier street, \$9,500.

Prince Albert, Sask.

W. W. Lock, of Minneapolis, has purchased 75 feet on Central street. It is stated a 5 storey block will be built on it in the spring.

Penticton, B. C.

It is stated that W. H. Tapley has secured a site for a cement factory on the water front. It is said that the clay cliff in the vicinity will afford the best material for mixing with the cement in the manufacture of concrete.

Port Hope, Ont.

The agreement between the town and the International Tool Steel Company, it is stated, has been satisfactorily drawn up. It is expected that work on the new building will be started shortly. Mr. Chapman, secretary-treasurer.

Quebec, Que.

See "Power Plants."

Sydney, N.S.

Mr. Davies, representative of steel works at Newcastle, England, will come here with a view to locate a steel industry.

St. John, N.B.

It is stated that Jos. A. Likely has secured option on a block of land on the Marsh creek on which he intends to erect a sawmill and lumber pond. Estimated expenditure, about \$45,000.

Sunnyslope, Alta.

H. F. Pieper has started erection of a large store building.

Smith's Falls, Ont.

We are informed that negotiations regarding the location of the Canadian Co-op-erage, Limited, in Smith's Falls are still open, the question of supply of raw material available being a consideration.

Sherbrooke, Que.

The Guelph Carpet Company, of Guelph, Ont., has purchased the plant of the Montreal Carpet Company here and will enlarge it.

Spanish River, Ont.

A reorganization of the Spanish River Pulp & Paper Mill has been effected and arrangements have been definitely made for the building of a paper mill and a sulphite mill which will cost \$800,000. The new paper mill will have a capacity of 200 tons of paper per day. Building operations will be commenced next spring. The engineers will be Messrs. Joseph H. Wallace & Company, Temple Court, building, New York. Mr. W. J. Sheppard, of Waukegan, Ill., will continue as president of the company and the new board will be composed of all the old members and several new ones.

South Vancouver, B.C.

The People's Trust Company, of New Westminster, will erect a two storey building on Fraser avenue. It is stated that work will commence at once.

Mr. A. Frederickson, corner of Main street and Twenty-seventh avenue, will erect a two storey business building.

It is stated that the property recently acquired by the People's Stock Company, of New Westminster, will have a three-storey business block erected on it, and the building completed by next year.

Sydney, N.S.

The Alexander Cross Company, Limited, of Glasgow, Scotland, has applied to council for support, etc., in their proposition to utilize the basic slag from the Dominion Iron & Steel Company's works in the making of fertilizer. About \$40,000 will be expended.

Sault Ste Marie, Ont.

W. C. Franz, manager of the Lake Superior Corporation, is authority for the statement that arrangements have been made for the location of a paper mill here. The improvement of the waterfront from

the ship canal to Bruce street has been arranged for by the company.

Toronto, Ont.

The Canadian Autopress Company, Limited, have purchased a factory at the north-east corner of Eastern avenue and Carlaw avenue. An addition will be built.

Plans are being prepared in Montreal head office for the C.P.R. freight sheds to be erected along Front street. Dimensions, 500 feet x 50 feet, \$25,000. Permit has been received.

Victoria, B.C.

Mr. S. MacLure, architect, is preparing plans for an extensive addition to the Dominion Hotel to cost about \$60,000. Work will start as soon as possible.

It is reported that the Hudsons Bay Company purpose establishing a large departmental store on a site for which negotiations have been in progress for some time past.

Mr. Crawford Coates, architect, is preparing plans for a new block to replace the Bowness block destroyed by fire recently.

D. Spencer, Limited, have acquired the half block bounded by Fort, Broadview and Douglas streets as the site for their new business block.

The Dominion Trust Company has decided to commence building operations at once on the lot owned by the company fronting on Government street. An eight storey pressed brick modern office building is to be erected.

Alterations to the banking premises of the Canadian Bank of Commerce to the extent of about \$12,000 will be started shortly.

Vancouver, B.C.

Plans were presented for a two-storey brick block for Mr. George H. Halse on Park Drive. The building will cost \$14,000.

The Red Fir Lumber Company has completed its agreement to build a mill at Roche Point, near the site of the large 15,000 ton dockyard being erected by the Imperial Car Company. The company owns about 11,000 acres of timber land. The new mill will cut cedar only, about 100,000 feet per 10-hour day, and will cost, it is estimated, \$100,000. Electric power will be used. President, C. C. Michener, Victoria, B.C., secretary-treasurer; P. D. Hillis, Victoria.

It is stated that clay extending for a distance of 4,000 feet along the water front has been discovered on the property of the Imperial Car Company and that it is suitable for the manufacture of first class pressed and common brick, tile and pottery.

Westboro, Ont.

A sash and door factory and a planing mill are to be erected by Mr. Mortimer Cumming, of Kazubazua, Ind. Construction will start shortly.

Windsor, Ont.

The by-laws granting exemptions to the Windsor-Burlington Blanket Company and the Penberthy Injector Company were carried.

The city council has granted exemption to the Winkley Company of Canada, whose plans call for the erection of a \$15,000 building, probably on city factory site property.

Winnipeg, Man.

Jas. Richardson & Sons, Gran Exchange, are building another elevator in Alberta.

The Standard Trust Company will remodel the old Bank of Montreal Building when it is vacated. Wm. Harvey, manager.

The Canada Metal Company, of Toronto, have purchased the property of the Ontario Wind Engine Company and will erect a large plant.

Burrows, Stewart & Milne, of Hamilton, Ont., have purchased a building site on James street. D. W. Bellhouse, architect.

E. R. Gabett, representing an English firm, is in the city to locate a site for a large creosote factory.

The Winnipeg Ceiling & Roofing Company have started erection of a plant at St. Boniface, 260 x 80 feet, cost \$60,000.

The Rice Malting Company will put up a plant 86 x 280 feet, in St. Boniface, with an elevator 138 feet high. Cost, \$255,000.

Jas. Alexander, president S. F. McKinnon Company, Toronto, has been in city with a view of having a new warehouse built.

The Loudon Hardware Specialty Company will build a warehouse in Elmwood, on Martin street.

The Mercantile Investment Company have bought a large building site on Portage avenue and Spence street.

An office building is to be erected on Garry street, south of the Wellington hotel, by a syndicate. Solid brick with cut stone front, six storeys, cost \$100,000. John Haffner is interested.

The Stewart Sheaf Loading Company will erect a factory at Elmwood next Western Iron Works.

Steele, Briggs Company have bought a new warehouse site on which they will build.

The warehouse belonging to J. H. Ashdown, Limited, will be extended.

Westboro, Ont.

The Cummings Lumber Company will erect a sash and door factory in Westboro this fall.

Woodnorth, Sask.

Hart Bros. are excavating for a new store building.

Yorkton, Sask.

A joint stock company is being formed to build a temperance hotel.

AWARDED.

Brandon, Man.

McDiarmid & Clark were awarded contract for interior woodwork C. N. R. depot.

Bassano, Alta.

M. C. Sacridier, of Medicine Hat, secured the contract to build the Union Bank building here. W. T. Williams, architect, of Medicine Hat.

Brandon, Man.

Robt. Lane has taken out excavation for business block to go up next spring.

Craven, Sask.

Mair & Sons were awarded contract to build C.P.R. station.

Nelson, B.C.

The contract for erection of brick and concrete building for Mr. W. Hancock has been awarded to Waters & Pascoe at \$2,400. Others tendered: J. Burns & Son, \$2,900; Jas. Dancy, \$2,487, all of Nelson. A. Carrie, Nelson, architect.

North Battleford, Sask.

W. S. Glass has awarded contract for \$6,500 brick warehouse to Mathews & Burdock.

New Liskeard, Ont.

The Canadian Office & School Furnishing Company has been awarded the contract

for the interior fittings of the Union Bank, New Liskeard. J. P. MacLaren, architect, Ottawa.

Ottawa, Ont.

G. A. Crain has been awarded the contract for the warehouse and office of the Ogilvie Milling Company on oBtelier street.

The contracts have been awarded for Barrett Brothers' block in Main street, W. E. Noffke, architect. R. M. Saunders gets the masonry; McArthur Bros, the brickwork; J. E. Cooper, the carpentry; James Patterson & Son, the plastering, and Wm. Howe, painting and glazing.

Weiser & Son, of Arnprior, have been awarded the contract for terra cotta for the interior of the Hope Building.

The Empire Electric Company has been awarded the contract for the electric wiring and fixtures of the Hope Building. W. E. Noffke, architect.

The contract for the steel work of the Slinn-Shouldis, Limited, bakery, has been awarded to the Dominion Bridge Company. James Mather, architect.

Red Deer, Alta.

S. Long will have a solid brick block erected. Loveland & Miller have the contract for carpentry work and J. McIntosh the brick and masonry work.

St. Thomas, Ont.

The carpentry work in connection with the factory for the Monarch Knitting Company has been let to J. M. Green & Son.

The contract for erection of factory for the Monarch Knitting Company, Limited, of Dunnville, has been awarded to A. E. Ponsford, of this city, \$35,000. F. R. Lalor, M.P., president.

Power Plants, Electricity and Telephones

Gretna, Man.

The town has decided to investigate the lighting of their streets by gasoline, and later on to put in an electric lighting plant.

Goderich, Ont.

The Board of Trade are in favor of the town asking the Hydro-Electric Power Commission's assistance in formulating a scheme for Maitland river power development, in case Niagara power proved too costly.

Medicine Hat, Alta.

The Alberta Electric Railway Company is seeking incorporation to construct 500 miles of electric lines in southern Alberta.

Moose Jaw, Sask.

An application is being made for an act to incorporate "The Moose Jaw Electric Railway Company," giving power to construct and operate a street railway in Moose Jaw, Sask. The company will have power also to acquire or construct suburban lines leading from the city.

Montreal, Que.

The Montreal Street Railway has announced their readiness to begin the construction of a belt line underground railway as soon as the city will give them the necessary legislation.

Niagara Falls, Ont.

The system of street lighting is considered inefficient. Manager Folger has estimated the cost of a new equipment at about \$9,300.

North Toronto, Ont.

The ratepayers of North Toronto will on January 1st vote upon a by-law to author-

Tenders and For Sale Department



Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on TUESDAY, NOVEMBER 22ND, 1910, for Electrical Measuring Instruments.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained from the Toronto Hydro-Electric System, City Hall, Toronto.

Tenders shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council or officers of the Corporation of the City of Toronto, or, in lieu of said sureties, the bond of a Guarantee Company, approved as aforesaid.

The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto, Nov. 10th, 1910. 46

City of Winnipeg

Electrical Distribution System

Tenders for 500 K. W. Motor Generator Sets

Sealed tender, on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope, "Tender for 500 k.w. Motor Generator Sets," will be received at the office of the undersigned up to 11 a.m. on THURSDAY, DECEMBER 15, 1910.

Copy of specification and form of tender may be obtained at the office of Smith, Kerry and Chace, Carnegie Library Building, Winnipeg, Canada, or at the office of the firm in Toronto, Ontario.

Each tender must be accompanied by a certified cheque as set forth in the instructions to bidders, which cheque will become forfeit to the corporation under the conditions set forth in that document.

The city reserve the right to reject any or all tenders, or to accept any bid which shall appear advantageous to the city's interests.

M. PETERSON,
Secretary.

Office of the Board of Control,
Winnipeg, November 11th, 1910.

Positions Wanted

Advertisements under this heading one cent a word
per insertion. B. x No. ten cents extra

WANTED, position as Superintendent of Grading, Rock Work or Concrete, experienced. Box 154 "Contract Record," Toronto Ont. T.F.

ACCOUNTANT, six years with large American construction company, wishes position. Thoroughly experienced in contractors' detailed cost records. Excellent references. Box 159, "Contract Record." 46

Equipment for Sale

One Georgian Bay Hoist Engine, double cylinder, reversible, link motion, 15 h.p., new and complete with 150 feet of 1/4-inch steel cable.

One Steel Side Dump Car, 2-foot gauge, capacity one cubic yard; 400 feet of 20-pound steel rails, new, with bolts and spikes.

One 25 h.p. Second-Hand Locomotive Type Boiler, in good condition.

One Hand Derrick, with castings for both ends of boom and legs, 90 feet of 1/4-inch wire cable.

One Friction Horse-Power.

STINSON-REEB BUILDERS' SUPPLY CO.,
Limited.

46 Eastern Townships Bank Building,
Montreal, Que.

ize the town council to expend \$18,000 upon a plant for street and house lighting.

Nanaimo, B.C.

A by-law authorizing the Nanaimo General Electric Railway Company, when incorporated, to construct a street railway along certain streets, etc., is being prepared.

Quebec, Que.

At a meeting of the civic finance committee it was decided to allow the Dorchester Electric Company to enter this city from the south shore to carry on business here. Among the conditions imposed by the committee and accepted by the company is the construction of their works here, to cost \$200,000, in the limits of this city, before 1st January, 1912, and other restrictions.

Red Deer, Alta.

At a recent meeting of the town council a resolution was adopted in favor of the hydro-electric scheme for the province towards which the council of Edmonton have already lent their support.

Seaforth, Ont.

The town of Seaforth has carried its final by-law authorizing contract with the Hydro-Electric Power Commission for 500 h.p. at estimated cost per h.p. of \$41.25 per year for 24-hour power. The ratepayers of Mitchell vote on the question on the 15th inst.

Sherbrooke, Que.

The Sherbrooke Railway & Power Company has secured permission from Ascot council to erect poles for transmission of power from the plant in Sherbrooke to Capeton mines, a distance of eight miles. Other industries are now negotiating for power along the same route.

Toronto, Ont.

See "Public Buildings."

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until Nov. 22 for electrical measuring instruments. Advertisement in "Tenders and For Sale Department" of this issue.

Watrous, Sask.

The National Securities Company are entering into agreement for lighting system and electric car line to Manitou lake.

Winnipeg, Man.

Tenders are being called by Board of Control until Dec. 15th for 500 k.w. motor

generator sets. Advertisement in "Tenders and For Sale Department," this issue.

AWARDED.

Montreal, Que.

The contract between the Saraguay Light & Power Company has been ratified by the Board of Control. The contract calls for the installation of 75 electric arc lamps at \$90 per lamp for the Notre Dame de Grace Ward, more lamps being added as municipality grows.

Swift Current, Sask.

The contract for supply of installation of motors, dynamos and outside equipment for an electrical light and power plant, a gas producer and a motor and pump for a modern sewage disposal plant, it is stated, has been awarded to Carter-Jones Company of Fort William, Ont.

Winnipeg, Man.

The contract for supply of 115 h.p., 60 cycle induction motor was awarded to Siemens Bros., Toronto, \$330; that for drive therefor, to Jones & Glasco, Montreal, \$66.11.

Miscellaneous

Hamilton, Ont.

The following building permits have been issued: H. New, architect, erection of a brick dwelling on Mount Royal avenue, for Dr. O. S. Clappison, \$3,500; Stewart & Witton, erection of a two-storey brick factory building 65 by 125 feet, and a dry kiln 50 by 40 feet, on Arthur street, east of Sherman avenue, for the Ludlam Ainslie Lumber Company, \$12,000; Stewart & Witton, addition to factory on Mary street, corner Kelly, for Chipman-Holton Company, \$5,700.

Ottawa, Ont.

Recent building permits include: M. Miskell, dwelling, Clarey avenue, \$3,400; J. D. Wilson, dwelling, Monk street, \$3,000; Philip Lennox, dwelling, Lyon street, \$6,000; J. A. DesRivieres, dwelling, Cathcart street, \$3,000; Geo. Eaman, dwelling, Florence street, \$4,000; Frank Wilson, dwelling, 3rd avenue, \$2,500; D. L. Campbell, 4th avenue, dwelling, \$3,000; A. E. Shaver, Powell avenue, dwelling, \$5,500; D. L. Beaudet, shop and dwelling, \$5,500; F. Dumond, dwelling, Wm. Gibson, builder, \$5,500; G. L. Barrett, shops and dwelling, W. E. Noffke, architect, Main street, \$8,000; W. J. Baird, dwelling, Balsam street, \$2,700.

Toronto, Ont.

Recent building permits include: R. Burkell, one pair semi-detached 2 1/2-sty. brick dwelling, Bloor street west, \$5,000; Coltman & Pearson, pair of semi-detached 2 storey brick dwellings, 180-2 Sunnyside avenue, \$8,000; Bailey & Leslie, pair semi-detached two storey and attic dwellings, Thorold, \$5,400; J. D. Farquhar & Self, pair semi-detached and two detached two-storey brick dwellings, aBin avenue, \$8,000; and a half storey brick dwellings, Geoffrey street, \$9,000; Annan & Jones, pair semi-detached two-storey brick dwellings, Palmerston Gardens, \$4,500; R. B. Storey, two detached two and a half storey brick dwellings, College street, \$8,000.

Contract Record

A Weekly Journal of
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Municipal Progress, Advance Information

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Contract Work and Day Labor

The various contentions made in recent issues of the *Contract Record* by the respective advocates of the contract system and day labor are the basis of an interesting editorial published in the last issue of "*Engineering Contracting*." While our Chicago contemporary criticizes the attack made by Canadian contractors upon day labor work as having been directed with "poor effect," it admits that some of the points raised deserve notice and also makes the significant observation that *Canadian cities appear to get better results out of day labor than American cities*. Continuing, the article runs:

The charge made against city bidding, as we gather, is three-fold: (1) The competition is not on a fair basis; (2) the quality of work secured is not superior, and, (3) the employment of public money to destroy private enterprise is wrong. None of these charges is very strong and two of them are in addition in our opinion wholly misdirected.

The contractors claim that competition is not on a fair basis because the city engineer bids on work which he will control and, consequently, he is in a position to deal leniently with himself in obeying specifications. Again they argue that the basis of competition is unfair because the engineer takes no financial risk as a contractor must do. These claims have an appearance of importance which is misleading. The measure which we must use here is not bidding price but quality and cost. If the engineer is lenient with himself the quality of his work will in the long run be inferior. Risk is an item which cannot be escaped. The engineer personally may not bear the charges and he may not include it in his bidding price but it exists and is paid by some one and is a part of the cost of the work. Appraised by the

measure of cost and quality of work and not by the measure of bidding price these "advantages" against which the contractors complain do not amount to much.

The charge that the quality of day labor work is not superior is doubtless sound. We do not speak with full knowledge of Canadian conditions but we do speak with extended knowledge of the facts in the United States. At comparable prices day labor construction in America is seldom superior and is quite often inferior in quality to well supervised contract construction. There is no plain reason why conditions should be different in Canada and we doubt if they are.

The final plea of the contractors against the employment of public money to destroy private enterprise is an admission of weakness. There is no greater reason why a city should give its work to contract so as to support the contracting business than why it should do its work by day labor so as to afford employment to indigent or inefficient laborers to prevent them from becoming burdens on the city's charitable institutions. If charity is to be distributed in either case it is cheaper and better to give pensions to the inefficient and disabled and have done with the matter.

We have been ruthless in criticizing the arguments of our Canadian contractor friends because we believe that they are losing by them a sure chance of victory. There is but one criterion for comparing the merits of contract work and day labor work and that is cost and quality. If a city can by day labor do its public work as well at less cost or better at the same cost than by contracting for it, it should most certainly do it by day labor. We do not believe that in the long run it can; much less do we believe that as a general policy day labor work can equal in cost and quality work done by contract. The facts wherever they have been demonstrated fully and fairly are against such belief and the burden of reason supports the facts. If Canadian contractors wish to convince the public that the day labor system of work of Canadian cities is wrong they should apply the measure of cost and quality by actual comparative figures and not forget that the city engineer's bidding prices are not costs.

In all the letters of the city engineers who have taken part in the debate in the columns of the *Contract Record* there is not a figure showing that day labor work costs less than contract work in Canadian cities. Nor do we find in their letters a definite assertion that the quality of day labor work is better than contract work. The most definite statement that we find anywhere is the following:

The assertion that poor workmanship and material are put into the work by the city engineer if he underbids the contractor, does not bear the appearance of fact. The engineer, of all men, is the one most interested in having his design properly executed in every way, for upon the results he is adjudged competent or incompetent.

As far as the ratepayer is concerned, he reaps the advantage, as he is saved both the contractor's profit and the salary of the inspectors.

That the engineer is interested in having his work good no one will dispute. He is no less interested when the work is being done by contract than when it is being done by day labor and he supports his interest by putting inspectors on the contract work. The engineer is also interested in having his day labor work cost no more than his bidding prices, by this also will be "adjudged competent or incompetent." Suppose the engineer makes a low estimate, as contractors sometimes do, and as he is quite as likely to do as are contractors, he must take care of it either by doing the work well and charging up the loss or by skimming the work so that it will come within the estimate. The contractor in a similar position will

and must do one or the other of these things, but he has to accomplish the "skimping" should he choose that resort in spite of the engineer's inspectors. Now we will say frankly that our belief in the rectitude of engineers is such that we think that between the two ways open to him he will choose to make the work good and charge up the increase over his cost estimate, but if he chooses the other way it must be admitted that it will be easier for him to succeed than for a contractor. We bring out these points not to curb suspicion on the honesty of engineers' day labor work but merely to show that the second sentence of our city engineer's statement is not so completely final a disposition of the matter as it sounds to be.

In his last sentence our city engineer harks back to the silly old bugaboos of the "contractor's profit" and "cost of inspection." What is the contractor's profit but pay for services? Some one must manage the work and get paid for it, if there is no contractor the city must hire a manager. There are no two ways about this. As for inspection it cannot be omitted safely on any construction work whether done by day labor or by contract. This is a fact so well recognized that day labor construction of any importance is seldom carried on without inspection.

From the following paragraph, culled from a recent issue of the *Victoria Times*, it would appear that there is not very much competition for the work of repairing the Smith's Hill reservoir at Victoria. Those who read the article published in our last issue, in which we discussed the conditions upon which it was proposed to award the contract, will be interested in further news of the work:

"Thus far there have been but few enquiries from local contractors relative to the work of repairing the Smith's Hill reservoir, and it is believed but few bids will be received. A firm in Vancouver is among the number likely to tender. The conditions imposed on the successful contractor are most onerous, as, besides putting up a guarantee bond, he must leave 25 per cent. of the contract price with the city for a period of five years."

Pavements and Illumination

Pavements and illumination were recently associated in a novel way by Mr. Preston S. Millar, who claimed in a paper read before the Illuminating Engineering Society that the character of street surfaces has an important effect on street lighting. This is a novel source of complication to the already involved problem of paving, says the *Engineering Record*. The municipal engineer is expected to train his ear so well that the delicate shades of noise from granite and gneiss blocks can be detected and estimated quantitatively. He is expected to know just how much more easily a horse will slip on blue gum blocks as compared with those of long-leaf pine. He is assumed to know the effect on public health which will follow the paving of Main Street with sheet asphalt and Front Street with brick. He is also expected, ex-officio, to be able to purchase a \$3.00 pavement for \$1.25, with a 10-year maintenance guaranty thrown in by the contractor. All these things the city engineer has learned the expect among his official duties, but a protest is inevitable when it comes to selecting pavements on the basis of their properties for absorbing and reflecting light. A noisy pavement is a nuisance in some localities, a slippery pavement is dangerous on some grades, a smooth pavement offers special advantages in the way of cleanliness; these considerations are based

primarily on the direct service due from pavements and must be given due weight. But it is unreasonable to select pavements with a view to improving the quality of street lighting, much as the electric companies would rejoice in this practice. By all means let us learn all we can about the absorption and radiation of light from street surfaces, but let it be distinctly understood that the information is to be used in improving the quality of the illuminating service and not in adding another condition to those now prescribed for pavements.

Canadian Cement and Concrete Association to Meet at Toronto

The annual convention of the Canadian and Concrete Association will be held January 16-20 next. There is every prospect of a record meeting. Mr. R. E. W. Hagarty, secretary of the Association, expects an unusually large number of delegates, consisting of architects, engineers and contractors from all parts of Canada and from the United States. Such distant points as Vancouver and Halifax will be represented at the conference. Special railway rates are being arranged and other facilities provided with a view to stimulating the interest of all persons interested in cement and its allied products. The third week in January is particularly well chosen, as it will enable exhibitors at the New York Cement Show in Madison Square Garden in December to visit Toronto on the way to the Chicago Exhibition in February. Intending exhibitors and others should address enquiries to the secretary, Mr. R. E. W. Hagarty, 662 Euclid avenue, or to the president, Professor Gillespie, University of Toronto.

Caisson Foundation for Sewer Outlet

A method of constructing a caisson foundation for a sewer outlet at the end of a drop chamber extending down the bank of the Ohio river, is given in the report of Chief Engineer J. B. F. Breed, and Harrison P. Eddy of Boston, consulting engineer, of the Louisville, Ky., Sewerage Commission.

By the original plan, the outlet structure was to be carried down to bed rock, which was supposed to be within a moderate depth below the bed of the river. But when low water in the river made a more careful examination possible, the bed rock was found much further down than was expected. A new design was, therefore, made providing for a foundation of caissons sunk to rock.

The trench for the proposed outlet being excavated to grade, the caissons were sunk. There were composed of steel cylinders five feet in diameter and in four and five-foot lengths. The bottom section was provided with a reinforcing band at the lower end. At the other end and on each end of the other sections, the cylinders were provided with flanges by which they were bolted together. In order to make the joints tight, rubber gaskets were used, with the aid of oakum when necessary. One section was set in its proper position and the material excavated from within by hand and as fast as necessary succeeding sections were bolted on. Usually the weight of the steel was enough to force the caisson into the ground, but at times the movement was aided by hammering or by jacks, which reacted upon the timbering of the trench. The ground water within were lowered into the caissons. But little ground water was found, as the materials through which the caissons were driven was largely impervious, being strata of fine salt, clay and cemented chips of slate rock. The completed caissons were filled with concrete and upon them the outlet structure has been built.



C.P.R. Bridge, Lachine, showing 1000-foot tramway built by Foundation Company to Facilitate Erection of Piers

Reconstruction of the Lachine Bridge

Methods Adopted by Contractors in Rebuilding C.P.R. Structure over St. Lawrence River—A 1000-ft. Tramway and other Noteworthy Facilities

With the Canadian Pacific Railway Company's decision to double track the railway between Adirondack Junction and Montreal Junction, to keep pace with the phenomenal growth of traffic around that centre came the necessity for the reconstruction of the large bridge which spans the St. Lawrence River at Lachine.

The original bridge was a single track structure, about 4,000 feet long, and consisted of eight single track spans of 250 feet, two of 270 feet, two cantilever spans of 408 feet, one deck span of 122 feet and three girders of 80 feet. The structure was built in 1886 by Messrs. Reid & Fleming, of Montreal, contractors for the ma-

sonry, and the Dominion Bridge Company, for the superstructure.

The contract for the foundation work and masonry of the new structure was awarded to the Foundation Company, Limited, of Montreal, and for the superstructure to the Dominion Bridge Company, Limited, also of that city.

Work on the foundation was started in July of this year and is progressing rapidly, so that by the time winter sets in a large portion of the work will have been accomplished. In the foundation of the old bridge there were eleven piers in the water, four piers on the



Construction in Progress, Showing Working Facilities



Building Cofferdam in erection of New Pier



View of Bridge and Tramway, looking toward North Side

shore and two abutments. In the reconstruction it is intended to have four additional piers in the river. The reconstruction of this work is considered a most difficult one, the current of the river at low water at this point running ten miles per hour and at high water twelve miles. The distance from the base of rail to high water is about 60 feet, the depth varying at low water from eight feet on the north side, gradually sloping down to thirty feet on the south side.

It is interesting to note the method employed in the building of the old piers in 1886. These were constructed by building single wall casings on the shore, caulking them, floating and placing them on the bottom after it had been dredged out. The bottom was then cleaned off by divers. A few feet of concrete was deposited under the water and allowed to set, the coffer dam was pumped out, and the concrete footings and masonry were then built in the usual way. The present contractors state that the piers are now in excellent condition and have not settled in the slightest degree. This reflects great credit on the original builders.

Operations on the new bridge were commenced from the north shore. In the construction of the piers the engineer in charge requires that no concrete shall be deposited in the water, but that the solid rock shall



Building Additions to Existing Piers

be cleaned off, examined in the open or in pneumatic caissons. A diamond drill outfit has been installed and holes have been drilled in existing piers where the extension of new piers is to be placed. These borings showed gravel and boulders varying in depth from six to ten feet, and underneath about three feet of limestone.

The method of operation of the contractors is to dredge off the bottom, and then build a double wall coffer dam, fill the double wall with clay and pump out the dam.

In order to have easy access in working around piers the company have built a tramway, 1,000 feet long, out into the river and parallel with the bridge. All the material is delivered on the high trestle on cars. Up to the present time they have built and sunk nine coffer dams in the water. Seven of these have been pumped out and filled with concrete to the point where the masonry starts. On five of these piers the masonry has been laid up to the height of the old bridge seat. It is intended that all the open work piers shall be finished this year and the pneumatic caisson work left over until next season.

When the work on the bridge is completed the structure will be one of the finest on the railway systems of the Continent.

Experiments in Binding Gravel and Crushed Gravel with Tar and Asphalt

Desiring to secure the best possible results from the use of the local road-building materials, the State Highway Department of Ohio decided to experiment with tar and asphalt in binding the Darke County gravel before preparing specifications for these roads. It was also desired to determine if the gravel could be water-bound after the manner of binding crushed stone in the water-bound macadam roads. A section of road was selected, and work was begun on July 20th and completed by August 13th.

Nine hundred gallons of Tarvia "X" and the same amount of Indian Refining Co.'s Asphalt were used in the experimental work. The roller used weighed 15 tons without water or coal. It was not satisfactory for this work as it has been found that better results can be obtained with a 10-ton roller, but it was the only roller available. The width of the surface treated in this experiment is uniformly 16 ft.

In this work the Tarvia was applied at a temperature of from 340° F. to 400° F., and the asphalt at a temperature of from 400° F. to 450° F. There was a good bed of gravel in the old road, and this was prepared to receive the top course by spiking up the surface with the steam roller and harrowing and grading to bring it to the proper cross-section, after which it was thoroughly rolled and watered. Beginning at the north end of this experimental section, the first 80 ft. in length was treated in the following manner:

Washed gravel from 1 in. to 2 ins. in diameter was spread on the surface to a depth of 3 ins. The gravel was then rolled and about 1½ gal. of Tarvia "X" per square yard was applied. It was then covered with ½-in. to 1-in. gravel to a depth of about 1 in. This was allowed to stand until the next morning and was then rolled until buckling commenced. Three-fourths of a gallon of Tarvia per square yard was then poured over the surface and a covering ½ in. thick of gravel from 1 in. to ½ in. in size was applied. The next morning it was rolled for 1½ hours, when it began to show signs of buckling. More gravel was applied at places where the

Tarvia was bleeding, in sufficient amount to take up the Tarvia.

The second section, lying south of and adjoining the first-described section, was 72 ft. in length, and was constructed in the following manner:

The bottom course, composed of $\frac{1}{2}$ -in. to $1\frac{1}{2}$ -in. washed gravel, was spread to a depth of 3 ins. and treated with the same amount of Tarvia and in the same manner as described for the bottom course of the first section. The second course, composed of $\frac{1}{4}$ -in. to 1-in. washed gravel, was spread to a depth of 1 in., and rolled as in the first section. Thirty-two feet of the north end of this section was poured with 1 gal. per square yard of Tarvia mixed in equal parts with unrefined coal tar; the remaining 40 ft. was treated with 314 gals. of the asphalt binder per square yard. The part which received the tar was covered to a depth of $\frac{3}{4}$ -in. with $\frac{1}{8}$ -in. to $\frac{1}{2}$ -in. washed gravel, more being added where bleeding appeared. The asphalt-treated part was covered with $\frac{1}{2}$ -in. boulder chips to a depth of $\frac{1}{2}$ -in. This section was rolled the next morning the same as described for the first section.

The third section adjoining the second section on the south, was eighty-eight feet in length, and was constructed as follows:

The bottom course, composed of 1-in. to 2-in. crushed boulders $3\frac{1}{2}$ ins. deep, was placed in the same manner as in the first section, and poured with $1\frac{3}{4}$ gals. of Tarvia "X" per square yard. This was covered to a depth of $\frac{3}{4}$ in. with $\frac{1}{8}$ -in. to $\frac{3}{4}$ -in. gravel, and rolled the next morning in a manner similar to the rolling of the first section. Three-fourths of a gallon per square yard of Tarvia "X" was then added and the surface covered to a depth of $\frac{3}{4}$ -in. with $\frac{1}{8}$ -in. to $\frac{1}{2}$ -in. washed gravel. This was rolled two hours without signs of buckling. Gravel was added where bleeding appeared.

The fourth section was 130 ft. long. The bottom course was composed of 1-in. to 2-in. washed gravel, with 30 per cent. of broken boulders, spread to a depth of $4\frac{1}{2}$ ins. It was poured with two $2\frac{1}{2}$ gals. of asphalt binder per square yard, and was then covered to a depth of 11-13 ins. with $\frac{1}{2}$ -in. to $1\frac{1}{2}$ -in. washed gravel. It was rolled the next morning, but buckling commenced in about one-half hour and the rolling was stopped. It was then poured with $\frac{3}{4}$ gal. of asphalt binder per square yard. The north 80 ft. of this section was covered with $\frac{1}{8}$ -in. to $\frac{1}{2}$ -in. washed gravel; the remaining 50 ft. was covered with $1\frac{1}{4}$ -in. to 1-in. boulder chips. This was rolled the next morning and buckling commenced in about one-half hour.

The fifth section, which was built of 1-in. to 2-in. crushed boulders, was 130 ft. in length. The bottom course was spread with the above material to a depth of 4-ins. This was partly filled with a clay filler, and the filling was completed with limestone dust rolled in with the steam roller until all of the voids were completely filled. This section was then thoroughly watered and rolled until a grout appeared on the surface. On the second day it was again watered and rolled thoroughly, and sand was added during the process of rolling. This section rolled down and became very hard and compact.

The sixth section, which was constructed of 1-in. to 2-in. washed gravel, to which 30 per cent. of crushed boulders had been added was 100 ft. in length. It consisted of one course 4 ins. deep, and was slightly filled with clay in the manner described in the fifth section. The filling was completed with limestone dust, which was thoroughly watered and rolled. The rolling was continued until a grout formed over the surface, and the road

was again rolled on the second day. In appearance this section is similar to the fifth section.

In addition to the rolling above mentioned, the roller was run over the completed work each day until the last section was finished. One month after completion the road was in perfect condition except two or three small spots that had raveled in the part where unrefined tar had been mixed with the Tarvia.

The total cost of the experimental roadwork was \$669.70.

Method of Estimating Costs of Piping and Wiring for Buildings

and on the cost of erecting steam piping for heating and power are extremely scarce. A "rule of thumb" method employed by various Chicago consulting engineers averages about as follows, says *Engineering-Contracting*:

Labor cost of electric wiring (mill buildings): For lighting, \$1 per light; for power, \$2 per horse power per motor. When figuring the above to include material (except motors) use \$4 per light and \$10 per horsepower, respectively. In figuring the cost of erection of piping for mill heating for buildings, the rule is to use \$1.25 per sq. ft. of radiation required. For the cost of installing steam pressure pipe and similar pipe, the rule is to multiply the estimated cost of the material by $2\frac{1}{4}$, that is $1\frac{1}{4}$ more than the cost of the material. When figuring the general cost of material and labor for installation of power, piping and machinery, \$250 per horsepower is used. These rules are all worked out for union labor rates of wages.

Fieldhouse Patent Sewage Tank

A circular sewage tank of concrete 82 $\frac{1}{2}$ ft. in diameter is now under construction at the disposal works of Guildford, England. It comprises a central inlet chamber and sludge pit, and an annular effluent chamber divided into six separate compartments with an effluent channel running entirely around the circumference of the tank. The tank is of the Fieldhouse patent type and its principal features are outlined by Mr. C. G. Mason, borough engineer and surveyor, in a paper presented before the Institution of Municipal and County Engineers, the source of these notes. The central chamber is 26 ft. in diameter and 26 ft. deep, its sides being built at a steep slope. The lower portion of this chamber, which forms the sludge pit, is covered by an inverted concrete cone, with a 2-in. annular space around its lower edge. The flow enters the central tank through a 15-in. pipe which discharges over the cone, the sludge falling through the annular space already noted into the pit below. The effluent passes radially through openings in the side walls, into six outer compartments where sediment escaping from the central tank settles; these outer compartments have steeply inclined sides and sludge pits drained by 9-in. pipes. From the outer compartments sewage passes over the circumferential weir, 260 ft. long, and then flows into the effluent channel. Scum also may be removed from the surface of the tank, which is divided into 17 parts, into the effluent channel, sluices being arranged to direct the scum into a scum pit and thence to a sludge tank. The effluent channel is protected by scum boards.

The annual convention of the Canadian Society of Civil Engineers will be held at Winnipeg, Man., January 24-27 next. Communications should be addressed to the secretary, Professor C. H. McLeod, Montreal, Que.

Details of Proposed Sewers at Leavenworth

Constructional Data on an Interesting Municipal Undertaking—Sewers above ground—Design of Special Castings—Unit Contract Prices

In designing main trunk and lateral sewers for Sanitary Sewer District No. 9, at Leavenworth, Kan., the latitude of the design was limited by a great many natural conditions. The district consists of several minor drainage areas and contains numerous creeks and "draws," making the topography very rough and broken. At points where creeks cross alleys and streets there are located culverts and bridges, the crossing

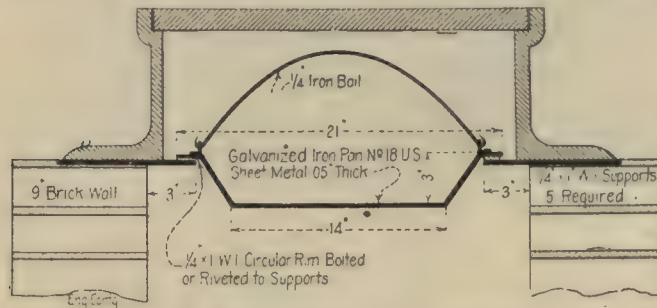


Fig. 1—Manhole Top, Exposed Sewer

of which controlled the grades of the sewers almost absolutely. Added to this, the several additions to the city comprising the district were poorly plotted when originally laid out and the arrangement of streets and alleys is bad; in some cases there are two and three alleys in one block, plotted as T and H alleys; in other cases there are no alleys, and it was necessary to condemn right-of-way for sewers. In order to lay out the main trunk sewer so as to provide for lateral sewers in each block, the alignment was controlled entirely by these requirements, and the topography had to be disregarded for the most part. Being thus controlled in grade and alignment, the depth varied from very shallow to exceedingly deep work, sometimes through 12 or 15 ft. of rock. In crossing creeks and ravines it was often necessary to have the sewer above ground. These "exposed" sewers will be discussed in this paper.

It was deemed best to use light weight, bell and spigot cast iron pipe supported on concrete piers, and to provide for the free expansion of the pipe. To attain this end, it was provided that the piers be mounted with cast iron pier plates, anchored into the concrete; on these plates were to be placed several lengths of round bar iron at right angles to the line of the sewer to serve as rollers; and fitting over the

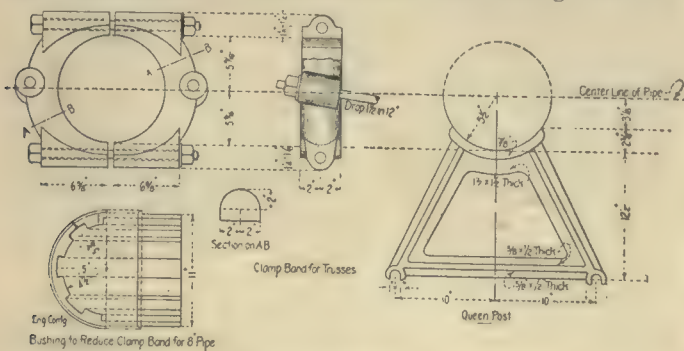


Fig. 2—Saddle Support and Trussing Details, Exposed Sewer

top of the plate and rollers in such a manner as to secure the rollers from falling out, but at the same time to permit them to roll on the plate with the expansion and contraction of the pipe, a saddle, Fig. 1, to fit the outside diameter of the pipe.

To avoid placing piers in creek channels where they would obstruct the flow, it was necessary to get a wider panel than 12 ft., and a truss was designed to support the intermediate joint. The truss consists of clamp bands, Fig. 2, to fit the circumference of the pipe and hold the truss rods in place, a queen post and a set of rods, as shown. In estimating the cost of the work, it was found that the complete truss was less expensive than the pier with its necessary castings, so it was decided to make the panels 24 ft. instead of 12 ft., and to use a truss between each set of piers. To provide further for expansion, it was decided in cases where there was more than 75 ft. of exposed pipe in a span to place an ex-

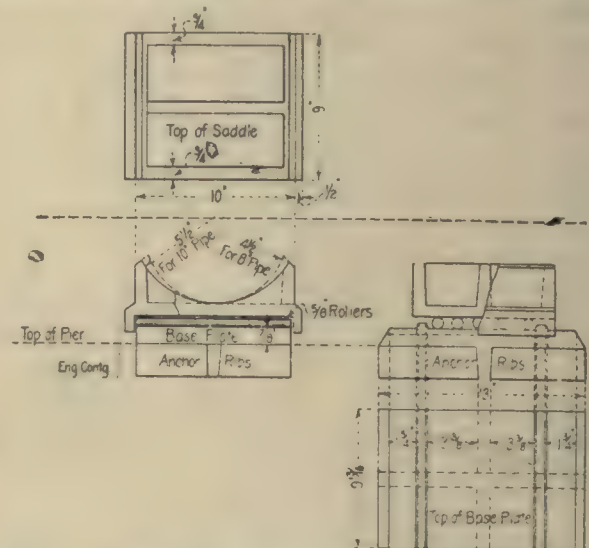


Fig. 3—Details of Saddle Support for Exposed Sewer

pansion joint. The regular type of iron body, brass sleeve expansion joint was specified.

While the expansion in an iron pipe with a flow of sewage would be very small, owing to the almost constant temperature of the sewage, and might be taken care of by the "giving" of the lead in the joints, at the same time the loosening of the lead from expansion and contraction would cause leaks that would require attention later on, and it was considered necessary to install expansion joints.

In designing the special castings required for this work, every effort was made to have them simple, yet strong. To provide for different sizes of pipe, bushings were used where possible, or one casting only of a set was altered. This reduced the number of patterns required for the castings and kept the castings standard as far as possible. The castings required for the work were made by local foundries.

The unit contract prices for this class of work were as follows:

10-in. light weight cast iron pipe in place, \$1.50 per ft.
8-in. light weight cast iron pipe in place, \$1 per ft

Trusses for 10-in. pipe, complete and in place, \$16.50 each.

Trusses for 8-in. pipe, complete and in place, \$18 each.

10-in. expansion joints, complete and in place, \$55 each.

8-in. expansion joints, complete and in place, \$45 each.

Concrete piers 5 ft. high or under, fully equipped with castings, \$22 each.

Additional height of piers, \$3 per ver. ft.

Unusual Example of Pneumatic Caisson Work

The deep foundations for the new Municipal Building, in New York, are notable for the magnitude of the work and its rapid execution under great difficulties, and for the manner in which perplexing contract difficulties were equitably adjusted. The substructure is designed to carry a 165,000-ton superstructure, rising to a height of 580 ft. above the street, on 106 separate piers. Some of these piers are supported on solid rock and some on sand and quicksand, the latter being without any appreciable variation in the slight settlement they have shown. These foundations have been sunk far below the ground-water level to depths closely approaching the limits for pneumatic pressure. Thousands of yards of sand and quicksand have been excavated far below the surface without injury to adjacent tall and heavy buildings. Elevated and subway railroad structures, and large gas, water, sewer and electric mains below the street surface were maintained in service with no serious interruption to the heavy traffic of vehicles, pedestrians, and street cars on an important city street which crosses the full width of the building. This work of sinking the piers has been accomplished in about a year at a cost of about \$1,500,000, and without serious accident or the loss of life, by methods described elsewhere in this issue.

The caissons vary greatly in size, form and depth and are of several distinct types, showing the most recent improvements in construction of this sort, together with new features developed to meet the special conditions existing at the site. The working chambers are of steel where the greatest economy of space is necessary, and of reinforced concrete where there is abundance of room, while in intermediate cases wooden caissons, heretofore standard for all but the smallest piers, are used. Permanent wood and steel are almost eliminated from the finished structures and the strength and weight of the concrete were utilized largely in the construction operations.

Rapid and efficient work in a very congested area enclosed by streets with heavy traffic of all sorts has been accomplished by the installation of a battery of steam boilers of over 1800 h.p. capacity, seven large air compressors, 26 hoisting engines, 11 steam pumps, 16 air locks, six concrete mixers, 56 steel buckets and other equipment in proportion, all located within the limits of a 164 by 374-ft. triangular lot. Storage was largely eliminated by the delivery of material only as needed, plant and materials were handled without delay and shifted repeatedly by a system of 26 traveling and movable derrick booms, and extra space was provided by elevated working platforms under which foundation operations could be carried down. Economy and rapidity of construction were promoted by the construction of the deep piers in rapidly shifted forms, entirely above ground, and by building them up to heights reaching a maximum of 60 ft. before sinking.

The piers, with maximum loads up to 5000 tons, were at first designed to have all foundations carried down to rock, but when it was found that the danger and expense of reaching the deepest rock were too great, additional investigations and practical tests were made on the bearing capacity of the soil and part of the piers were redesigned and proportioned to rest without serious settlement on the sand far above the rock. Fortunately the heaviest and tallest part of the building has rock foundations and it is believed that the loads on the other piers are so well within the tested bearing capacity that no injurious settlement will be occasioned by their final loads.

After the contract had been made for 116 caissons to be sunk to solid rock and the work was well under way, it was decided to eliminate 10 of the piers and modify the design of 30 others, which were to be sunk to a less depth than at first proposed, thus greatly changing the condition and cost of the work. The advantages and disadvantages accruing to both the owner and contractor from these changes were carefully studied; allowances were made for the elimination of very dangerous and costly work, for the loss of reasonable profits, for the delay in operations and change in plans and material, and for fixed and overhead charges. An equitable basis of unit prices was deduced from the results of this investigation, and the original contract was accordingly modified to suit the new conditions in a manner that was satisfactory to both parties and is believed to afford a valuable basis for the readjustment of future contracts. These results are due to the harmonious efficiency of engineers and contractors, experienced in caisson work and in general construction, unhampered by interference from the laymen connected with the city administration.—*Engineering Record*.

A vein of rich red marble has been discovered at Trenholmvile, near Sherbrooke, Que. A Montreal company is stated to be negotiating for the property.

Building permits issued in Toronto last month are valued at \$2,914,980, as compared with \$1,540,355 for October, 1909. The total for the ten months' periods of 1909 and 1910 are \$14,605,232 and \$17,734,488 respectively.

Mr. E. W. MacLean director of the Burrard Inlet Tunnel & Bridge Co., states that work will be commenced on the Second Narrows Bridge Vancouver in the spring and completed in eighteen months. The estimated cost of the structure is \$300,000.

For surfacing concrete pavements at Ann Arbor, Mich., a mixture of tar and sand is used. According to the specifications of Mr. E. W. Groves, city engineer, as published in "*Good Roads*," the pavement consists of a 5-in. bottom layer of 1:8 concrete and a 2-in. mortar surfacing. After the concrete has thoroughly set a thin coating of tar is spread on the street and before this is dry a coating of sand is applied.

At a meeting of the Metropolitan Park Commission at Montreal, last week, Sir William Van Horne and Controller Wanklyn submitted important plans for relieving the congestion of traffic in the city. In one case it was proposed to build a three-track tunnel under Cote des Neiges Hill, to connect the portion of the city situated on either side of the mountain. The estimated cost of the latter project is placed at \$1,000,000. The former plan would be considerably less expensive.

Difficulties of Modern Road Building

Evolution of the Best Construction—Some Notes on Surface Treatment—Selecting Materials on Basis of Merit and Cost*

BY CHARLES W. ROSS, Street Commissioner, Newton, Mass.

It is not my intention to criticise or find fault with the road builder, but merely to show what should be expected of him at the present time. In the first place, his work is always before you like a picture on the wall. He cannot cover up his mistakes. Experiments must be tried to obtain the best results. At present, there is nothing that can be termed perfect in the way of paving or constructing a street to take care of the traffic; we are looking for the best and while we may think that we have reached that point, we still find that such is not the case. I suppose our forefathers felt the same way fifty years ago, but the modern method of transportation is so different from what it was, that the requirements are entirely different. If we should undertake to build roads similar to theirs, we can readily see that we would be criticized severely by the public.

The people as a whole appreciate what is being done and also recognize the ability of experienced men and are looking for the best facts and opinions that can be obtained. If it were not so, this congress would never have been called, and other similar meetings that have been so beneficial would not have been required. I think the day is not far distant when we shall have reached a point in road building when it will be possible to answer all questions at a glance. If a person states the amount and kind of traffic over a certain road, the evidence should be in mind as to just what kind of treatment should be recommended. We may go still farther and say that our belief is that the horseless carriage is fast superseding the horsedrawn vehicle, and if it could be done at once, which we cannot yet hope for, the roads could be built to take care of the traffic much cheaper, and give better satisfaction to the public than by our combined system. They could be surfaced with a treatment either of tar, cement, heavy oil or any of the new preparations that have been tried that will withstand the traffic of the automobile and keep the dust down so that the road will be clean and in perfect condition every day of the year for the automobile. But when the roadway is expected to be used for the combination of automobiles and horse-drawn vehicles, the problem becomes more difficult, and every road builder will agree that the opinion of the chauffeur and driver should be regarded in deciding what kind of a surface shall be used in order to give perfect satisfaction for both. The treatments to be used for the various roads have never been determined, and until we can say that a certain road is to be used almost exclusively for automobiles, we cannot tell what kind of a surface to recommend; or if the road is to be used almost entirely for the horse-drawn vehicle, it is an easy matter to determine what kind of a treatment shall be used.

This year the State of Massachusetts, a census has been taken of the amount of traffic over different roads, and these figures show that on many of our roads more than one-half the number of vehicles passing over them are machines that are propelled by gasoline or some power other than horses. In many cases automobiles comprise three-quarters of the travel. Where these conditions exist the roads should be divided into different classes. For example, if the census should show that the whole number of vehicles passing over a certain road in twenty-four hours are vehicles propelled by gas or steam, the road would require an entirely different treatment from that required for one subjected to horse-drawn

traffic passes over it, also the kind of traffic, the grade and traffic only. The road surface for an automobile can be kept free from dust, free from mud, in fact, a perfect surface every day in the year, but the surface that is required for a horse-drawn vehicle is apt to be more or less dusty or muddy—and will not withstand the traffic of the automobiles if they are run at the high rate of speed that they are at present. If the law were enforced restricting the speed of the automobile to not more than twenty miles an hour, it would be much easier for us to decide as to the kind of a surface treatment to put on a road. When the speed limit is exceeded then the trouble commences, and by every mile by which the limit is exceeded, the road is torn to pieces. In many cases we find our best macadam roads are becoming almost impassable on account of the loose stone, which makes them rough and very expensive to maintain.

I believe that the time is near at hand when we shall be called upon to build two types of roads. All the through lines or what might be termed "state roads" should be built to take care of the automobile traffic; the city street and those that are not used for through traffic could be surfaced with a different treatment. There are many dust-lying materials on the market at present that are perfectly satisfactory on a city street, but many of them are not fit to be used on the main highway, because the automobile, travelling at a high rate of speed, tears the surface off and leaves the road in a very bad condition in a short time. We are looking forward to the time when either the speed limit will be changed or the traffic divided into classes. At present, the question of proper treatment on different roads is very perplexing and is causing more discussion than any other subject that I know of. Many municipalities are at a loss to know how to solve this problem. This state of affairs cannot exist long because discerning people will soon learn the proper treatment and correct advice will be obtained from those who are capable of giving it.

Selection of Materials.

Because there are so many bituminous and asphaltic materials on the market at the present time and as each agent claims that his product is the best, it is pretty hard for any one to select the materials to adopt. My opinion is that they are all good under certain conditions and applied to certain streets. A treatment that will do one street may not do on another on account of the heavy traffic and other various causes that may arise. Taking these things into consideration, it is much better to obtain the services of a competent road builder or secure the advice of some one who has had practical experience in this line than to rely on the statement of an agent whose only desire is to sell his product.

During the twenty years that I have been actively engaged in this business, I have never seen the time when so many people visited our city, wrote so many letters, asked so many questions and inquired over and over again: "What can our city or town do to improve the roads and keep up with the automobile traffic"? I suppose that every road builder present has been through the same trials and tribulations. It is as hard a question to answer as it would be to have a man ask you how much it would cost to build a mile of road. It would depend altogether on the kind of road and the thousand other things that might enter into it. The amount of money that should be spent on a road depends entirely on how much

*Paper presented at the Second International Road Congress, Brussels, Belgium.

the sub-soil. Knowing these, you can readily tell what kind of a surface to recommend and about how much it would cost per square yard.

Surface Treatment.

As I have already stated, the work of a road builder is on the surface. A man may build a sewer or drain, or in fact almost any other kind of construction; it is soon covered up and out of sight, but the surface of the street is visible at all times, especially in a rural city where people take so much pride in their private drives, walks and lawns. They require so much of the Street Department that it seems at times almost impossible to keep up to their requirements. We appreciate the fact that they are willing to pay for all they have and that they are only anxious to get the best they can, let it cost what it will. It is, therefore, no easy task to say what should be applied to the surface of a street unless you understand the conditions. For instance, a street of from eight to ten per cent. grade cannot safely be covered with asphalt or a bituminous paving, so that it will be perfectly safe for horses to climb in all sorts of weather and we are obliged to look, then, for a treatment that will fit these conditions.

We have found by experience that a heavy asphalt oil worked into the surface of the road prolongs the life of the road, makes it dustless, free from mud and is not likely to be slippery. One of the best ways that we have found to apply this material is to take a cubic foot of sand to a gallon of heavy asphalt oil, heat the sand to a temperature of from 150 to 175 degrees F., mix the oil thoroughly with the sand, spread it on the street with shovels and rake it with a four-tooth wooden lawn rake. In this way, we have not been obliged to roll the surface of the street, leaving the sand and oil to be rolled down by the teams. This has been tried more or less during the past two years, and has proved to be absolutely clean and we have not been obliged to close the streets at any time during the process of this treatment. It has proved very satisfactory and one treatment a year seems to be sufficient. After the first year, the expense is much less, as the material is worked into the surface of the road, making it nearly waterproof, and this for combined traffic has given very good satisfaction.

We have tried several of the different emulsions that are applied with water, such as terracolio, dustoline, calcium chloride and Speare's road binder. I do not intend to go into the detail of how they should be mixed and applied, as I believe the process is well known to everyone present. These have proved very satisfactory. We have also tried Tarvia A, B and X, the latter being a heavy binder, which has to be heated and mixed with the stone. All of these preparations have proved very satisfactory.

There are streets in almost every community which might be termed "gravel roads," that are used very frequently for pleasure driving. They generally lead through a rural district and are enjoyed by people riding horseback, also by ladies and children who like to drive on the soft, smooth surface. These should be kept free from dust in order to make them pleasing and agreeable. They may be treated with any of the lighter oils and preparations that are so well adapted for this purpose. In this way, it is evident that we cannot apply a hard and fast rule to all city streets as the conditions vary so much. Each street must be studied carefully to see the amount of traffic passing over it before any satisfactory report can be made.

When poor roads prevail in a section, everything is very apt to be poor, the horse, the farmer, the merchant and the church.

Importance of Road Improvement.

It is a well-known fact that in spite of the strenuous efforts made in some sections of our country to induce immigrants to settle in them, very few accept the invitation. They in-

variably post themselves pretty thoroughly about a section. This is made easy by the numerous emigrants who have preceded them and they are sure to have acquaintances in several sections who give them information. They very seldom locate in a place where the roads are impassable, as they do not wish to be mud-blockaded for six months in the year. In order to induce immigrants to come into such sections, good public roads must be made first. If it is economy that prevents, it is a false economy; every day that we allow our public roads to remain in an impassable condition, streams to remain without bridges, we deal a direct and severe blow at our own interests and the country will remain undeveloped. These roads, if improved at once, newly engineered, and made good roads, with permanent bridges that could not be swept away with every rise of the streams, would give some sign of permanence of settlement and of contentment with the section. The burden of the tax would soon be shared by so many that the roads would not only be self-sustaining, but would be a source of revenue to the state. The taxes would return in the improved condition of stock and running gear, and of the increased loads that could be sent to market in wagons. Circulation, which is the backbone of business, would be facilitated; where now it is a hazard and a task to venture on the public highways, then it would become a pleasure. But unless roads are made first-class to commence with, we will never have them, and we throw away the money we expend for them.

Winnipeg's Municipal Asphalt Plant

Some interesting particulars concerning the above plant are given in a recent consular report, which runs as follows:

"Winnipeg has a municipal plant, established in 1899, at a cost of \$14,000. The first asphalt was laid in 1897, by contract, 7,314 square yards, at \$2.35 per square yard, Trinidad Lake asphalt being stipulated. In October, 1898, tenders were asked for paving 17,801 yards on Portage Avenue, one of the city's principal thoroughfares. About that time the civic authorities deemed it desirable to establish a municipal plant, and the plant of the local company was purchased.

"Experimenting showed that the best mixture for wearing surface of an asphalt pavement was 10 to 12 per cent. bitumen, 78 to 85 per cent. sand, and 5 to 10 per cent. pulverized limestone. The various kinds of asphalt used have been Ventura, Alcatraz (small quantity), Obispo, Acme, Los Angeles, Trinidad Lake, Trinidad Land, Venezuela, and Bermudez. Trinidad Land, it is said, was found to be the least satisfactory. The asphalt for 1907-08 was bought from Venezuela, for 1909 from Mexico.

"The preparation for an asphalt pavement in Winnipeg is thoroughly made. The street is excavated 11 inches. Soft and spongy places are dug out and refilled with good earth well rammed. Curbing is laid on grades and lines given by the engineer in trenches of the required depth, filled with broken, coarse, macadam stone. Upon the sub-grade is laid a bed of Portland cement concrete $4\frac{1}{2}$ inches thick, made by first mixing dry and then making into a mortar one measure of cement equal to the best quality of Portland cement and three of sharp, clean sand. The binder course consists of broken stone and asphaltic cement, about fifteen gallons of cement to one cubic yard of stone, the stone broken to three-fourths inch. The stone is heated by passing it through revolving heaters, and thoroughly mixed with the asphaltic cement. It is laid hot and rolled with hand and steam rollers.

"The average cost of paving the streets of Winnipeg with asphalt is about \$2.30 per square yard. There are 58 miles of asphalt-paved streets in the city. During 1908 and 1909 extensive paving operations necessitated the maintenance of 125 men at the plant and 75 men on the street during the busy season."

Beams in "Genuine" Mill Construction

Toronto, November 12, 1910.

Editor, "Contract Record":

In your issue of November 9th I notice an article under the above heading by Mr. F. W. Dean, of Boston, in which he advocates the use of wood beams in preference to steel in mill construction. Mr. Dean must surely know that steel beams are preferable to wood when protected by porous terra-cotta, and that the floors, when constructed with the same material are also to be preferred to floors made of thick planking.

It is a well known fact that the insurance companies seek to encourage fireproofing material of porous terra-cotta, and will afford the lowest rate of insurance to buildings constructed in that way. It may not be generally known, however, that one or two inches of porous terra-cotta will protect steel from the fiercest fire. Those who are skeptical I would refer to the record of the Baltimore fire, where the damage was only about one per cent. With material of the right quality the damage would be nil.

Porous terra-cotta is the only material that ever withstood a 24 hours' fire and water test, therefore its efficiency and superiority are admitted by the highest authorities. In a building constructed of brick walls, with floors and roof of porous terra-cotta there is practically nothing to burn.

In conclusion I would add that porous terra-cotta is not only absolutely fireproof, but also more nearly sound-proof than any solid construction can be.

Yours truly,
Robert Bennett.

Municipal Reports*

A very large proportion of matter appearing in printed municipal reports represents a waste of public funds, inexcusable because done under the direction of supposedly intelligent men. A bare record of expenditures is deemed sufficient because men are prone to work along lines of least resistance. Your committee has had mailed to it the past year over 300 reports, and in very few have enough items of value appeared to warrant the editor of a technical paper in devoting his time to abstracting them. That is, few of them contain data of any value to technical readers, and, as presented, the reports are of extremely local value because they amount in effect to a recital of the amount of money received and the amount expended, the items being the items of bookkeeping. The greater number of reports are issued because the law requires such reports, and the work is done in a perfunctory manner. Illustrations are cheap at the present time and as common people like pictures the presence of half-tones and zinc etchings relieves the reports of extreme dryness.

In this the engineer and technical men alone seem to have been considered. The taxpayer says he is not engaged in the printing of free text books, a conclusion with which your committee is in accord. The only reply possible is, that if the report is of no value to engineers as a record of work done and a guide to the doing of better work in the future, then it is of no value to the man who pays for the printing.

Your committee is somehow of the opinion that the report of a city engineer should include information that will give the reader some idea of unit costs in water works construction and operation of sewage disposal plants, in the construction, paving and maintenance of roads and streets. The reports of superintendents of lighting plants as a rule are better than the reports of city engineers and street superintendents. While this is the impression of each member of the committee, and, strange to relate, is the impression of every man with whom

the committee discussed the matter, the reports seem to attempt to avoid such data.

Upon diligent inquiry the committee believes that reports are insufficient mainly because reports are considered as additional work and not properly a duty of the official reporting them. The work is left to be done in the last few weeks of the outgoing administration and is hurried to an absurd degree. It is presented in a perfunctory manner as a gratuitous job, and finally, when every one has forgotten it, a wagon drives up to the City Hall with a load of printed reports just as rush night work has commenced on reports for the following year. The reports should be condensed and made valuable for the guidance and instruction of future officials and should be printed within at least three months after the date they bear. A number of reports were received this year following 18 months after the typewritten report had been presented to the Common Council.

Your committee believes that annual reports should contain some account of work of an unusual character which may have been done. A terse account of the difficulties encountered might be given with half-tone illustrations. Zinc etchings should be given of plans especially prepared to overcome the difficulties and a description of how they were overcome. Care must, of course, be exercised to prevent the report from dwelling too much upon common matters.

In many cities the office engineers in different departments have estimating tables or diagrams to assist them in preparing estimates of the cost of proposed work. Such tables and diagrams could properly appear in the annual report.

For the information of the general public, as well as of the men who will read the report for information as to methods employed in other places, there should be included a full-page diagram of the organization of the offices of the city engineer, street superintendent, sewer commissioner, water commissioner, etc. A graphic diagram is of wonderful assistance in guiding visitors to the City Hall to the proper office to obtain information or lodge complaints. An example of such a diagram is hardly needed in this report, as the members are familiar with their construction and they are in use daily in a number of offices.

Water Tight Sewer Joints

BY JOHN S. STIGER, City Engineer, Summit, N.J.

During the winter of 1909 to 1910 I had tests made to arrive at the amount of the ground water in filtration in the sewers of the City of Summit and found that in nearly all lines the amount was excessive. I at once had laboratory tests made of different jointing material to see if it was not practical to correct this trouble.

After several tests it occurred to me that as "Dip," which is manufactured by the Union Clay Products Co., made a good water proofing material, adhering well to cement or glazed surfaces, it should make a dependable joint when used on vitrified pipe, although it had never been used or recommended for any such purpose by the manufacturers.

I made a test joint on two three-foot lengths of 10-inch vitrifiable clap pipe which were joined together with the "Dip" and plugged at both ends; a pressure of twenty-two pounds per square inch was then applied to the interior without any leakage appearing at the joint.

But as we had made tight joints before with other materials I was not satisfied that the main cause of leakage from settlement after the trench was filled would be overcome by the "Dip"; I therefore subjected the joint made to another test, viz.: the pipe was set up on two end supports and a deflection of one and a half (1½) inches given to the middle (at the joint); the pressure under this condition again reached twenty-two pounds without any leakage showing at the joint.

I then had an analysis made by Dr. Stillman, of Stevens Institute, who reported that there were no ingredients in the

*Extract from Report of Committee on Municipal Data and Statistics to the American Society of Municipal Improvements.

"Dip" that would deteriorate by being buried in the ground or from the action of sewage.

After his report I decided to specify the use of "Dip" on all sewers laid this year, and the results obtained have been most satisfactory, as the following tests will show.

The first was upon 300 feet of 10-inch vitrified pipe on a six-tenths (.6) grade, in testing which the ends of the section were closed up and the trench allowed to fill with water. After twelve days of rainy weather there was seven feet of water in the trench and a gauge at the lower end of the pipe showed only 300 gallons infiltration, after standing for two days.

The second test was on 300 feet of 10-inch pipe which, after filling until the water was above the pipe and standing for one week, showed no infiltration whatever.

However, I do not feel that such good results would have been obtained with any material had I not departed from the old custom of having sewer inspectors, and put all contractors under a two-year guarantee for tightness of joint.

Before accepting the sewer, I have an inside water test made on all pipes, and the test will be repeated before the expiration of the two-year guarantee specified.

Technical Education Discussed at Winnipeg

Several prominent Winnipeg contractors gave evidence last week before the Royal Commission on Industrial Training and Technical Education. Among these were Messrs. W. H. Carter, of the Carter-Halls-Aldinger firm, J. W. Morley, Jas. Malcolm, N. Burgeault, J. J. Wallace, C. S. Shipman, R. Cotter and Edward Cass. Mr. Carter, president of the Winnipeg Builders' Exchange, stated that at the present time he was employing 600 men. During the summer he had 1,200. He always carried out a good deal of work in the winter, but thought that night classes at the Technical School would be attended by the men. Among the bricklayers Mr. Carter stated that his firm had only one apprentice, the rules of the union being that an employer could only take one apprentice every two years. Mr. Carter stated that very few men were being trained in Winnipeg, new men arriving continually from Great Britain, United States and Eastern Canada. The speaker alluded to the difficulty in obtaining good foremen. The average man offering for the position had not executive ability and did not understand plans. In the United States there were schools where men learned the building trade thoroughly from the ground up.

Mr. Burgeault made similar observations in connection with the stone-cutting industry. It took four years, he said, to learn the trade and an extra year for finishing. He had only one apprentice. All the new men came from Europe or the United States. In Great Britain the trade was apparently on the decline. The rate of wages had not increased for six or seven years.

Mr. Morley, representing the painting and decorating branch of the Winnipeg Builders' Exchange, said that the lack of apprentices in the city was due to the restrictions imposed by the unions and to the inefficient instruction given by the average employer.

Mr. Edward Cass, general contractor, gave it as his opinion that in such a strenuous country as Western Canada, men had neither the disposition nor the time to teach trades to others. Technical schools as established in Germany should provide the solution to the problem.

After this session the Commission left for Portage la Prairie.

Helmer & Winstanley, contractors, have just constructed at Coaticook, Que., what is claimed to be the second largest reinforced concrete bridge in the country. The largest is at Weston, Ont., illustrated in our issue of November 2.

Winnipeg Water Supply

The City of Winnipeg is considering the advisability of taking its water supply from the Winnipeg river. It is interesting to recall that in 1907 a board of consulting engineers comprised of Messrs. J. H. Fuertes, New York; R. S. Lea, Montreal; Geo. C. Whipple, New York, and J. E. Schwitzer, assistant chief engineer, C.P.R., reported upon the various sources of supply, these being the Red river, the Winnipeg river, Shoal lake and the extension of the present system. The board based its report upon the needs of a city of 500,000 inhabitants. The engineers considered the Winnipeg river the most satisfactory and economical proposition. The following are the details of their estimated cost of this supply.

WINNIPEG RIVER WATER SUPPLY—COST OF CONSTRUCTION AS ESTIMATED BY BOARD OF ENGINEERS.

Items—	For an Average Daily Supply of			
	12,000,000 Gallons	24,000,000 Gallons	36,000,000 Gallons	48,000,000 Gallons
Land and right-of-way..	\$ 15,000	\$ 18,000	\$ 18,000	\$ 18,000
Intake works	150,000	150,000	150,000	150,000
Pumping station at Winnipeg river	325,000	465,000	740,000	1,015,000
Pipe lines	1,737,000	3,399,000	5,111,000	5,111,000
Coagulating basins	65,000	65,000	130,000	130,000
Filters	250,000	500,000	750,000	1,000,000
Filtered water reservoir ..	270,000	270,000	350,000	350,000
Winnipeg pumping station ..	350,000	645,000	930,000	1,200,000
Keepers' houses	12,000	12,000	12,000	12,000
Telephone lines	11,000	11,000	11,000	11,000
Tramway	150,000	150,000	150,000	150,000
	\$ 3,858,000	\$ 5,850,000	\$ 8,342,000	\$ 9,147,000
Add 15%	604,900	877,500	1,251,300	1,372,050
Totals	\$ 4,462,900	\$ 6,727,500	\$ 9,593,300	\$ 10,519,050
Using steel pipe lines...	\$ 6,050,000	\$ 10,915,000	\$ 16,159,000	\$ 17,084,000

WINNIPEG RIVER WATER SUPPLY—COST OF OPERATION AS ESTIMATED BY BOARD OF ENGINEERS.

Items—	For an Average Daily Supply of			
	12,000,000 Gallons	24,000,000 Gallons	36,000,000 Gallons	48,000,000 Gallons
Interest	\$ 174,000	\$ 294,000	\$ 432,000	\$ 473,000
Depreciation	33,000	59,000	80,000	106,000
Pumping	80,000	160,000	240,000	320,000
Filtering	44,000	88,000	131,000	176,000
Maintenance of pipes, keepers' wages, etc....	12,000	19,000	29,000	39,000
Totals	\$ 343,000	\$ 620,000	\$ 922,000	\$ 1,104,000
Using steel pipe line...	\$ 468,000	\$ 870,000	\$ 1,292,000	\$ 1,474,000

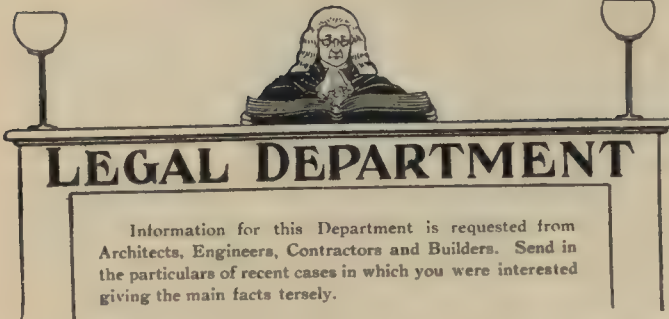
The estimate given for an average daily supply of 12,000,000 gallons is based on the laying of a single conduit with a capacity of 23,000,000 gallons a day to cover maximum requirements. This is detailed by the engineers as follows:

"The water would be brought from the Winnipeg river to the city of Winnipeg in three separate pipe lines, one of which would be built immediately, the second when the average daily consumption of water in the city would have reached about 17,000,000 gallons, and the third when the average consumption shall have reached 33,000,000 gallons daily. Each conduit would have a carrying capacity of 23,000,000 gallons daily."

In his report to the city council on October 22, 1910, in regard to the Winnipeg river project, the city engineer, Mr. H. N. Ruttan, recommended the installation of two pipe lines. Mr. Ruttan considers that the proportionate estimate of the board of consulting engineers for a daily supply of from 18,000,000 to 20,000,000 gallons would be \$6,160,550. He concludes:

"Owing to the increase in cost of works since the date of the water commission's report and apparently low estimates of some of the items, for instance, the right-of-way and tramway, it would be prudent to add 10 per cent. to the above estimate for the bond issue, making the total \$6,776,605, say \$6,800,000."

During the present season 12 miles of concrete sidewalk and 3½ miles of permanent pavement have been laid at Ottawa.



Obstruction of Highway.—Breen vs. City of Toronto. Plaintiff attempted to cross a street diagonally, when he fell among some loose scoria blocks placed upon the boulevard by defendants to be used in repairing the street. Plaintiff broke his leg, and brought action to recover damages. It was held, that defendants owed no duty to plaintiff to leave the boulevard unobstructed by the blocks; that had plaintiff conformed to the city by-law prohibiting persons from walking on any boulevard where there were crossings, he would not have been injured. Action dismissed, but without costs.

Contract as to Party Wall.—Sterling Bank vs. Ross; Divisional Court of Ontario. Plaintiffs and defendants owned a party wall. By a survey of the town it was found to encroach 20 inches on the public street. The survey was sanctioned and permitted then existing buildings to remain until they were rebuilt. Defendant's building having been destroyed by fire she desired to rebuild, and the town council required her to conform to the statute. Defendant desired to remove 20 inches of the party wall standing on the highway in front of her new premises so as to enable her to extend the front of her new building across the full width of her lot. Plaintiffs asked for injunction to restrain defendant from interfering with said wall. It was held that the wall in question constituted an integral part of each building and could be maintained so long as either building is entitled to remain upon the highway. Injunction granted plaintiffs with costs.

Non-fulfilment of Contract Causing Death.—MacDonald vs. Walkerton and Lucknow Railway Company; Court of Appeal. Plaintiffs brought action to recover \$5,655.45 balance alleged to be due on a contract to build a railway for defendants. Defendants pleaded that under the agreement it was the duty of plaintiffs to fill the narrow places between the rails at frogs, guard rails and switches with standard wooden blocks, and that, by reason of plaintiffs failing so to do, one Clarke had his foot caught in a frog and was run over and killed, and the defendants had to pay his legal representatives \$5,250. Defendants paid into Court \$405.45 as a balance due plaintiffs on their contract. At trial it was held that the action should be dismissed with costs, the money in Court to be paid out to plaintiffs.

The Court of Appeal reversed above judgment on ground that there was no liability upon plaintiffs to the Canadian Pacific Railway Company, for injury done to that company's servant. Judgment entered for amount of plaintiffs' claim with costs.

Preservation of Lien by Delivery of Materials.—Brooks—Sanford Hardware, Ltd., vs. Theodore Telier Construction Company; Court of Appeal. Plaintiffs brought action to have it declared that they had a lien for \$325.92 upon the estate or interest of defendants, owners of certain lands, and for judgment against the contractors to whom they had supplied materials used in the construction of a building for defendants. The last delivery was within 30 days of the filing of the lien. It was 84 cents worth of expansion bolts. The action against

the owners was dismissed by the Official Referee, who ordered that the lien registered against the lands should be vacated, but he gave judgment against the contractors for \$325.92.

The Divisional Court allowed plaintiff's appeal against the owners of the land as the bolts were supplied to be used and were actually used in the construction of the building, and a lien therefore attached has no application in Ontario. A plaintiff's lien is not destroyed or prejudiced by taking a note and discounting it, and if the note is returned unpaid, the plaintiff is entitled to rely on the original accounts and file a lien for the amount of the note, as well as for goods supplied after the taking of the note.

The Court of Appeal reversed judgment of Divisional Court and restored judgment of the Official Referee with costs.

Mechanics' Lien.—Kelly Bros., & Company vs. Tourist Hotel Company. Plaintiffs. Plaintiffs sought to enforce a lien claimed for work done and materials supplied in building an hotel. Defendants, according to agreement, were to make payments each month, upon production of architect's certificate that such payments were due. Nine progress estimates were given plaintiffs by the acting architect, the last of which was dated 1st June, 1908. In February or March defendants refused to make further payments on ground that plaintiff had failed to furnish a satisfactory bond for the performance of their agreement. Pending the action the architect gave plaintiffs another progress certificate showing a balance due plaintiffs of \$6,730.13.

The local Master at Kenora held that defendants were not justified in refusing to make further payments, nor were plaintiffs justified in discontinuing their work. He gave plaintiffs judgment for amount certified due on 1st June, after deducting payments on account and \$991 for insurance on hotel after 1st January.

The Divisional Court varied the judgment of the Master by increasing plaintiffs' judgment by \$991, the amount of the insurance and added to the judgment an order that any surplus which might be realized by sale of the hotel, after payment of sums directed to be paid out of the proceeds, should be paid into Court subject to further order, and reserving leave to plaintiffs to apply in respect of the lien.

Dispute Over Changes in Plans.—Smallwood vs. Powell; Court of Appeal. This was an appeal by defendant from a judgment in favor of the plaintiff contractors in an action to recover \$1,470 for work claimed to have been done for defendant in the erection of a house and stable and for a declaration of a lien on the defendant's lands for that amount. Defendant undertook to pay 75 per cent. fortnightly on account of the contract as the work proceeded, the balance of contract and extras to be paid within thirty-three days of the completion of the work. The plaintiffs were to carry out the work to the satisfaction of the architects, and subject to any changes required. A clause in the contract gave the defendant or his architect the right to make such changes. The court held that if the work was to be done under the direction of the architect, the contractors would not be fulfilling their contract if they refused to make the changes required. Another matter referred to was that part of the contractors' claim was on a progress certificate for \$200. "It is expressly declared," said Mr. Justice Magee in his finding, "that such certificates in no way lessen the total and final responsibility of the contractor nor exempt him from liability to replace work if it be afterwards discovered to have been badly done or not according to the drawings and specifications either in execution or materials. That, of course, does not touch the question of his exemption after a final certificate, but when we find that the final certificate is not itself necessary nor conclusive, the provision I have alluded to goes to show that thorough performance of the work was what the parties had in mind and the contractor was not to escape

through temporary non-discovery of inferior work." The Court of Appeal ordered a new trial with costs of former appeal to defendant.

Retention of Contract Money by Municipality as Security for Repairs.—Manufacturers' Lumber Company vs. Pigeon; Divisional Court of Ontario. The fund sought to be made available by the judgment creditor was \$1,360, held by the City of Stratford under terms of a contract for paving. The work had been completed, but under the contract the contractor was bound to maintain the work in good repair for a specified time. In default of his doing so, the city could make the repairs and charge the cost to the contractor. Judge Middleton held that under the reading of the contract the work was not completed, and that therefore the contract money was not attainable. The finding concluded as follows:

"The fact that the bulk of the work is done and that what remains to be done is only an insignificant part of the whole, makes no difference. Though in one sense the greater portion of the money has been earned as a matter of law, none is earned until all the work is done. This case comes very close to the line and it is hard to say with certainty upon which side it falls. I have come to the conclusion that the money is earned and has been pledged by the contractor as security for the performance of his contract to maintain and repair the work. This, it seems to me, is a contract collateral to the construction contract, and the price to be paid is the price of construction only and not of construction and maintenance. The maintenance is by way of warranty of the quality of the work and is to be done gratis for the period named."

Alleged Negligence in Collapse of Building (Crystal Hall Disaster).—Earl vs. Reid. Defendant owned a four-storey brick building, comprising two premises on Dundas street, London. As originally constructed a brick wall about 17 inches thick divided the two premises from foundation to roof. Many years ago three arch-shaped openings were made in the section of this wall which divided the ground floor, for the purpose of converting the two stores into one. Subsequently these openings were closed by defendant, not by restoring the solid brickwork, but by a wall about four inches thick on either side, on a line with the surface of the original wall, leaving a hollow space about eight inches wide between the two. In April, 1907, Reid entered into a twenty-five year lease with one Smyrles, who agreed to make certain alterations and improvements to the building at his own expense. One of the alterations indicated on the plan was the removal of between fifty and sixty feet of that section of the wall above referred to which divided the first floor of the main building into two compartments, and the substitution therefore of three iron columns supporting steel beams against the wall above and resting on plates 13 or 14 inches square imbedded in cement on top of the wall below.

Smyrles engaged Kernohan & Wilson, a firm of contractors, who were also defendants in this action, to do the work, but the contract between them did not appear in evidence. The work of putting in the steel beams and iron columns was completed on July 12th, 1907, and either on that day or on July 15th, the shoring which had been used to support the wall until the columns were in place was removed.

The easterly wall of Reid's building was an outside wall and faced on a lane which divided it from the building of one, Brewster, in which the plaintiff was on July 16th, 1907, employed as a clerk. On the afternoon of that day, as described by the witness, Hammett, Reid's building went down in a wedge-shape in the centre and crushed out the walls, and the easterly wall fell against Brewster's building crushing it in, whereby plaintiff received the injuries for which he sued.

Other than proving the existence of the openings and the

method of supporting the superstructure of the wall by the beams and columns, and the fact that the first indication of the impending fall was the crumbling down of some bricks in the easterly half of the ground floor from the angle formed by the ceiling and the division wall, which was instantly followed by the collapse of the wall as described by Hammett, the plaintiff gave no evidence to account for the accident. No expert evidence was given to show that to do the work in the manner indicated on the plan, having regard to the three openings filled up in the manner described, would injure the stability of the wall, nor was any witness called to prove any specific act of negligence by defendants or those doing the work.

It was found in the first instance that the plaintiff's injuries were caused by defendant's negligence in placing the iron columns on a defective wall, and the damages were assessed at \$500. The Court of Appeal gave defendant the right to appeal on his undertaking to pay costs of such action. The following principle laid down by the court is of interest:

"A man who orders a work to be executed, from which in the natural course of things injurious consequences to his neighbor must be expected to arise, unless means are adopted by which such consequences may be prevented, is bound to see to the doing of that which is necessary to prevent the mischief, and cannot relieve himself of his responsibility by employing someone else—whether it be the contractor employed to do the work from which the danger arises or someone else—to do what is necessary to prevent the act he has ordered to be done from becoming wrongful."

City Creosoting Plant at Victoria, B. C.

Mr. Angus Smith, city engineer of Victoria, B. C., has reported as follows in connection with the city creosoting plant:

There is a reservoir under the floor of the plant approximately fourteen feet square and twelve feet deep, into which the creosote is emptied from the barrels or drums or tank cars. The creosote is pumped from this reservoir into a large tank on the second storey of the plant and is there measured. The creosote is then drawn from this tank into a large cylinder which contains the cars of blocks. The creosote is there heated to between 212 and 220 degrees, and the water is evaporated from the blocks. Afterwards sufficient pressure is given to force the creosote into the blocks. The time given to the treatment of a batch is approximately four hours.

In June it was discovered that the large reservoir was leaking and it was decided to line this reservoir with steel lining one-eighth of an inch thick, which was accordingly done. There was a space between the steel lining and the old walls of the reservoir three inches wide. This was filled in with concrete in the proportion of one part of cement to three of sand, the idea being to prevent the creosote from seeping through any fissure that might be in the rocks. Soon after the first rain it was discovered that water was seeping into the reservoir where the steel was rivetted together and soon afterwards the weight of the waterback of the lining bulged the steel lining inwards. The lining was put back in place and the leak was repaired as well as could possibly be done. The plant seemed to go on without difficulty until the next heavy rain when water again found its way into the reservoir. It is quite possible that the concrete filling at the back of the reservoir has closed up the old surface water outlet in the crevice of the rock. Otherwise the water would be drained away and not rise five or six feet in height between the lining and the concrete.

The creosote that is used in the treatment of the blocks is carefully measured in the upper tank so that the amount actually used in the treatment of a batch is definitely deter-

mined. The city has on hand 641 drums or 56,160 gallons of creosote. The average creosote used per thousand blocks of 74 gallons. The city has on hand sufficient creosote to treat 759,000 blocks or 14,300 square yards of pavement. I estimate that it will take 10,000 square yards to complete Douglas and Yates streets.

An order was given for creosote from England early in the spring, which has just arrived this month. A number of cars of creosote were brought from Sidney to keep the plant going until the arrival of the drums.

Attached herewith is a statement showing the blocks treated, the creosote used, the cost of labor, the cost of the creosote, and the total cost for labor and treatment per thousand blocks, the average cost per thousand blocks is shown in red and varies from \$13.58 to \$19.86.

The cost of block pavement costs approximately as follows:

Costs of blocks	\$78.18
Cost of creosote	65.45
Treatment and labor	14.87

Total cost\$158.50

The number of blocks treated per week varies from 18,500 for the week ending June 25th, 1910, to 141,180 for the week ending October 22nd. The number of men employed averages from six to eighteen.

Late Building Season at Ottawa

Activities of the Ottawa Improvement Commission—Prospects of New Industries—Little Change in Supply Market

Ottawa, November 12, 1910.

The work of the Ottawa Improvement Commission is continuing later than usual this year, owing to the favorable weather. It has accomplished, if anything, more work than in any previous summer. From 125 to 135 men have been employed all the summer. The wages paid ranged from \$1.75 up to \$2 for laborers, and mechanics the regular prices. The commission has its own quarries, its own lands from which to take sods, its own crushers, etc. Mr. A. Stuart has charge of the work. The commission uses a large amount of cement, which it bought from the local firms for \$1.82 per barrel. During the year the commission built over two miles of driveway, besides a number of ornamental bridges. The beautifying of Nepean Point was an extensive work, carried out this season. Next year it is probable that there will be even more work on hand.

"The city has practically completed its street paving and sidewalk construction for the year. The Barber Asphalt Company and the Ottawa Construction Company are finishing up their contracts.

There are a number of industries negotiating with the object of locating in this city, and there is every indication that some of them will begin building plants this winter or early in the spring. J. H. Henderson, of England, has purchased property in the city to erect a factory for manufacturing hair cloth. A structural steel and iron works are reported to have closed an option for 6 acres in the city limits on which to locate a plant. A fibre board company of New York, a Detroit automobile industry, a pump industry and a biscuit company are negotiating with Publicity Commissioner Baker, with the object of locating in this city.

The Cummings Lumber Company, of Kazubazu will build a planing mill and sash factory in Westboro', and other companies are making investigations.

The final survey on the Morrisburg and Ottawa Electric Railway line has been made and the options for the entire

right of way have for the most part been taken. The officials expect to begin construction early in the spring.

A large number of foundations for dwellings are being put in before the frost becomes too severe. Lime is selling at 33 cents per cwt. in lots of over two tons, and for lots under that, at 35 cents. Sand is being delivered in all the central parts of the city at 95 cents per cubic yard, washed river sand is sold on the wharf for \$1.00 per load of two cubic yards.

Canadian Railroad Development

Andrew McGinnis, contractor for five miles of the Canadian Northern through and to the west of Belleville is now working 80 men and 24 teams, and if the weather is favorable expects to complete grading early in December.

The Canadian Northern Railway has been granted permission to construct a subway at Cobourg, Ont. The Grand Trunk Railway is also to construct a subway. The subways will be where the railways cross Division street and about 600 feet apart.

David McBeth, according to advices from Nelson, B.C., has taken a sub-contract on the Kettle Valley Lines for the clearing of the right-of-way between Rock Creek and Beavertdale, a short distance of about 25 miles. He expects to have the work completed by March 1 next.

Advices from Rock Creek, seven miles north of Chesaw, Wash., state that a crew of construction men have started work on the extension of the new railroad westward from Midway, B. C., to the coast and several miles have already been graded. It is believed that the Canadian Pacific is interested in the project.

A. C. Mackenzie has started grading operations on the Morinville east branch line of the Canadian Northern Railway. The line will run east from Morinville, but as yet it has not been decided just where it will connect with the main line. In all probability a town on the line in the North Battleford district will be made the junction.

The Toronto & Eastern Railway Company, recently chartered, has been financed and has completed its survey for its projected lines and is arranging preliminary matters so that construction work can be started in the spring. The road is to run from Toronto to Cobourg, with extensions of the system from Port Hope to Peterborough, from Oshawa to Lindsay, and from a point in the township of Scarborough to Uxbridge. R. H. Rothray, of Toronto, has recently been appointed superintendent of the line.

Engineers in the employ of Mackenzie & Mann, Toronto, are going over the proposed route of the Alberta & Great Waterways Railway, with a view to estimating the probable cost of constructing the line and the securing of the best and most direct route to Fort McMurray. This leads to the belief that the Canadian Northern interests will take over the Alberta & Great Waterways Railway project and will build the line for the Provincial Government, and in all probability either buy it outright from the Government or else operate it on a long-term lease.

The Laurent, Jacques Cartier & Maisonneuve Railway Company has submitted a plan to the Railway Commission to construct a railway line in and near Montreal. The company proposes to build its line from the junction of St. Laurent avenue and Cartierville avenue, in St. Laurent parish, through the north end of the city, ending at St. Catherine street, between Frontenac and Harbor streets. Part of the line will follow Iberville street. This line is really a branch of the Grand Trunk Railway System, and is intended ultimately to connect the eastern and western terminals of the system in the city. The G. T. R. proposes to build an east end sta-

tion with docks and wharves. At present only a freight shed has been erected in the east end, but the company is now laying this line, which will connect the two stations.

According to a despatch from Edmonton, Alta., a new construction company is being organized to take over all the work on the main line of the C. P. R. west from Edmonton to the British Columbia side. Mr. J. McKenzie, son of the president of the C. N. R., and Mr. C. J. Merry, of Winnipeg, are prominently identified with the enterprise. For some time past Mr. Merry has been connected with the Cowan Construction Company, which has been doing a considerable amount on C. N. R. work in the west. Should this new company take over the construction, they will work west to the mountains, meeting the Northern Construction Company's gangs, which are now working north from New Westminster and Kamloops. The McMillan Company, of Winnipeg, is now under contract for the first seventy miles west of the city, but it is understood that the new company may take over construction next year.

It now looks as though the Toronto-Ottawa branch of the Canadian Northern Railway would not be ready for operation before next summer. Good progress has been made on the grading work and this will be completed nearly on contract time. The principle delay, however, has been in connection with the bridge work, and this is said to have been due to slow delivery of steel. The bridge work began at the junction point in the Don Valley, where this line branches off the Sudbury branch for the east, for the Don river had to be spanned. This was only a small problem and was soon completed. In the meantime the grading eas had been completed to allow of the rails being laid on to the next gully, which was at the Rouge river. There are two forks to this stream. The western, 19 miles from the union station at Toronto, made necessary a steel viaduct with concrete abutments, 500 feet in length. The eastern fork called for a span only 180 feet long. There was only one cutting that could be called big in the ground work along this mileage, where the road crossed under the Grand Trunk Railway at Scarborough. The steam shovel work there was extremely heavy. But the completion of this and the throwing over of the steel made it possible to lay the rails down east almost to Bowman's creek, which is situated north of Bowmanville. Here was another viaduct, though a small one. But a little farther on came the Dixie Creek gully, which entails a viaduct of 850 feet in length. This one is not yet built. Beyond it again there is another at Stephen's Mill Pond, which is a span of 650 feet, also not constructed as yet. It is about 56 miles from the Union Station. From there the line continues on and down to Port Hope, where there is a span to be thrown of 2,000 feet in length. The grading from Cobourg to Trenton is practically all finished, and the steel laid, except a small piece near Brighton, where there is still some work to be completed. The engineers hope the grading will be finished by the new year, and that by the end of January all the steel viaducts to Trenton will be in place. Ballasting has been done on a good portion of the line, and it is expected this work can be proceeded with in the winter and be finished in the early spring.

A meeting of the Ottawa branch of the Canadian Society of Civil Engineers will be held at 177 Sparks street on November 16, when Mr. D. H. Nelles will address the members on the subject of the International Boundary Survey. Mr. H. V. Brayley is secretary of the branch.

Building Inspector Chausse, of Montreal, has approved plans for a ten-storey office building to be erected on St. Francois Xavier street, at a cost of \$1,000,000. Messrs. Ross & MacFarlane, of Montreal, are associated with Messrs. Carriere & Hastings, New York, in the architectural work. Peter Lyall & Sons have the contract.

Personal News and Notes

Victoria, B. C., is considering the advisability of appointing a supervising engineer for the city.

Mr. J. M. Wilson, city engineer, of Moose Jaw, has returned from a trip through Eastern Canada.

Mr. T. Aird Murray has been invited to report upon a new water supply for the town of Pembroke, Ont.

At Toronto the Civic Improvement committee have recommended the appointment of a local architect to prepare plans.

Robert Tracey, of High River, Alta., a well known contractor, formerly of St. Mary's, Ont., was thrown from his horse last week and died later from his injuries.

The new post office at Edmonton was opened last week after lying idle for over six months, although practically completed. It is stated that the delay was in interior finishes ordered from England.

The building by-laws of the City of Montreal are to undergo a thorough revision. The Board of Control has recommended the engagement of a sanitary engineer and steel expert in this connection.

Building permits issued at Vancouver last month represent a total value of \$1,286,995. The total for the ten months of the current year is \$10,298,355, an excess of more than \$3,000,000 over the total for the whole of 1909.

The Chateau Laurier Hotel, at Ottawa, is beginning to assume a finished appearance. Good progress has been made in the concluding stages of this work. The building will be completed and handed over to the Grand Trunk Railway next season.

We regret to note the death of Mr. Jos. Greenfield, one of the oldest and best known architects in Winnipeg, and for the past six years superintendent of public works in that city for the Dominion Government. The late Mr. Greenfield was born in Croydon, Eng., 65 years ago.

The Civic Improvement League of Halifax, N. S., at a meeting held last week decided to ask the members of the city council for their co-operation in the appointment of a permanent commission, and the securing of expert advice in providing a comprehensive plan for the development of the city.

Mr. C. E. Cartwright, of Vancouver, and Mr. A. J. Matheson, formerly of Ottawa, have formed a partnership as general consulting engineers. Mr. Matheson has reported on a number of important matters for the Dominion Government. Formerly he was division engineer on the Georgian Bay Canal Surveys.

Mr. Rudolph Hering, consulting engineer on the disposal system, now under construction at Toronto, paid a visit of inspection to that city last week. The local press recalls the fact that it is just a quarter of a century ago since Mr. Hering was first retained by the city, and that it was at that time that he recommended the work now in progress.

The Ottawa city council is expected to appoint an expert engineer to report in conjunction with the city engineer on the C. P. R. tunnel scheme now under consideration. The following names have been mentioned: Hugh Lumsden, (Ottawa); W. F. Tye, (formerly chief engineer for the C. P. R.) and Walter Shanley, (Montreal.)

Extensive paving work is projected at Winnipeg and City Engineer Ruttan is looking for pointers on the most satisfactory material. When in Port Arthur recently he inspected a surface application, known as "Roomas." It is interesting to note that an experimental strip of Westrumite pavement has been laid on Ellice avenue, Winnipeg, from

Garry to Smith streets. The experiment was made on behalf of the inventor, by Mr. C. W. Sharpe, chairman of the Winnipeg Parks Board.

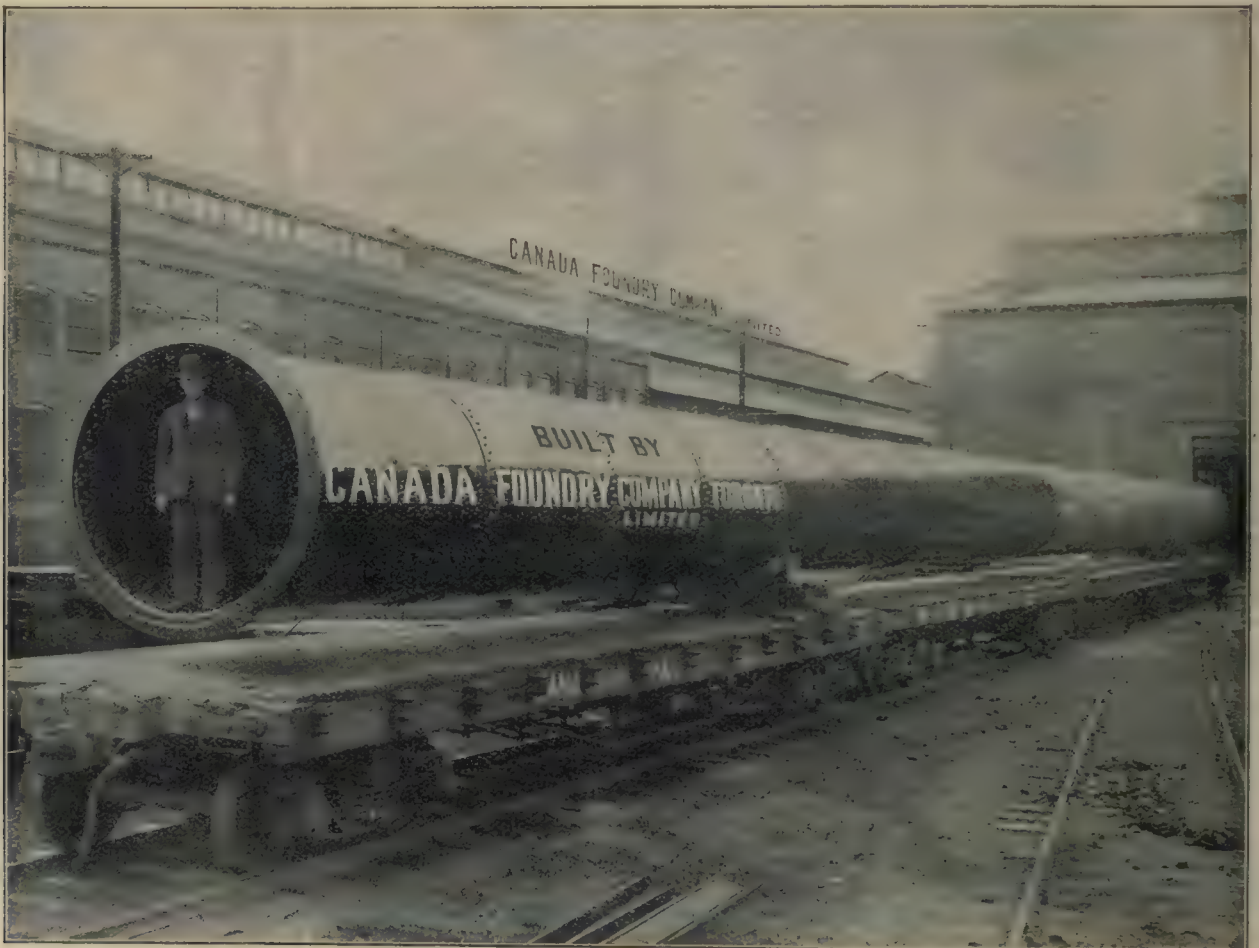
Mr. Geo. C. Rainboth, one of the best known land surveyors in the country, died last week at the age of 64 years. He had been in charge of the Canadian survey party working on the international boundary line between New Brunswick and Maine. He was a Dominion land surveyor, and was also registered in the provinces of Ontario and Quebec.

The death occurred at Montreal last week of Mr. Jno. Watson, president of the firm of Jno. Watson & Son, Montreal, architectural iron workers. The late Mr. Watson was born in Greenock, Scotland, and was 57 years of age. He was prominent in local military circles, having been sergt.-

ports leading ultimately to the reciprocity treaty of 1854. It is of interest to recall that it was under Mr. Keefer's direction that the Ottawa waterworks were built. He also constructed waterworks for the cities of Hamilton and Montreal. Mr. Keefer was also prominent in railway work, making preliminary surveys for the Grand Trunk Railway and for the railway bridge over the St. Lawrence at Montreal, and acting for some time as chief engineer for railways in Upper and Lower Canada.

Canada Foundry Company's Large Contract

The accompanying illustration shows a section of the new intake pipe for the city of Toronto recently made by the Canada Foundry Company, Limited, this being about one-



Section of new Intake Pipe made by the Canada Foundry Company for the City of Toronto.

major of the Prince of Wales Rifles for many years. He held both the long service and Fenian Raid medals.

November 4th was the 89th anniversary of the birth of Mr. T. C. Keefer, C.E., of Ottawa. Mr. Keefer was educated at Upper Canada College, Toronto, and at the age of 17 years first essayed engineering work, being employed for a time on the Erie and afterwards on the Welland canal. From 1845-48 he was chief engineer on the Ottawa river works. In 1849 he gained Lord Elgin's prize for the best essay on "The Influence of the Canals of Canada" on Her Agriculture, and about this time published his "Philosophy of Railways." In 1849 Mr. Keefer was placed in charge of the surveys for navigation of the rapids of the St. Lawrence and in 1850 assisted the United States consul in preparing a report on Canadian trade with the United States. In 1852 he went to New York to assist with a second report on the same matter, these re-

third of the total 500 feet length. The pipe is 72 inches inside diameter and each section weighs approximately 45 tons. The section shown is interesting from the point of view that it is the longest section of pipe ever turned out by the Canada Foundry Company. Having been made in a Toronto shop, it was possible to use fewer sections than would be possible if it had to be shipped any distance by rail. This pipe is now being placed in position by the city engineer's staff.

At the convention of the Union of Manitoba Municipalities, which is to be held in St. Boniface during the latter part of the present month, one of the most important matters to be discussed is proposed legislation looking to the improvement and construction of roads. A number of important recommendations will be made in this connection by the Manitoba Good Roads Association.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Creston B.C.

The ratepayers at a meeting authorized the secretary appointed to ascertain the cost of the various kinds of piping required in the proposed sewerage system and also to appeal to Hon. Thos. Taylor, minister of works, for financial support. Estimated cost, \$10,000. S. A. Speers, secretary.

Kingston, Ont.

A by-law will be submitted to the ratepayers in January next for the extension of Barrie street. Estimated cost, \$3,600.

London, Ont.

It is stated that new tenders for the repaving of Dundas and Richmond streets may be called, the advisability of re-surfacing being questioned because of the undermining going on in that locality. The Barber Asphalt Company held the contract for the resurfacing.

Montreal, Que.

The nature of the work and the amount apportioned in the estimates for public works next year is found in the following statement: For the enlargement of the waterworks, \$1,000,000; for a filtration plant, \$1,500,000; for execution of public works, \$4,500,000; for a municipal lighting plant, \$1,000,000; for underground conduits, \$1,000,000; for working capital, \$1,000,000. Total, \$110,000,000.

New Lis'card, Ont.

Tenders addressed to F. W. Ferguson, secretary, Water Commission, will be received until November 25th for laying of about 550 feet of 4 inch and 600 feet of 6 inch c.i. water pipe, and also for the setting of valves and hydrants. Plans, etc., at office of C. H. Fullerton, town engineer.

North Toronto, Ont.

The report of Engineer T. Aird Murray on the sewerage system for North Toronto is as follows: 40 1-2 miles of sewers, \$189,999; easements, \$3,855; sewage disposal works, including land, \$49,000; engineering fees, \$11,650; legal expenses, \$1,000; contingents, \$10,000. The plan, as submitted, would take care of a population of 7,000 at 60 gallons per head per day.

Ottawa, Ont.

A number of new hydrants, estimated to cost about \$4,217, were recommended by the fire chief, but will not be installed until next spring. The cost of water mains laid this year in Ottawa was \$48,208.

Perdue, Sask.

The ratepayers will vote on a by-law for \$2,900 to be expended on good roads.

Penticton, B.C.

The by-law to raise \$20,000 for street improvements and drainage was carried.

Point Grey, B.C.

Tenders were called until November 23 for clearing and grading streets. H. Lloyd, clerk.

Tenders addressed to H. Floyd, clerk, Kerrisdale, B.C., will be received until November 26th for new reservoir (3,000,000 gallon capacity). Messrs. Cleveland & Cameron, engineers, in charge.

Pembroke, Ont.

A committee was appointed by the council to prepare a by-law to raise \$65,000 by way of loan for the purpose of extending the waterworks. The report of T. Aird Murray, M.C.A.N., C.E., was read and included the recommendation that a new intake pipe be installed from O'Kelly's Point to 6,000 feet in to the main channel of the Ottawa, the diameter of the intake pipe to be 18 inches, of steel, flanged and bolted joints with flexible joints where required; and that a new and large fire-proof pump station be built at O'Kelly's point, etc.

Roleau, Sask.

The \$15,000 by-law for waterworks was carried.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until November 29th for construction of sewers in Cheltenham avenue, Bloomfield avenue, Ivy avenue, also culvert across Queen street, etc. Specifications at office of city engineer.

Victoria, B.C.

Tenders for valves for the waterworks department were received as follows: A. Sheret, \$6.50 each; E. G. Prior & Company, \$6.80; A. B. Fraser & Company, \$6.80; B. C. Hardware Company, \$8. Referred to city engineer, etc.

The tenders for repair of reservoir were as follows: C. J. Betts Company, Spokane, who agree to do the work at 30 cents per square yard, making a total sum of between \$4,000 and \$5,000; Newton & Greer, Victoria, \$7,900; S. Rutter, Lampson street, Esquimalt, \$32,000. In their offer the Spokane firm mention "water proofing." Newton & Greer in their specifications propose to employ waterproof paints very largely, and the bidder from Esquimalt would do a lot of heavy concrete work.

The date for the voting on the borrowing of \$700,000, for the purchase of the undertaking of the Esquimalt Water Works Company has been set for November 24th.

Vancouver, B.C.

The \$500,000 sewerage by-law was carried. Noted in October 12th issue.

The Board of Works will soon be called upon to bring in a recommendation for the paving of Denman street from Georgia to Beach avenue, a largely signed petition having been filed with the city clerk asking that this work be done as soon as possible. Either wood-block or bitulithic paving is desired a full width of 42 feet.

Mr. H. M. Burwell, consulting engineer of the city waterworks extensions, has submitted his report dealing with present extensions and contemplated improvements to the city waterworks system for the next two years. This includes the

construction of an additional main up the intake and a high level main from Capilano Creek to the Little Mountain reservoir, at a total estimated cost of \$690,000, excluding submerged pipes.

Estimate of cost of new supply main from Seymour Creek intake, capacity 12,000,000 gallons per day from present intake, and connection of Capilano system with Little Mountain reservoir.

Seymour Creek supply main—Pipe line from present intake to Second Narrows, complete, \$236,000. Submerged pipes and shore connections, \$65,000. Supply main from Second Narrows—Pipe line from Second Narrows to connection with city distribution system, corner Campbell avenue and Pender street, \$107,000. High level main, from Capilano canyon to Little Mountain reservoir—Pipe line from canyon to Little Mountain reservoir, complete (excepting the submerged mains), \$187,000; engineering and supervision at 5 per cent., \$30,000; expense and loss on sale of debentures and contingencies at 10 per cent., \$65,000. This report is of special interest at the present time owing to the proposed work of the Dominion Government in dredging First Narrows, which means an interruption of Capilano water service for a considerable length of time. During this time it will be necessary to use Seymour Creek water almost entirely unless arrangements are made beforehand for the continuing of the Capilano supply temporarily in the meantime. The report was laid over for further consideration.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until November 28th for construction of following sewers: In Centre avenue and in Wolfe street. M. Peterson, secretary.

Tenders for sewers, the total cost of which is estimated at \$511,208, will be received within the next two weeks. The following are the detailed estimates as provided by Col. Ruttan, city engineer: Jefferson avenue, from McPhillips street to the Red River, \$276,690; Clifton street, from Portage to Sargent avenues, \$101,222; Livinia avenue, from Clifton to Strathcona streets, \$6,757; Centre street from Assiniboine River to Portage avenue, \$19,382; Ash street, from Assiniboine River to Godfrey avenue, \$44,495; Godfrey avenue, \$44,495; Godfrey avenue, from Cambridge street to Renfrew street, \$56,905.

AWARDED.

Belleville, Ont.

The contract for the construction of Front street sewer was recommended to Mr. Thomas Manley.

Montreal, Que.

The Montreal city council at its last meeting awarded to the John McDougall Caledonian Iron Works Company, Limited, of Montreal, the contract for a motor-driven centrifugal pump of 5,000,000 gallons capacity, for \$7,716.00. The unit consists of a 16 inch two stage turbine pump, driven by an Allis-Chalmers-Bullock 500 h.p. wound rotor motor. There were fif-

teen tenders for this unit, including the John Inglis Company, of Toronto, Canada; Canada Foundry Company, of Toronto; Chapman and Walker, of Toronto; Canadian Boving Company, of Toronto; Canadian Buffalo Forge Company, of Montreal; Nather & Platt, of Montreal, and Peacock Bros., of Montreal.

New Westminster, B.C.

The following contracts were let: The contract for the new cement walks to be laid on Alexander, Begbie, Lorne, Mackenzie and Church streets, on both sides, the full length from Columbia street, to Albert Peck, of this city; the contract for the paving of Columbia street extension from Fourth street to Leopold Place, to the Hassam Paving Company; the contract for the laying of the Eighth street sewer system, in which there are over twenty miles of sewer, to F. T. Sinclair, of Revelstoke.

Vancouver, B.C.

Contract for the block paving of Richards street, from Georgia to Robson, was awarded to the Paterson Timber Company at \$6,571.31.

Winnipeg, Man.

The contract for sewer pipe and special was awarded to Thos. Jackson & Son, Winnipeg, \$10,398. M. Peterson, secretary.

Railroads, Bridges and Wharves

Montreal, Que.

It is stated that the Grand Trunk Pacific will apply to Parliament for powers authorizing the construction of a line to enable it to connect with the Hudson Bay road which the Government proposes to build from the main line in Keewatin to the southwestern shore of the bay. The southern terminus of the road will be at a point near the mouth of the Garret and Pasqua Rivers, and from there the distance will be about four hundred miles to York Factory on the Nelson River.

Owen Sound, Ont.

It is stated that application will be made for a Dominion charter for the dry dock for which the by-law carried in August last. Mr. Edward Box, the promoter, has returned from England, where, it is stated, he obtained the necessary financial backing. Mayor Harrison and W. P. Telford, ex-M.P., are interested.

Ottawa, Ont.

The city engineer has recommended that Mr. W. F. Tye, consulting engineer of Toronto, be engaged to report with himself as to a comprehensive plan for the entrance of all railways to Ottawa. The scheme upon which he is to report is an outgrowth of the Canadian Pacific plan for closing a section of the canal and constructing a tunnel between the two depots. Noted in last issue.

Toronto, Ont.

The G.T.R. management are calling for tenders until November 28th, for removal of houses on Empress crescent and vicinity. Ground must be cleared by March 1st, 1911.

Vancouver, B.C.

The Burrard Inlet Tunnel & Bridge Company called for tenders for boring on the site of the proposed new bridge across the Second Narrows until November 18th. The engineering firm in charge is Cleveland & Cameron.

AWARDED.

Aylmer, Que.

Contract for wharf here was awarded to Thos. Moran and John Moran, Arnprior, Ont., \$8,974.

Bic, Que.

The contract for construction of wharf here was awarded to Theophile Beaumont, St. Thomas de Montmagny, \$33,810.

Barrington's Cove, N.S.

Contract for wharf here was awarded to J. W. Dobson, Sydney, C.B., \$29,000.

Great Salmon River, N.B.

Contract for breakwater here was awarded to C. A. Huntley, Parrsboro, N.S., \$10,750.

L'Assomption, Que.

Contract for concrete ice pier was awarded to Jos. Renaud, St. Paul de Joliette, \$4,910.

Lakeport, Ont.

Contract for reconstruction of wharf here was awarded to Samuel Gowan, Brockville.

New Edinburg, N.S.

Contract for breakwater here was awarded to J. E. and H. Bigelow, Canning, N.S., \$11,900.

Pelee Island, Ont.

Contract for extension to wharf here was awarded to Donald McDermid, 43 Avenue road, Toronto, \$13,000.

Riviere des Prairies, Que.

Contract for piers here was awarded to Morrow & Beatty, Peterboro, Ont., \$8,520.

St. Andrew's, Que.

Contract for wharf here was awarded to Bridge & Wharf Builder Co., 362 Notre Dame street, Montreal, Que., \$3,245.

Winnipeg, Man.

See "Business Buildings, Awarded."

Wallaceburg, Ont.

The Chatham Township Council received tenders for the two bridges to be built over Running creek as follows: Petrolea Bridge Company, of Petrolea; Jenks and Dressler, of Port Huron and Sarnia. The tender of the Petrolea Bridge Company being the lowest, was accepted for \$2,050.00. The tenders specified steel.

Public Buildings, Churches, Schools, etc.

Brandon, Man.

Plans are being prepared for a new insane asylum and call for a central building with wings, no part to be more than two storeys in height, and absolutely fireproof.

Cranbrook, B.C.

The Board of Trade and others will recommend to the City Council the erection of a new city hall. Estimated cost, \$15,000. B. B. Benedict, secretary.

Collingwood, Ont.

The ratepayers will, in all probability, vote on a by-law to authorize the raising of \$14,000 by debentures for the erection of a new fire hall. This amount will cover equipment as well as building.

Chilliwack, B.C.

The tenders submitted on September 24th for erection of city hall here disclosed the fact that no contractor was prepared to erect the structure required for less than \$20,000. The amount of by-law was \$15,000. A new by-law for the increased outlay will be submitted.

Calgary, Alta.

The time for receiving tenders for the two new schools, it is stated, has been extended.

Cobourg, Ont.

A campaign for a new hospital has been started and a public meeting called

to consider question of site.

Fredericton, N.B.

Chief Rutter of the Fire Department is of the opinion that two fire stations instead of one should be erected.

Edmonton, Alta.

Tenders for erection of two storey frame school were called until Nov. 19th by A. W. Coone, secretary-treasurer, 44 Jasper avenue east. Plans, etc., with C. W. J. Haworth, Griffin's Packing Plant.

Guelph, Ont.

The Children's Aid Society will appeal to the public for assistance in the erection of a new Shelter. Estimated expenditure, about \$9,000. Plans have been prepared.

The Property Committee of the city council and the Finance Committee of the city council have sent on the recommendation that plans and estimated cost be obtained for a new court house and jail and these compared with those for new jail and repairs to court house. Estimated cost of new buildings, \$125,000. Mr. Beattie, county clerk; Mr. Hastings, mayor.

Halifax, N.S.

The Board of Works has received convincing testimony from the witnesses called that the City Home was not now suitable for the purpose for which it was being used.

Moosejaw, Sask.

The council have decided to co-operate with the Board of Trade to make the erection of a \$50,000 Carnegie library possible for the city. E. M. Saunders, R. Bogue and J. W. Sifton are interested.

Kelliher, Sask.

The Atlas elevator in Kelliher was destroyed by fire on the 12th inst. It will be rebuilt.

Montreal, Que.

A permit for the sacerdotal school of the Seminary of St. Sulpice has been issued, \$49,000. The new structure is in the grounds of the Seminary, north side of Sherbrooke. A permit for repairs amounting to \$20,000 was also issued for the present seminary. The architect is Mr. A. H. Lapierre.

A representative business committee has been chosen from the citizens to take charge of arrangements for the establishment of a hotel for working women of this city. Rev. Dr. Symonds, Rev. Mr. Sullivan, Mrs. Grafton, Mrs. F. Minden Cole, and others are interested.

Ottawa, Ont.

A new drill hall is needed here.

Building Inspector Garvoek, of the Public schools, has been asked to make a report on the heating problem for the public library.

The Salvation Army will erect a new citadel on Gladstone avenue. Staff Captain Burrows is in charge of financial arrangements.

The board of directors of St. Luke's Hospital have chosen Horwood, Taylor and Horwood architects for the new laundry, tenders for which will be called very soon. It will be a detached building and thoroughly up-to-date.

Tenders for the addition to the detention home will be received at C. P. Meredith's office.

Port Arthur, Ont.

Tenders addressed to Rev. J. A. Grenier, S.J., pastor of St. Andrew's Church, will be received until December 12th for construction of a new church.

Rigaud, Que.

Tenders are being called until December 5th for construction of public building here by the Public Works Department, Ottawa. R. G. Desrochers, secretary.

Rosemount, Que.

The Catholic School Commissioners will erect an up-to-date school for which site has been purchased.

Renfrew, Ont.

The Separate School Board have sold the convent property. A new convent will be built on Lochiel street next year.

Regina, Sask.

The management of the . T. P. have accepted the proposals of the city re entrance into Regina. The depot will be on Albert street, as proposed, and the freight sheds constructed according to the plans already submitted to the railway company. Work will be started in the spring.

Sydney, N.S.

As soon as the membership list is up to the number justifying the erection of a new Y.M.C.A. building, a building campaign will be commenced. Mr. Thomas Thorburn, secretary.

Stratford, Ont.

A by-law will be submitted on January 2nd for authority to expend \$15,000 to erect a market shelter.

Toornto, Ont.

Permit was issued to General Hospital for a 3-storey brick surgical wing, on College street, \$250,000.

It is stated that plans have been prepared for the erection of a new Grace Hospital.

Tenders will be received by R. C. Desrochers, secretary Department Public Works, Ottawa, up to December 12th, for fittings for the Toronto central post office. Specifications, etc., from Thos A. Hastings, clerk of works, postal station F, Toronto. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

At a meeting of the athletic directors at the university recently, the matter of the new athletic field and grandstand was discussed. The directorate of the athletic department have three propositions before them, one to build a grand stand of reinforced concrete to cost approximately \$120,000, another to build a stand of cement, cost about \$100,000, and another to build it of wood and concrete, cost about \$50,000. Prof. C. H. Wright is to report.

Victoria, B.C.

The plans for the new school at the corner of Bank street and Leighton road were considered, but no action taken.

Vancouver, B.C.

Plans were presented to Building Inspector Jarrett for the erection of a theatre, corner of Harris street and Westminster avenue, \$65,000.

The directors of the Vancouver Athletic Club will probably join with the Commercial Club in erecting a big eight-storey building on Pender street, between Seymour and Granville streets. The matter will be put to the shareholders of the Athletic Club. Estimated expenditure, \$230,000. The option on the proposed site expires by December 1st.

The Vancouver Conservative Club have taken option on a site for a block to be used as permanent headquarters. Tentative plans have been prepared and show a brick building, 10 storey, which will cost

approximately, \$450,000. Geo. H. Cowan, M.P., is interested.

Competitive plans will be received by the Board of Park Commissioners for a refreshment pavilion building, buildings for animals, and improvements to grounds at Coal Harbor entrance, Stanley Park. Address Park Superintendent, Stanley Park, or Commissioner Eldon, 1158 Alberni street.

The amount raised here by the Y.M.C.A. building campaign is \$505,783—\$4,000 more than the amount aimed at. Construction will not be started until next spring. C. R. Sayer, western field secretary.

Wolfville, N.S.

Tenders are called until December 1st for erection of brick and stone church. C. B. Chappell, architect, Charlottetown, P.E.I.

Windsor, Ont.

The governors of King's College have decided to raise \$25,000 for increased accommodation for the students. The committee appointed will report in St. John on February 2nd.

Weston, Ont.

Tenders addressed to J. H. Taylor, clerk, will be received until Nov. 26th for construction of transformer sub-station and fire hall, to be completed within 3 months. Plans, etc., at office of Chipman & Power, engineers, 204 Mail Building, Toronto.

Winnipeg, Man.

The Y. M. C. A. building campaign had reached \$278,648 on the 19th inst.

The citizens of Winnipeg are to be asked to raise within a week \$350,000 for the Y.M.C.A. This amount, added to the quarter of a million already in hand, will make possible the erection of the building on Vaughan street, with a branch on Selkirk avenue, to meet the needs of the north end of the city. G. F. Stephens, president; J. D. Ormsby, chairman of Young Men's Committee building campaign.

The awards of the judges on the competitive plans submitted for a tubercular hospital have been discussed by a joint committee of the board of control and the hospital committee, and the recommendation that the plans of George Teeter be given first prize and the work of supervising construction, was concurred in, subject to the calling of tenders which will prove whether or not the architect has kept within the condition that the building must not cost more than \$75,000. The awards were: First, George Teeter (collaborating with Dr. C. T. Sharpe); second, C. W. U. Chivers; third, William Bruce. Six sets of plans were considered and all were reported good. Several sets were too complicated to be adjudged favorable for adoption.

AWARDED.**Campbellton, N.B.**

The contract for erection of public building here was awarded to James Reid, Sackville, \$23,592.

Diamond City, Alta.

James Patterson, Lethbridge, Alta., has the general contract for the new school building.

Hartland, N.B.

The contract for public building here was awarded to Messrs. J. W. and Chas. J. Smalley, River Bank, N.B., \$16,700.

Moncton, N.B.

The contract for erection of public building here was awarded to O. J. Dunham and P. N. Leblanc, of this city, \$5,739.

Smith's Falls, Ont.

The contract for erection of new Collegiate Institute here was awarded to R. N. T. McFarlane, of Kingston, at \$38,050. Owing to conditions imposed, Mr. John Davidson, who held the contract, gave it up.

Toronto, Ont.

The contract for roofing and galvanized iron work on the Museum building, Queen's Park, has been awarded to A. B. Ormsby, Ltd., Toronto.

Instructions have been issued to Commissioner of Customs John MacDougald to proceed with the proposed alterations and extension of the examining warehouse at an estimated cost of from \$10,000 to \$15,000.

Walkerville, Ont.

The contract for the foundation for the customs office building, owned by Hiram Walker & Sons, Ltd., has been awarded as follows: Piling, Candler Dock and Dredger Company; concrete, Corrick Bros. We are informed that no other contracts have been let. Burrowes & Wells, architects, 701 Trussed Concrete Building, Detroit.

Residences**Brandon, Man.**

Building permit was granted to Charles J. Whillier for the erection of a brick veneer residence on Rosser avenue, \$2,600.

Calgary, Alta.

Some recent permits issued are: A. F. Ritchie, for a \$2,800 residence in Inglewood, Col. Walker's estate; R. C. Blow, a \$2,500 residence on 10th street west; R. C. Lloyd, a \$3,000 residence in Mt. Royal.

O. G. Davenish, of this city, is having plans prepared for a large apartment building to be erected on Eight street west.

Ottawa, Ont.

Donald Fraser will erect a large apartment house on the corner of Laurier and O'Connor.

Among the building permits issued recently are: St. Germain & Fraas, brick veneer dwelling, Carling avenue, \$4,500; Ernest Webster, dwelling, Breeze Hill, \$3,000; G. A. Elliott, dwelling, Mutchmor street, \$4,500; W. F. Fields, dwellings, Frank street, \$7,500.

St. John, N.B.

It is stated that L. D. P. Tilley has secured option of the new Victoria Hotel, which will be turned into an apartment house.

Vancouver, B.C.

A permit has been issued for an apartment house, southeast corner of Bute and Comox streets, by Messrs. J. V. and E. G. Lighthouse. The estimated cost of the block is \$250,000. Among the various innovations for the new block will be an incinerator plant for the use of the tenants, disappearing furniture facilities, vacuum cleaning, gymnasium, etc.

AWARDED.**Calgary, Alta.**

Messrs. McDougall and Foster, contractors, have commenced work on the large apartment block being built on the corner of First street east and Seventh avenue.

St. Catharines, Ont.

The contract for brick and stone residence for Dr. W. J. Chapham, this city, has been awarded to Harrop & Hawley, also of St. Catharines, at \$7,500. Architect, Thos. H. Wilby, St. Catharines.

Business Buildings and Industrial Plants

Blenheim, Ont.

Mr. G. A. Fraser, of Thamesville, is considering the location of a canning factory here.

Berlin, Ont.

Damage to the extent of about \$15,000 was done to the Alpha Chemical Company's factory here.

Campbellton, N.B.

The Trans-Continental Railway Company plans to erect larger buildings here, it is reported, at an estimated cost of \$200,000. G. Grant, of Ottawa, Ont., is chief engineer.

Chatham, Ont.

The American Pad and Textile Company, of Greenfield, Ohio, capitalized at \$1,500,000, have definitely decided to locate in Chatham, and will, as soon as possible, start to build a factory. Estimated cost, \$20,000.

Fergus, Ont.

Beatty Bros. are feeling the necessity of the enlarging of their plant. A by-law will probably be submitted to the rate-payers as to the granting of civic privileges.

Flesherton, Ont.

The business block, which included post office and warehouse, etc., owned by W. Buskin, was destroyed by fire on the 18th inst.; loss, \$3,600. Damage to the extent of about \$9,000 was done to other buildings.

Galt, Ont.

The C. Turnbull Company, manufacturers, purchased two valuable pieces of property on King street, and will, it is stated, next year build a large extension.

Guelph, Ont.

It is stated the Messrs. W. W. Hesson and W. E. Rothwell will erect a factory here to manufacture carpet sweepers, etc.

Imperial, B.C.

The Imperial Fir Company will erect a \$20,000 3-storey hotel here, to be completed by April, 1911. President C. C. Michener. Noted in last issue.

London, Ont.

It is understood that the McLaughlin Automobile Company have purchased the property at the southwets corner of Bathurst and Richmond streets, and that a large building will be erected.

Medicine Hat, Alta.

The general store belonging to Kilgrow Bros., at Grassy Lake, was destroyed by fire. Loss, \$25,000.

Moose Jaw, Sask.

The Board of Trade, represented by Messrs. Miller, Saunders and Bogue, will approach the C.P.R. on the question of a station hotel.

Montreal, Que.

The sash and door factory owned by Phillipe Saumure, 1244 Sanguinet street, residence and other houses, were destroyed by fire on the 16th inst. Estimated loss, about \$100,000.

New Westminster, B.C.

Tenders are required by the B. C. Electric Railway Company for the erection of a tramway station and office buildings. Architects, Messrs. Maclure & Fox, Winch building, Vancouver.

North Bay, Ont.

We are informed that the erection of veneer plant and basket factory for Mr.

D. A. Leach, mentioned in issue of October 19th, will not be commenced before the spring. J. E. Farrell, chairman Industrial Committee.

Orillia, Ont.

The directors of the National Hardware Company purpose to enlarge their lock works.

Ottawa, Ont.

G. Trudel has obtained a building permit for bakery and stables, \$6,500. A. Christie, builder, Rideau street.

The Diamond Arrow Motor Car Company and the Modern Machine Company have decided to unite their concerns. The manufacturing will be done at the Modern Machine Company's works which will be much enlarged forthwith to do the work.

The building on the corner of Bank and McLaren streets, owned by Mr. W. H. Wooding, was destroyed by fire on the 20th inst. Estimated loss, \$13,000.

Petrolia, Ont.

The 3-storey flour mills on King street, owned by W. W. Paing, of this town, was destroyed by fire on the 17th inst. Total loss, \$10,000.

Perth, Ont.

The Fallbrooke Roller Mills, owned by A. B. Lees, were destroyed by fire on the 16th inst. Estimated loss, about \$9,000.

Pembroke, Ont.

The Canada Box and Barrel Company, Limited, have selected a site for their new factory with water frontage on the Ottawa. President, Jas. F. Munro; secretary-treasurer, J. G. Forgie, both of Pembroke. G. S. May, of Ottawa, is a director.

Prince Albert, Sask.

Plans have been prepared by Olaf Albrechtsen for the three-storey block for Mr. J. H. Mitchell. Excavation will be taken out this year and construction started in the spring. Pressed brick with facings of stone will be used. The brick, it is stated, has been purchased. Estimated expenditure, \$50,000.

Regina, Sask.

The finance committee decided to sell two lots to the Regina Plumbing & Heating Company.

St. Boniface, Man.

The council have closed an agreement with the Taggart Iron Works, Ltd., of Winnipeg, by which the company will erect a large building on lots 74 and 75, Montcalm street as a branch industry. Building operations are to commence within the next six months.

St. John, N.B.

Mr. C. E. Vail, whose alundry was recently destroyed by fire, will build a new plant in Leinster street. The building will be one storey, brick or concrete, fireproof. About 10,000 feet of floor space will be taken up. Garnet W. Wilson, Ritchie building, 50 Princess street, is the architect.

Sydney, N.S.

The Nova Scotia Hotel Company, Limited, which has purchased the Alphonse Hotel premises, have had the plans for the reconstruction of the hotel prepared and completed by Prof. Dahl, C.E., and tenders for the remodelling of this hostelry will be called for at once.

Sherbrooke, Que.

The Bell Telephone Company, it is stated, has purchased the Bellevue hotel property on Stratheona square, where, it is understood, their intention is eventually to erect a new exchange building.

Toronto, Ont.

The Bank of Ottawa has purchased the northeast corner of Broadview avenue and Gerrard street, and will, it is understood, erect a fine new bank building in the near future.

The Brown Milling Company have submitted a proposition to the Board of Control for the erection of a large flour mill and elevator on the site of the present mills, Princess and Esplanade streets. Proposed expenditure, \$500,000; capacity of mill, 6,000 barrels; capacity of elevator, 1,000,000 bushels. Mr. J. C. Forman, assessment commissioner, has recommended the adoption of terms submitted.

Victoria, B.C.

A permit has been issued to John Hart for a one-storey brick business block, Fort street, \$10,000.

The National Finance Company have effected the sale of the property of Lim Sam, corner of Douglas and Johnson streets. It is understood that the intention of the purchaser is to build.

Vancouver, B.C.

Plans for the Bank of Nova Scotia's extensions on Hastings street have been submitted, \$30,000.

Messrs. David Gibb & Son will begin the erection of an hotel. The structure, which is to be of reinforced concrete, and steel, will cost \$300,000, and will be situated at the southeast corner of Seymour and Dunsmuir streets.

Tenders were received until November 17th for erection of C.P.R. station, corner of Howe and Robson streets. Honeyman & Curtis, architects.

Plans have been prepared for a new modern 6-storey office building on the northwest corner of Hastings street and Westminster avenue. George Dawson, of Dawson & Nuttimer, 500 Granville street, is interested.

Jonathan Rogers announces the erection of a 10-storey office building on the northeast corner of Pender and Granville streets. Cost, \$500,000.

Permits were issued to Mr. Carter-Cotton for his new four-storey building on the corner of Pender and Cambie streets, work on which has already been begun. \$200,000; Boyd-Fordham Company, for the erection of a \$50,000 warehouse, northeast corner of Columbia and Powell street, the building being six storeys in height and constructed of brick; Bank of Nova Scotia, addition to premises on Hastings street west, \$350,000.

Winnipeg, Man.

It has been decided to extend the J. H. Ashdown, Ltd., warehouse and offices on the corner of Bannatyne avenue and Rorie street. Work on the extensions will begin at once.

Plans have been prepared by W. G. Beach, 2 McLean Block, for the erection of an office building, six storeys high, 62 x 148 feet, of brick and stone, for Charles E. Colin. Tenders will be received next month.

The Twin City Hoisting & Manufacturing Company propose the establishment of a factory here. A. M. Smith, manager.

AWARDED.

Goderich, Ont.

Mr. E. Chandler, of Stratford, is in charge of the erection of the new G.T.R. station here.

Montreal, Que.

The Foundation Company, Ltd., have been awarded the contract for installing the foundations for the Dominion Express

building, which is being erected on the site of the old St. Lawrence Hall. The foundations will consist of pneumatic caissons sunk to rock. Work will start at once.

Ottawa, Ont.

McKinley & Northwood, of Ottawa, have been awarded the contract for plumbing in the Rosenthal building, John D. O'Leary, of Montreal, the electrical contract, and Dunning & Company, of Ottawa, the galvanized iron roofing. C. E. Deakin general contractor.

Sarnia, Ont.

Contracts have been awarded for Scott Bros'. new bakery, corner of Christina and Davis streets, as follows: Geo. Bruce, carpenter work; Frank Gutteridge, mason work. Cost of building, \$8,000.

Victoria, B.C.

Parfitt Bros., 1446 Gladstone st., have the contract for two buildings on Fisguard for Lee Mong Kow and the Chinese Benevolent Association. Cost, \$15,000; also contract for warehouse for the R. P. Rithet Co., \$17,000.

Winnipeg, Man.

The contract for the train shed for the Canadian Northern Railway Company, 150 feet long, has been let to the Manitoba Iron Bridge Company. Approximately 1,650 tons of steel are required for the work. The company has also been awarded the contract for the Canadian Northern Railway freight sheds.

Power Plants, Electricity and Telephones

Brandon, Man.

Several petitions are in circulation here asking the council to grant a franchise for the street railway to a Vancouver syndicate, which offers to build at once if given a reasonable franchise.

Calgary, Alta.

William Kennedy, jr., Montreal, has been chosen to investigate the power possibilities of the Bow and Elbow and other adjacent rivers.

Guelph, Ont.

The amounts to be voted on by the various townships and towns in connection with People's Railway are as follows: Proton township, \$36,000; Luther township, \$30,000; Garafraxa township, \$25,000; Arthur, \$20,000; Fergus, \$20,000, and Elora, \$15,000. Total, \$146,000.

The Radial Railway Board have decided to ask the council to prepare and submit a by-law to raise the sum of \$30,000 to provide for the extension of the Radial Railway into St. Patrick's Ward.

Kitsilano, B.C.

Tenders were invited until November 14th for the erection and completion of an exchange building for the British Columbia Telephone Company. Plans and specifications can be seen at office, 209 Cotton building, Vancouver. Bids to include all trades en bloc (excepting steel construction). A. Arthur Cox, architect.

London, Ont.

The city council will be asked to guarantee \$150,000 of the bonds of the proposed railway between London and Sarnia. Ex-Ald D. A. Stewart is interested.

Marmora, Ont.

On November 28th, by-laws to issue \$2,000 for the purchase of an electric light plant; \$10,000 for the purpose of building

a substation for the electric light system, will be voted on.

Mitchell, Ont.

The Hydro-Electric Power by-law was carried.

Montreal, Que.

The city having decided that underground conduits must be built, a number of civic officials will make an inspection of the various streets, and make a report as to places where conduits are most needed.

Alderman L. A. Lapointe gave notice at a recent meeting of the council of the city's intention to borrow \$10,000,000 for the purpose of carrying on public works next year. The charter requires the formality of by-laws. The expenditure includes, \$1,000,000 for municipal lighting plant, \$1,000,000 for underground conduit.

Owen Sound, Ont.

Town Engineer McDowall presented a plan for a line extending from Southampton, Bruce Co., by way of Owen Sound, Meaford, Thornbury to Collingwood. Blue prints of this plan are being prepared. Among the directors are representatives from each town.

Ottawa, Ont.

The Trades and Labor Council of Ottawa recommended that a municipal charter be taken out for a railway from the city to the cemeteries.

Port Dover, Ont.

It is reported that the electric road between this place and Brantford will be built in the spring. Estimated expenditure, \$900,000.

Penticton, B.C.

The municipal council is about to take out records on Penticton and Ellis Creek which will be a basis for supplying the town with 1,000 horsepower for power purposes. Five hundred horsepower will be developed with the installation of a domestic water service, work upon which will be commenced shortly. Five hundred horsepower will be in reserve for development when the occasion arises. F. Latimer, municipal engineer.

Sherbrooke, Que.

See "Business Buildings."

Toronto, Ont.

The tenders for electric light pillars were as follows: Reid & Brown, 8 pillars weekly for seven weeks, at \$36 each; Canada Foundry Company, 20 pillars weekly for seven weeks, at \$42 each; Flour City Ornamental Iron Works, Minneapolis, 75 pillars per week for four weeks, at \$35.28 each, delivery to start in two weeks.

Weston, Ont.

See "Public Buildings."

AWARDED.

Calgary, Alta.

The following companies furnished each a carload of copper wire: Northwest Co., General Electric & Phillips Co., of Montreal. 50,000 lbs. of copper wire was purchased for \$16.62 per 100 lbs., and 16,000 lbs. of aluminum wire at prices ranging from 21c. to 22c. a lb. Aluminum wire was purchased for power transmission purposes.

The following tenders for supplies for street railway were received: Twenty-four motors from General Electric Company, \$14,700; eight hundred poles from Gorman, Clancy & Grindley, at \$27 each, \$2,216; fifty thousand ties from Western Supply Company, at 54c., \$27,000; fifty ton of spikes from Gorman, Clancy & Grindley, at \$2.75 per cwt., \$2,750; eight thousand bonds for tracks from J. W.

Campbell, at \$40.60 per cwt., \$3,248. Total, \$3,248. In every case but one lowest tender was accepted. In the purchase of motors, the lowest price was not accepted. The Bullock Company tendered \$450 below the General Electric Company, who secured the tender, but it was thought best to purchase the General Electric motors because they have the same controllers as the Westinghouse motors, also used on the street cars here. It is claimed that there are few Bullock motors in use in this country. The General Supply Co. and the Westinghouse Co. submitted tenders which were over \$2,000 in excess of the General Electric Co.'s tender. The tenders for rails have not been decided upon yet, and this will be another big item.

Toronto, Ont.

The Board of Control recommended the following awards: Reid & Brown, Toronto, 56 pillars at \$36 each, and 700 lanterns at \$1.61 each; Canada Foundry Company, Toronto, 140 pillars at \$42 each, and 1,050 lanterns at \$2.30 each; Flour City Milling Company, Minneapolis, 300 pillars at \$35.28 each, and 5,000 lanterns at \$1.37 each.

Winnipeg, Man.

The contract for supply of copper wire and cables were awarded as follows: E. J. Phillips, electrical works, Montreal, 200,000 pounds wire at 16 3/4c. per lb.; 100,000 pounds cable at 17c. per lb.; Wire and Cable Co., Montreal, rubber covered wire, total, \$1,269. M. Peterson, secretary.

Miscellaneous

Hamilton, Ont.

The following building permits have been issued: Robert Dyet, erection of ten brick dwellings on Fife street for A. I. Proctor, \$15,000; S. Levy, erection of two brick dwellings on Bold street, \$3,000; Bennett & Thwaites, erection of a brick store building and brick stable, corner of Fairleigh avenue and Wilson street, \$3,500.

Montreal, Que.

City Surveyor Barlow recommended the purchase of 500 snow carts at a cost of about \$2,500.

Recent building permits include: Z. & J. St. Pierre, 423 Marie Anne east, house containing sixteen dwellings on St. Luke street, cost \$16,000; Methodist Missionary Society, a hall building at 505 St. Andre street, cost \$15,000; La Cie Construction Lafontaine, a two storey bowling alley and billiard building, on Sherbrooke street, \$29,000; P. L. W. Daure & Company, two houses containing six dwellings on Amity street, \$6,000; George Sleep, 20 Charron street, a two storey house on Grey avenue, N. D. de Grace Ward, \$4,400; D. C. Leach, King George Apartments, a three storey building at 16 University street, \$3,500; J. S. Smith, 207 St. James street, two three storey houses at 783 Sherbrooke street west, \$16,000; N. Marcell, 614 Chambord street, a two storey house on Esplanade avenue, \$3,000; L. Fortier, 2388 Esplanade avenue, house containing three dwellings on Christopher Colomb street, \$3,800.

North Vancouver, B.C.

Bids have been received as follows by the city for a 15-ton steam roller: Watrous Engine Company, Limited, Vancouver, \$3,500; Buffalo Steam Roller Company, \$4,250; Canada Foundry Company, \$3,900; Mussels, Limited, gas motor roller, \$3,200; Western Engineering Company, \$2,860.

Prince Rupert, B.C.

Tenders addressed to Alexander Johnston, Deputy Minister of Marine and Fisheries, Ottawa, will be received until Janu-

Tenders and For Sale Department

Relaying Rails Wanted

We are in the market for a carload of relaying rails, 30 pounds to the yard preferred. Hagersville Contracting Company, Limited, Hagersville, Ont. 48



Sealed tenders addressed to the undersigned, and endorsed "Tender for Fittings, Toronto Central Post Office," will be received at this office until 4.00 p.m., on MONDAY, DECEMBER 12, 1910, for the work mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the office of Mr. Thos. A. Hastings, Clerks of Works, Postal Station "F," Toronto.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. O. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, November 18, 1910.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 48

City of Winnipeg

Electrical Distribution System

Tenders for 500 K. W. Motor Generator Sets

Tenders for Electric Travelling Crane

Sealed tender, on prescribed forms, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope, "Tender for 500 k.w. Motor Generator Sets," or "Tender for Electric Travelling Crane," will be received at the office of the undersigned up to 11 a.m. on THURSDAY, DECEMBER 15, 1910.

Copy of specification and form of tender may be obtained at the office of Smith, Kerry and Chase, Carnegie Library Building, Winnipeg, Canada, or at the office of the firm in Toronto, Ontario.

Each tender must be accompanied by a certified cheque as set forth in the instructions to bidders, which cheque will become forfeit to the corporation under the conditions set forth in that document.

The city reserve the right to reject any or all tenders, or to accept any bid which shall appear advantageous to the city's interests.

M. PETERSON,

Secretary.

Office of the Board of Control,
Winnipeg, November 11th, 1910.

Notice to Building Contractors

Sealed tenders will be received by the Municipal Clerk until 12 o'clock noon on SATURDAY, NOVEMBER 26TH, 1910, for the construction of a combined Transformer Sub-Station and Fire Hall. This building is to be completed within three months. Cash deposit of \$200 required with each tender.

Plans and specifications may be seen at the office of the engineers, Mail Building, Toronto, or at the Clerk's Office, Weston.

R. J. BULL, Esq., Mayor, Weston, Ont.

J. H. TAYLOR, Esq., Clerk, Weston, Ont.

CHIPMAN and POWER, Engineers,
204 Mail Bldg., Toronto.

Positions Vacant

Advertisement under this heading two cents a word per insertion. Box No. ten cents ex ra.

WANTED, Architectural Draughtsman; must be experienced. State references and salary. Storey and Van Egmond, Architects, Regina, Sask., Can. 48

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

WANTED, position as Superintendent of Grading, Rock Work or Concrete, experienced. Box 154 "Contract Record," Toronto Ont. T.F.

ary 3rd, 1911, for the construction of a of a reinforced concrete wharf, timber approach trestle, power house with chimney, buoy shed stores, offices and dwellings, also the installation of drainage and water systems. Plans, etc., at above department, at office of the agent of the offices of the agents in Victoria, B.C.; Halifax, N.S.; St. John, N.B., Quebec and Montreal, at the local postoffice and at the Customs House, Winnipeg.

Quebec, Que.

Tenders were called until November 23rd for supply of stone, lumber and sand for the city.

Toronto, Ont.

Recent building permits include: F. G. ey brick dwellings, Wroxeter, \$20,000; F. G. McBrien, two pair semi-detached two-storey brick dwellings, Perth, \$8,000; Mrs. J. Richards, two-storey brick dwelling, 186 Bedford road, \$4,800; F. R. Baumhard, one pair semi-detached two-storey and attic brick dwellings, Grace street, \$4,600; H. W. Ireland, two and a half storey brick dwelling, Edgar avenue, \$5,000; The Kent Estate, four attached two-storey brick dwellings, Richmond street west, \$7,000; A. A. Kennedy, three attached two-storey brick dwellings, east side Spadina, Davenport, \$6,000; Hedley & Bradford, three attached two-storey brick and roughcast dwellings, Emerson, \$4,800; G. Phillips, three pair semi-detached two-storey brick dwellings, on east side Brock avenue, \$12,000; J. S. Case, six pair semi-detached two and a half storey brick dwellings, on east side Western avenue, \$36,000; M. A. Beesley, pair semi-detached two and a half

storey brick dwellings, corner Fernwood Park and Fir, \$5,000; J. W. Walker, pair semi-detached two-storey and attic brick dwellings, on Chicora avenue, \$5,000; Elder Carriage Works, three-storey brick addition to factory, corner Soho and Phoebe, \$9,000; S. Shaver, pair semi-detached two-storey and attic brick dwellings, on Breadalbane, \$5,000; S. Olive, three attached two-storey brick dwellings and stores, Elmwood and Mackey, \$6,000; J. A. Thompson, three-storey brick store and hall, corner Lansdowne and Wallace, \$9,500; Love & Patchett, three attached two-storey brick dwellings, on Chorley street, \$6,000; H. S. Hara, two and a half storey brick dwelling, Rowanwood avenue, \$5,000; G. A. Griffith, pair semi-detached two-storey brick dwellings, College street, \$9,000; J. Prager, two-storey brick warehouse, Elm and Elizabeth, \$10,000; C. E. Walton, two-storey and attic brick dwelling, 1031 Gerard east, \$4,500; W. W. Hiltz, two pair semi-detached two and a half storey brick dwelling, 85-91 Hogarth avenue, \$8,000; A. E. Playter, three-storey brick stores and lodges rooms, 6 Danforth avenue, \$10,000; H. Johnston, pair semi-detached two-storey brick dwellings, 35-37 Western avenue, \$5,500; W. Braybon, pair semi-detached two and a half storey brick dwelling, 108-110 Hampton, \$4,800; J. Henderson, pair semi-detached two-storey brick dwelling, Franklin, \$4,500; Mrs. M. J. Low, three attached two-storey brick dwellings, Armstrong, \$6,000; O. E. Perry, pair semi-detached two and a half storey roughcast dwelling, Dingwall, \$5,000; F. Lindsay, two pair semi-detached two storey brick dwelling, Boulton, \$6,500; J. Shaver, five detached two-storey brick dwelling, Lee, \$10,000; R. J. and W. C. Cooper, pair semi-detached two-storey and attic brick dwellings, Balmoral, \$7,000; A. Grassi, two-storey brick store and dwelling, Roncesvalles, \$5,000; High Park Lawn Bowling and Curling Club, two-storey brick curling and club rooms, Indian road, \$12,000; Fred Holt, two-storey brick dwelling, Oriole road, \$5,000; Mrs. Edith Quinn, two-storey brick dwelling, Warren road, \$7,000; J. J. Thompson, pair semi-detached two-storey and attic brick dwellings, Macdonnell, \$4,500; Frank Bowden, four detached two-storey brick dwellings, 649-655 Logan avenue, \$8,000.

Vancouver, B.C.

Recent building permits include: George Weaver, 2006 Third avenue east, \$3,500; H. H. Davis, 1035 Thirteenth avenue west, \$4,000; A. L. Wilson, 1576 Eleventh avenue east, two houses, \$3,200; St. Paul's Church, 1162 Jarvis street, Sunday school room and rectory, \$15,000; J. Stephen, 1285 Eleventh avenue west, \$4,000; Geo. McCombe, 1728 Third avenue west, \$2,600; J. Danner, 512 Boundary avenue, \$3,000; G. C. Ossenger, 2968 Carolina street, \$2,600.

AWARDED.

Nelson, B.C.

Cunningham & Oliver, Nelson, have secured the contract for building a steel barge here for the Canadian Pacific Railway Company. Cost, \$20,000.

Winnipeg, Man.

The contract for supply of 600 feet 2 1-2 inch fire hose was awarded to the Canadian Rubber Co., Winnipeg, "Keystone" brand, at \$1.10 per foot.

Contract Record

ESTABLISHED 1856

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

PUBLISHED EACH WEDNESDAY BY
HUGH C. MACLEAN, LIMITED

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SUBSCRIPTION RATES

Canada and Great Britain, \$2.00 U.S. and Foreign, \$2.50

Vol. 24

Toronto November 23, 1910

No. 47

Training the Engineer-Contractor

It has been said of the engineer, with a degree of truth, that he must be born and not made. Certainly it is an erroneous idea to suppose that the average student can be made a competent engineer by processes like those of learning to read and write or acquiring a language. In the first place the embryo engineer must be possessed of some originality, must be capable of ignoring precedent and must be a man of the sound judgment which comes of innate ability. At the same time, however, it cannot be denied that the training a man receives at college will either make or mar him, ability notwithstanding.

A particularly instructive letter published under the heading, Training the Engineer-Contractor, is contributed to this issue by Mr. Henry Holgate, the well known consulting engineer of Montreal. Mr. Holgate's letter is written in criticism of a letter by Mr. W. R. Harris, published in our issue of November 2. Mr. Harris contended that students should be instructed in the practical details of sewerage, building construction, machinery and so on, and that when they come to consider the design of such they should be required to make up a schedule of quantities, quoting market prices of materials and specifying the plan of operation and equipment required in the carrying out of the work. Students might further be required to prepare plans, specifications and estimates of actual work in the vicinity of the college. An open class discussion of the methods of each day's work would be the most important part of such a course, according to Mr. Harris.

Mr. Holgate's views are somewhat at variance with those expressed by Mr. Harris. "I have always recognized," he writes in this issue, "that the college does

not turn out an engineer but an engineering student. . . . A man must develop into an engineer." Both, however, agree as to the value to the student of advice from a practising engineer.

Recently, the *Times* took occasion to refer to the subject of the qualifications of the engineer in terms which are particularly impressive. The following extract is interesting at this time:

"The cardinal principle of reform depends upon the fact that it is to the public interest that positions of responsibility for engineering work should be held only by engineers duly qualified by their respective institutions. It should therefore be possible to induce public bodies to make it a condition in appointing engineers for such positions that they should possess the diploma in evidence of fitness to carry out the work. This is the legitimate and proper object of combined effort, and there is evidence that municipalities and other official employers are ready to carry out their part of the process of excluding by this means all unqualified persons from public undertakings. Before the scheme can be firmly established, the conditions determining the grant of a diploma will in some cases have to be made more rigorous, and there will require to be greater coherence between the technical institutions, so that they can present a combined report of their respective qualifying powers to public or to private employers who seek their assistance. A clear notion is also necessary regarding what constitutes incompetence. It is not too much to say that some men are born incompetent, and that no amount of technical education or examination will correct the fault or discover the failing. What the institutions can do, however, is to apply a test that will give a very strong presumption of competence, especially if their test is made to depend upon practical work well done, rather than upon adroit questions conventionally answered."

R. E. W. Hagarty establishes a connection between this subject and that of engineering organization. Special attention, he holds, should be given to estimating and computing costs.

It will be instructive to discuss this matter further, and we trust that a number of our readers will give us the benefit of their experience and contribute their views.

Carrying Out Municipal Work

Some interesting and forcible reflections on how not to conduct municipal improvements were submitted at the recent convention of the American Society of Municipal Improvements, by Mr. Will P. Blair, of Indianapolis, Ind., Secretary of the National Paving Brick Manufacturers' Association. Mr. Blair first told of a city which, for a street of light traffic, put down 5-in. brick block pavement on 10-in. concrete base, thus wasting a large sum of money for unnecessarily heavy construction. Not content with this, the inspection of the paving work was entrusted to a lay member of the board of public works and he managed to mix things up pretty badly with the result that in a years' time this needlessly heavy and expensive pavement was in bad condition. Other instances of improper supervision of municipal work were cited and were contrasted with examples of good supervision. The paper closed with the statement that these improper conditions affecting the conduct of municipal work would never be remedied by efforts from outside the engineering profession. Mr. Blair thought the association before which he was speaking should take the lead in bringing about these improvements. He remarked that the great success of the General Electric Company has not been brought about with employees

selected on the personal recommendation of this, that or the other man, but that instead the company has picked men of good collegiate training. Finally, he said that engineers must not submit to dictation from anyone founded solely upon political reasons.

The Engineer as Sole Arbitrator

In a letter to the "Contract Record," Mr. F. W. W. Doane, city engineer, of Halifax, N. S., makes the following criticism in respect to the position of the engineer as sole arbitrator, discussed in recent issues of this journal. The following is an extract from his communication:—"I readily endorse the principle, but find in practice that the arbitration clause does not always work out satisfactorily, owing to the weakness of human nature. In all such matters a great deal depends upon the man. With a good man, the engineer's estimate and the engineer as sole arbitrator are safe; with a good contractor the interests of the municipality are safe; but, as must occasionally happen when you have a contractor who is not absolutely reliable, or an engineer whose principles are not the best, the results must be unsatisfactory at times."

Clay Products to the Fore

Canadian Association to Meet in Toronto Next Month—Every Indication of a Record Gathering

The annual convention of the Canadian Clay Products Manufacturers' Association will be held in Toronto, December 14, 15 and 16. Among those who are expected to address the members are Mr. J. W. Ball, of Toronto, whose practical talks on kiln troubles at past meetings have been so helpful, and Professor W. H. Day, of the Ontario Agricultural College, who will discuss the tile drainage problem.

The question of power for clay-working plants is receiving more and more attention every season. This year the extension of the Hydro-Electric Commission service throughout Ontario has turned the attention of many clay-workers to electricity as a motive power. The announcement that Mr. Chas. A. Millar, of the Standard Brick Co., Limited, has consented to describe their power installation, which is entirely electrical, and to emphasize its advantages, will be received with pleasure by many clay-workers.

An open discussion will follow these papers and every member is invited to come prepared to ask any questions he may desire answered.

The Association banquet, which will probably be held on Thursday, Dec. 15th, will be the most attractive function of the kind yet held in connection with the convention.

A discussion will be opened on Friday, Dec. 16th, by Mr. S. J. Fox, M.P.P., on the subject: Which Pays the Better, Piece Work or Day Work? Mr. J. S. McCannell, of the Milton Pressed Brick Company, a former president of the Association, and Mr. W. N. Freeborn, of Brantford, have agreed to give their views on this question.

A visit will be paid to the plant of the Berg Machinery Company, at the corner of Niagara and Bathurst Streets.

This plant is one of the best equipped and most complete of its kind on the continent and will well repay a visit. Mr. Anton Berg, the president of the concern, has done a great deal to advance the interests of clay-

workers by his enthusiastic work for the various trade associations of Canada and the United States.

The report of the committee on technical education which will be presented at this meeting will be awaited with much interest. Mr. D. O. McKinnon, Toronto, is secretary of the Association.

Unprofessional Conduct by Engineers

In a recent issue of the Engineering News it is related how a certain city desired to construct works for sewage and garbage disposal. A prominent resident of the city, himself an engineer of eminence, was consulted as to the best engineers to engage to prepare plans for these works, and he recommended a firm of engineers a national reputation. The firm was engaged, plans were prepared by them and bids upon these plans were received. The amount of the bids, however, was somewhat in excess of the amount which had been appropriated by a vote of the city. The chief engineer of one of the companies bidding thereupon appeared before the mayor and aldermen and declared that the engineers who had prepared the plans did not know anything about garbage and sewage disposal; also, that "they had so drawn the specifications that no one but their own people could bid for the work."

We quote this language from the public report of the meeting given in a daily newspaper. Later, the man who made this attack upon the reputation of this engineering firm declared over his own signature that the firm had drawn plans in the interest of a certain contracting company.

By argument of this sort, he brought the mayor and the aldermen to distrust the firm of engineers under whose plans they had been working and finally persuaded them to give him a contract to make new plans and specifications for the work. One of the baits that he used to secure this contract was the agreement that the successful bidder for construction could use all of his patents and patented appliances. He also agreed that, if the bids for the work exceeded a certain sum, his company would undertake the contract.

We need hardly say to our readers that the average board of aldermen, confronted by a glib talker presenting arguments of this sort, is exceedingly vulnerable. Quoting again from the newspaper report: "The city council agreed that this was a good offer and the mayor was authorized to enter into a contract with Mr. Blank at once. Mr. Blank agreed to have his plans and specifications ready to submit to the council to-morrow morning."

To an engineer, we presume the last sentence alone will be sufficiently eloquent comment upon the sort of plans and specifications which the city was likely to receive from this new engineer, and for which, by the way, it is to pay a fee of 5% of the cost of the work.

Another unique feature, which it is sufficient to report without comment, is that this new engineer has taken a very strong stand against the employment of an inspector on the construction work. He declared that such an inspector would simply be a nuisance and cause delays, and that, in view of his company's guarantee such an inspector was unnecessary.

We are glad to say that so far as we are aware this man, calling himself an engineer, who committed the acts above recited, is not a member of a national engineering society.

The point on which we desire to lay emphasis, however, if any emphasis is necessary, is the attempt of

one engineer, or one claiming to be an engineer, to discredit another by attacks upon his professional reputation and professional honesty.

Surely if the engineering profession is entitled to be called a profession at all, it must brand such conduct as dishonorable. Standards as high as this obtain to-day in the world of business. The salesman who attempts to get business by attacks upon a competitor's reputation for honesty generally finds to-day that he has hurt himself more than he has hurt his rival. If the commercial world brands such competition as dishonorable, surely the engineering profession should have standards of conduct at least as high.

Early Development of Reinforced Concrete

In the introductory lecture to a course which will be given this year in the School of Building of the London, England, County Council, Mr. H. Kempton Dyson, secretary of the Concrete Institute, sketched the history and development of reinforced concrete, in the course of which he mentioned some primitive and early methods of reinforcing masonry.

He called attention to the construction used in the roof of a Roman tomb built on the Via Appia about 100 B. C., or earlier. It has been found to consist of a slab of lime concrete in which bronze rods were placed crossing each other to form a reinforcing latticework. The Romans also strengthened their masonry work by timber and tiles. In China, too, efforts were made to strengthen masonry by embedding foreign materials in it. At one point it has been found that the Great Wall of China, on a bad subsoil, was built on a kind of concrete raft, in which timber, reeds and rushes were embedded. In the Middle Ages, Mr. Dyson stated, timber was frequently employed to reinforce rubble-concrete walls.

The first suggestion of an idea of reinforcing concrete in modern times, according to Mr. Dyson, seems to have been a statement in J. C. London's "Encyclopædia of Cottage, Farm and Village Architecture," published in 1830, in which it was suggested that flat roofs might be constructed of latticework of iron tie-rods thickly embedded in cement and cased with flat tiles. About 1840 two systems of floor construction were employed in Paris, known as the Vaux and Thuasne systems; the former consisted of round rods, closely spaced, hooked over flat wrought-iron bars placed on the edge some distance apart and embedded in a slab of plaster-of-paris concrete; while the latter employed small iron joists with hangers or stirrups placed over them, in which round rods were suspended, placed in holes in the stirrups. Plaster of paris was, however, not a proper cement to be employed, as it caused the embedded iron to rust, and probably the reason reinforced concrete did not arrive sooner was that the world was waiting for a suitable cement—it needed Portland cement, which was invented in 1824, but was not manufactured to any extent until some years later.

The first real inventor of reinforced concrete in the modern sense seems to have been W. B. Wilkinson, a plasterer, of Newcastle-on-Tyne, who took out a patent for floors and beams of the same in 1854. Mr. François Coignet, a Paris contractor, took out a patent in 1855 for reinforcing slabs with a network of iron rods, and a M. Lambot, another French contractor, proposed the construction of ships by means of concrete with an embedded skeleton of wire, and he constructed a punt of the kind which was shown at the Paris Exhibition of 1853, and is still in service in a pond at Miravel, where he

resided. Among those credited by Mr. Dyson with the development of the art are Frederick Ransome, Monier, Hyatt, who made a great many tests on reinforced concrete beams and worked out formulas for their strength; W. E. Ward, who erected a building in New York in 1875 containing reinforced walls, floor-beams and roof; E. L. Ransome and Hennebique.

Sand Blasting Concrete Surfaces and Cost

A Chicago company has recently made successful experiments in roughing the surfaces of sample concrete blocks, made from materials which are being used in the construction of a bridge at Lake Bluff, Ill. The bridge is being built in connection with the new United States Naval School and is about 285 ft. long, 60 ft. wide and about 100 ft. above the bottom of the ravine which it spans. Experiments showed that a very good surface could be obtained in a short time with air at 50 to 55 lbs., and that best results are more easily obtained on concrete a month old or more than on green concrete. The proper surface cutting is obtained by holding the nozzle at an angle with the surface and by varying the distance between the nozzle and the surface about 1,000 sq. ft. a day is easily covered, and with good men a maximum area of 2,000 sq. ft. could be done. An estimate of the cost of this class of work is as follows:

	8-hr. day.
1 tuck pointer	\$ 4.80
1 laborer	2.50
1 engineer	5.00
Gasoline and sand	8.00
Machine, interest and depreciation	5.00
Incidentals	5.00
Total	\$30.30

Assuming an average day's work of 1,000 sq. ft. this amounts to 3 cts. a sq. ft.

Reconstructing a Reinforced Concrete Bridge by shortening its arch, adding a pier and building another arch, is described in "Ingeniören" of Copenhagen. The macadam and part of the side walls of the old arch were removed and three holes, each 7 ft. square, were cut in it over the site of the new pier. The foundations of the latter were laid and twenty old 35-lb. rails were placed vertically in it in two rows, passing up through the holes in the old arch. The iron bars in the old arch, exposed by cutting the holes, were cut near the lower edge of the holes and bent upward to correspond with similar bars to be built into the new arch. The abutment of the new arch was cast, then the new arch itself, and finally the remainder of the pier. The work was carried on continuously by four shifts. Five weeks later the four strips of the old arch, projecting through the new work, were cut and wedges inserted. These were gradually slackened as the centering of the new arch was struck, thus preventing any serious unbalanced pressures on the pier from either side.

Cheerfulness is the most important factor in business and the most potent. It is also the one best to be recognized. Cheerfulness will attract more customers and sell more goods with less wear and tear than any other quality. There is practically no difference between cheerfulness and optimism. And no matter what you call this quality in a man it is the greatest business getter, the biggest trader, the greatest achiever in the world.

Hydrated Lime—Its Manufacture and Uses

Early Methods of Hydration—Systems in Vogue in Canada and the U. S.—Various Processes—Machinery Used—A Growing Industry

Specially contributed by L. E. ALLEN, Chemical Engineer, Belleville, Ont.

The manufacture of lime is one of the oldest processes known to commerce. It was produced in a crude way by the early Greeks and Romans, as is shown by an examination of the mortar from many of the ancient buildings in Greece and Italy. It probably preceded the manufacture of the old Roman cements, which show such remarkable tests of strength and permanency.

Owing, no doubt, to the imperfect methods of calcining the raw materials, the lime was thrown into pits in the ground and covered, and allowed to stand. The consequent hydration of the lime took place very slowly, but nevertheless surely, and produced a very fine lime putty, which possessed great plastic properties and when mixed with sand made a mortar of great binding power. This method of hydration is still in vogue in some parts of Europe.

Until quite recently, the hydration of lime has been carried out in a more or less crude and unscientific man-

stone, or dolomite, which is a combination of magnesium carbonate and lime carbonate, commonly known as marble. In nature, carbonate of lime seldom occurs in a pure state, but nearly always contains a greater or less amount of oxide of iron, alumina, silica, phosphate of lime, magnesia, etc. In many cases the magnesium carbonate is not considered an impurity, and in fact until quite recently it has been much easier to produce a high grade hydrated lime from a lime containing magnesia, as will be explained. Some of the largest and most successful plants in the United States, however, are producing what is known as a high calcium hydrated lime, or one made from a very pure limestone containing little, if any, magnesium carbonate.

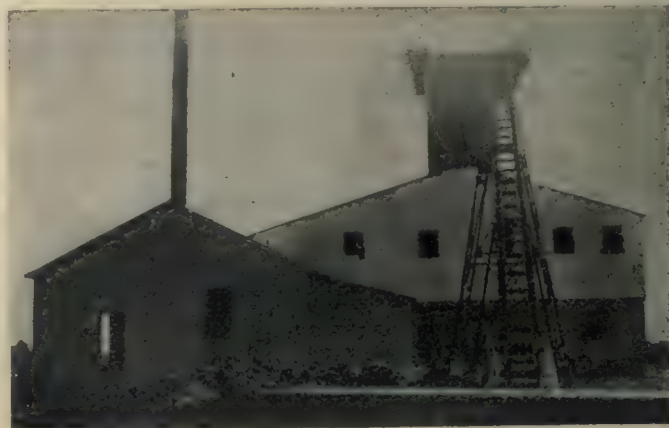
The crude limestone is first quarried and broken up by hand to fairly uniform sizes, and then sent to the lime kilns. The most modern kilns are continuous, and are fired either with producer gas, coal or wood. The



Limestone Quarry.

ner, and what is now known as hydrated lime, was practically unknown as a commercial article fifteen years ago. The present day demand for a material put up in a convenient form to handle, an article that is stable under all ordinary conditions, and one that saves labor, has doubtless been the cause of the rapid growth of this industry within the past five years. According to the last report of the United States Geological Survey, there were, in 1906, thirty plants on the United States manufacturing hydrated lime; in 1908 there were forty-six plants operating; and the growth of the industry since 1908 has even been more rapid. In Canada this industry has been slow to develop, and there are now only some three or four plants manufacturing a commercial product. A considerable amount of hydrated lime is at present imported from the United States and from Belgium.

The process or reactions involved in the manufacture of lime and hydrated lime are quite simple, and yet there are various conditions which have to be met with in order to produce a high grade product. The most important essential in the production of a high grade product is the suitability of the raw material, lime-



Lime Plant of the Ontario Limestone and Clay Co., Limited, Belleville, Ont.

kilns are from 50 to 75 feet in height, and from 10 to 15 feet in diameter, and are usually set in batteries of two or more kilns. The limestone coming from the quarries is elevated and discharged into the top of the kilns during the day time, and there is usually sufficient storage space provided for in the upper portion of the kiln to permit of sufficient limestone being stored to last for two days if necessary.

As the limestone gradually descends in the kiln, the moisture is first driven off, and gradually as the limestone becomes heated from the furnaces below, the carbonic acid gas is expelled and passes off in the form of a heavy gas through the top of the kiln. As the limestone descends still further and passes through the hot zone of the kiln, the last of the carbonic acid gas is driven off. The resulting lime is then cooled in a cooling cone at the base of the kiln, and the lime drawn as may be required.

The original limestone rock, if it be a pure limestone, has now lost about 44 per cent. of its original weight in the form of gas, the remaining 56 per cent. being lime. If this lime is sold a sordinary lime, it is simply barrelled or shipped in bulk. If it is desired to transform this quick

lime, into hydrated lime, it should be treated soon after it is drawn from the kilns, as lime rapidly absorbs moisture and carbonic acid gas from the atmosphere, which decreases the yield of hydrated lime as well as the quality.

The quick lime is now delivered to crushers, which crush it to uniform size. It is then elevated into bins over the hydrating mill. The process of hydration consists of the addition of the proper amount of water to ensure perfect slacking of the lime, and an excess of water to allow for the loss in steam, due to the heat generated by the slacking of the lime. The addition of water chemically changes the quick lime (oxide of lime) to the hydrated lime (hydroxide of lime), in which form it is absolutely stable.

Referring to the old method previously mentioned, the hydration may be accomplished by placing the crude lime in large tanks, water added, and the mass agitated until the lime is thoroughly slacked. This leaves the hydratel lime in a wet, putty-like mass, which must be further treated by drying before it can be placed on the market. As a considerable excess of water has to be added in this method, there is a large amount of moisture to evaporate, which requires special dryers. This method of hydration is not used to any great extent on



Knickerbocker Plant and Kilns (Pennsylvania).

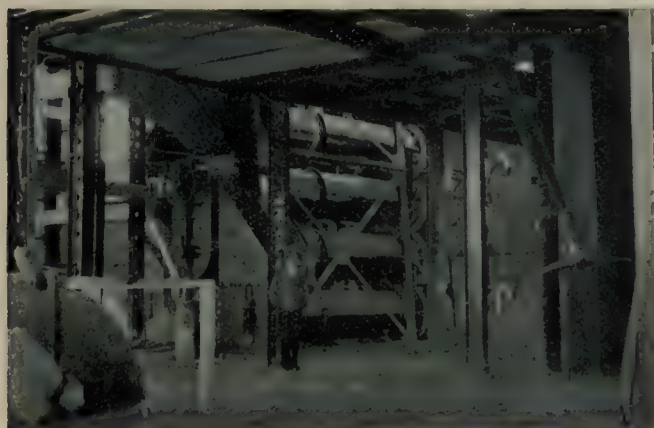
particles expand or "swell," so that when it is discharged from the hydrator, it is much bulkier and is in the form of a fine powder.

The hydrated lime is now elevated and passed over vibrating screens, which remove any particles of grit or foreign matter, leaving the product absolutely free from all coarse particles. The product is again elevated or conveyed to storage bins and sacked by automatic sacking machines. It is usually sacked into 100-pound cloth sacks, or 40-pound paper sacks, the latter being much more convenient to handle.

Uses of Hydrated Lime.

The use of hydrated lime in preference to ordinary bulk lime, with those who have become familiar with its advantages, are so obvious, that it does not seem necessary to enlarge upon this feature however it is evident that the principal advantage is the fact that hydrated lime is absolutely stable when stored under the same conditions as Portland cement is stored. Its use saves the troublesome and expensive hand labor required to slake bulk lime and prepare it for making mortar. The hydrated lime simply requires the addition of water, and and whatever binding material is used to be ready for use.

An important use for hydrated lime is as a waterproofing agent with Portland cement, in concrete or stucco work. The last report of a Committee of the National Cement Users Association recommends the use of hydrated lime for this purpose in preference to the many patented waterproofing compounds now on the market, as its use does not injure the concrete, but when properly used within certain limits increases the strength of the concrete, and also makes it moisture and damp-proof. As a fertilizer for certain soils, it is becoming widely



Hydrating Mill.

account of the high cost of production; however, a fine product can be made by this process on account of the slow hydration, which increases the plasticity of the product.

It will be readily understood that if it were possible to take advantage of the large number of heat units evolved during the process of hydration, to evaporate the small excess of water added in the beginning of the process, and thus leave the hydrated lime in the form of a dry powder, much time and expense would be saved. Some ten years ago, experiments along these lines were begun on a practical scale, and as a result machinery has been perfected to handle the product in this manner. The most successful type of hydrating machinery is performed under a partial vacuum, thereby lowering the temperature of hydration, and preventing too quick a hydration of the quick lime, and also increasing its plasticity.

In this type of machine, the quick lime is first crushed to small grains, then either weighed or measured automatically, and fed into the hydrator. Here the water is added in the form of a fine spray, and the hydration immediately commences. At the same time the material is stirred, and moved forward in closed cylinders, so that every particle of the quick lime is brought into contact with the water. As the hydration continues, the lime



The L. M. Palmer Plant (Pennsylvania).

used, as in this form it is easily applied to the ground through ordinary drills, and corrects the acidity of the soil. In certain sections of the country it is also being extensively used as a component of fruit sprays. It is also used in the manufacture of sand lime brick on account of the uniformity of the product. Put up in suitable packages, it is a very convenient insecticide and disinfectant, and is far more economical and convenient for this purpose than is the ordinary quick lime. It is also used in various chemical and technical processes which it would not be of interest to enumerate.

For most purposes it is obvious that a hydrated lime manufactured from a non-magnesian limestone is a much

Repairing Concrete Floors and Pavements

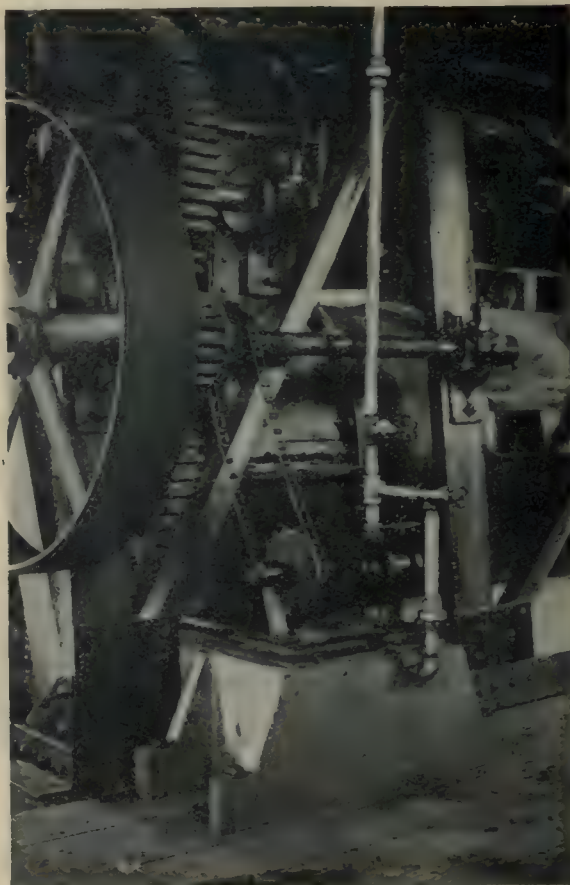
Almost everyone is familiar with the ugly and unsightly appearance of a badly patched concrete floor or pavement. This result, while partly due to careless workmanship is more often the result of ignorance as to how such work should be handled.

During fourteen years concrete experience, the writer has tried various systems for repair work of this kind, and finds the following method invariably gives the best results:

The usual results of heavy trucking are chuck holes of various sizes, and very often the legitimate wear on



Hydrator.



Showing Method of Controlling Water Supply.

better product than one manufactured from a highly magnesian limestone, or dolomite, and it should also be sufficiently low in iron to produce a pure white product.

To sum up the essentials of hydrated lime, it is:

- 1.—A natural product—not a mixture of one or more products, hence its stability.
- 2.—Its purity depends on the purity of the raw material, quick lime.
- 3.—The plant for its manufacture should be designed and equipped with great care, and by those familiar with its manufacture.
- 4.—The methods of its use are simple, and it is far more economical and efficient than ordinary lime.
- 5.—The remarkable growth of the industry indicates that it is a product worthy of careful attention by engineers, contractors, builders, municipalities, manufacturers and concrete users.

a floor brings out hollow places due to different causes, of which poor materials are the principals.

These chuck holes and faulty places should be first chipped out to a depth of at least 2 inches, then well scrubbed with a wire broom, using plenty of water, so that the surrounding concrete is well wetted. A similar mix of concrete to that already used in the floor of medium consistency should now be made and well rammed into the space so as to insure good contact and finished off with a wooden float. After allowing an interval of one hour the repair should be covered with wet gunny sacks. Care must be taken that the mix is not sloppy, as the tamping brings the cement to the surface leaving the bottom part poor. A trowel finish is very often used and is generally the poorest, as it nearly always crazes or cracks and is slippery and best results are always obtained by a wooden float used with

a circular motion. The usual tooth roller is not much better than the trowel.

Many writers on concrete recommend that the old surface, after chipping, be treated with an acid wash, any acid having an affinity for lime being used. It is customary for those washes, to use hydrochloric or oxalic acid (Commercial) mixed in varying proportions of from 1 part acid to 4 to 10 parts water. The method of applying is as follows:

1st. Wet the surface thoroughly and apply acid wash and leave on for one hour, then wash thoroughly with a hose, taking care that all the resulting salts are well washed off and the surface well cleaned with the aggregate well exposed. A neat cement paste 1 to 2 inches thick is now applied to the surface when the concrete is immediately placed and finished as above described. Very often a second acid wash is necessary.

This method involves careful supervision as if the acid wash is not well washed off the result is disastrous.

In cold storage warehouses and freezing weather, when the thermometer drops below 29.3 degrees Fahrenheit, the freezing point of concrete, good results are always obtainable with a little care. The surface after chipping should be well washed with very hot water. The mix should be fairly dry and water used in mixing should be heated to about 75 degrees Fahrenheit. Half an hour after placing the concrete, the patch should be covered with sawdust, dampened with hot water. This covering can be removed on the third day. For outside work, manure is a good protection, first having a layer of sacking, tar paper, or some such material to prevent contact. Salt is sometimes added to the water to prevent damage from freezing, the usual rule being to dissolve 1 pound of salt in 18 gallons of water when temperature is at 32 degrees Fahrenheit and add 1 ounce for each degree of lower temperature. Salt, while not injurious to concrete, always produces efflorescence and is not to be recommended. Calcium chloride is sometimes used in the same proportion as salt and gives about the same results.

All concrete floors and pavements whether new or old should be artificially hardened. This process of induration, while common in England, is but little used in this country. Silicate of soda and potash commercially known as soluble glass being the hardening agent. Soluble glass is manufactured by intense heat from flint and caustic soda and is usually sold as a thick fluid having a hygrometer strength of 1700. It is mixed 1 part silicate to 5 to 8 parts of water and brushed over the surface of the concrete until it can absorb no more. New concrete should be 7 days old before applying it. The result is, the floor becomes denser, 50 per cent. harder and non-porous.

The care of warehouse floors is of more importance than is usually ascribed to it. The floors, after a day's work, should not be swept. They should be first well wetted and the sweeping deferred until the following day. This gives the finer cement particles, worn off by the day's traffic, a chance to set back in the floor, and water is always necessary to keep concrete in good condition.

Repairs to a dam which had been partly carried away were made near Crampagna, France, by the use of reinforced concrete, as described in "La Technique Moderne." The breach was 141 feet long, and a piece of the original masonry stood up above water nearly in the middle of it. Three supports were thus available for

a reinforced concrete girder, which was placed immediately above water level. This girder was used to support the top ends of reinforced concrete sheet piles placed at an inclination of about 50 degrees. The bottom ends rested on the river bed. The sheet piles were followed by rubble work, which was finally brought to the proper cross-section of the dam.

A Large Reinforced Concrete Cantilever Girder

In a Boston steel cage building two columns 42 ft. apart on centers at the rear corners are located just within the lot lines and transmit loads of about 325,000 lbs. each to their pile foundations. As there are existing buildings on both sides of the lot and as there are no party wall agreements it was thought best to keep the foundations entirely on the owner's lot and not encroach at all upon adjacent property. Offset concrete piers about 10 ft. wide at the base were required to transmit the column loads to the foundation piles and were so far eccentric from the columns that it was proposed to support the latter from them on an intermediate double cantilever box girder extending across the full width of the building with pin bearings on cast-iron pedestals about 5 ft. and 7 ft. from the ends of the girder.

Such a girder about 44½ ft. long was designed, and together with its concrete covering which completely enclosed it, was about 2½ ft. wide and 4 ft. deep over all, containing about 11 tons of structural steel. The compression flange of the girder was located in the line of the basement floor which provided lateral support for it. The open hearth steel of which the girder was designed was proportioned for unit stresses of 16,000 lbs. in tension, 13,500 lbs. in compression and 10,000 lbs. in shear. Besides the column loads the girder was proportioned to carry a full length concrete retaining wall 12 in. thick and 4 ft. high to support the ends of the basement floorbeams.

The designs were checked by the consulting engineer, Mr. G. H. Brazer, who decided that an economy could be secured by replacing the steel girders with a reinforced concrete girder occupying the full depth between cellar and basement floors, and serving also as a retaining wall, thus making a more simple construction which would not require fireproofing or other protection.

The reinforced concrete girder was therefore built, which occupied all of the space between the tops of the foundation piers and the basement floor across the full width of the building, and at one end was notched on the lower corner to clear the footings of the foundations in the adjacent building. This construction utilized the concrete necessarily required for a retaining wall and for the support of the basement floor and by the addition of reinforcement bars developed compressive strength to support the columns at the extremities and to transfer the eccentric loads to symmetrical distribution on the piers.

The fabrication, transportation and erection of a heavy and expensive structural steel member and its subsequent protection or maintenance were thus eliminated and a single concrete member was constructed at an estimated saving of about \$540 over the former design. In addition to the 650,000 lb. of load from the columns the girder sustains a uniformly distributed floor load of about 178,000 lb. and its own dead load of about 124,000 lb. It is proportioned for a maximum compression stress of 650 lb. per sq. in., and shear of 120 lb. per sq. in. on the concrete and for a tension of 16,000 lb. per sq. in. in the steel rods.—Engineering Record.

Driving Two Spiral Tunnels on the C.P.R.

Complete Description by C. S. Gzowski, Vancouver, of an Interesting and Resourceful Piece of Railroad Construction in British Columbia

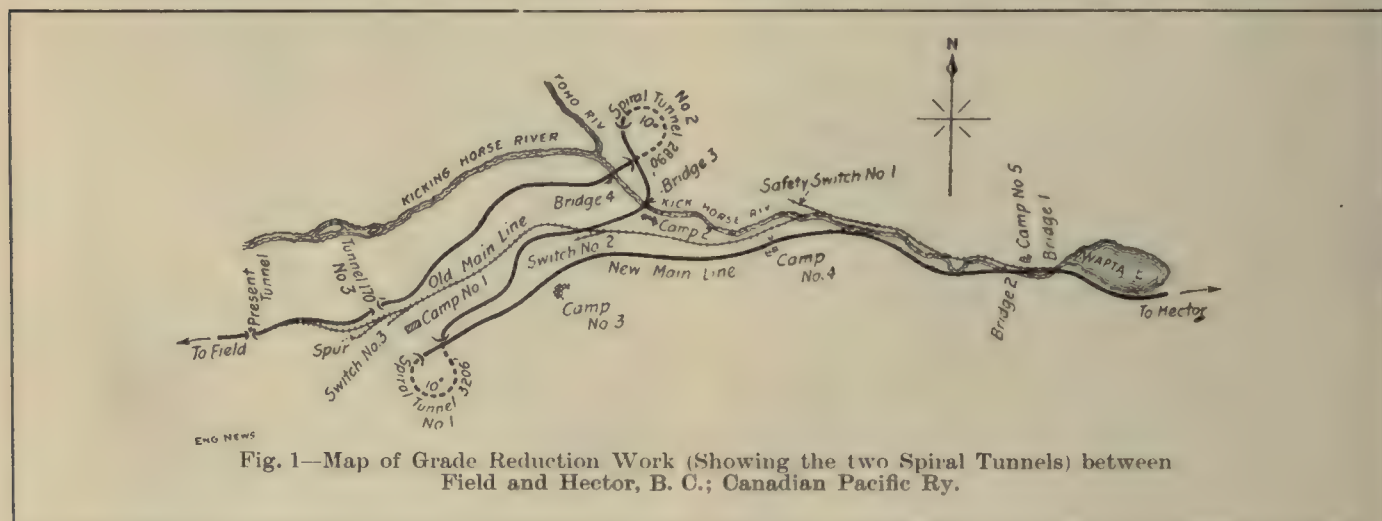
One of the most interesting of the many grade reduction works that have been undertaken by railways on this continent is that of the Canadian Pacific Railway between Field and Hector, B. C., in the valley of the Kicking Horse river. The original distance was four miles, with a grade of 4.5 per cent (compensated) for about three miles, and 3.5 to 4 per cent. for the remainder of the distance. For safety, three spring switches or catch sidings were introduced, which were normally closed to divert a train onto the spur and opened only when the engineman of a descending train signaled to the switchman that his train was under control.

Owing to the increase in traffic and in train loads it became very desirable to eliminate these extreme grades, but it was a difficult matter to find room for the neces-

long, turning an angle of about 232° , and having a difference in elevation of about 45 feet at the two portals.

The following information as to the details of the construction work on the two spiral tunnels was furnished Engineering News by Mr. C. S. Gzowski, of the contracting firm.

There was a camp and plant for each tunnel, and the equipment for each plant was practically the same. Table No 1 shows the principal equipment of the plant for both tunnels. The location of the plant for camp No. 1 was put on the old line about 250 feet in elevation below the portal of tunnel No. 1 and about 800 feet distant from it. The plant was located at this point as there was a small bench on the mountain side which enabled the machinery for the compressor, etc to be hand-



sary development of length along the steep sides of this valley. The location finally adopted forms three lines in the valley, connected by loops, and the only way in which these loops could be made was by means of tunnels in the mountain side. The grade is reduced to 2.2 per cent. (compensated) and the length is increased to 8.2 miles. The compensation for curvature is 0.04 per degree, but this is increased to 0.06 per cent. in the tunnels on account of the liability of damp rails reducing the adhesion.

Fig. 1 shows the old and new location, together with the positions of the tunnels, bridges, construction camps, etc. The contract for this stretch of grade reduction work was awarded to Macdonell, Gzowski & Company, of Vancouver, B. C. Their work included the grading of 8.25 miles of line, two spiral tunnels, one short straight tunnel (710 feet), and four bridges over the Kicking Horse river. The grading was the average heavy rock work.

The most interesting work was the driving of the spiral tunnels. These are on loop curves of 10° (or 573 feet radius), with a grade (as reduced by compensation) of 1.6 per cent. Tunnel No. 1 is 3,200 feet long, and turns an angle of about 234° ; the difference in elevation of its portals is about 48 feet. Tunnel No. 2 is 2,890 feet

led conveniently from the old railway line. Another reason was that water for operating the plant was obtainable there by digging wells and catching the seepage.

The plant at camp No. 2 was located on the Kicking Horse river about quarter mile beyond tunnel No. 2 and on about the same level as that tunnel, or 150 feet below the old railway line. The plant for this camp was unloaded off the old line and let down a skidway to its location.

The first operation that of excavating both portals of each tunnel was conducted by hand labor, while the machinery at each camp was being installed. By the original plan of operation it was intended to use compressed air drills and do the mucking by hand from a "jumbo" car. After a short trial of this method it was decided to use power shovels (operated by compressed air) at each working end of both tunnels. This necessitated doubling the capacity of the air compressors as well as the boiler capacity.

Method of Tunnel Driving.

The driving of the tunnels was through crystallized limestone, very much distorted, and in places (where badly crushed) timbering had to be used. About 25 per cent. of the length of each tunnel was permanently timbered and enlarged to a sufficient size to allow of a

concrete lining being put inside at some future time. In fact, in the untimbered portion, after the character of the ground had been well determined, it was decided to enlarge this also, to permit of a future concrete lining.

The method of driving the rock section which did not require timbering, was to drive a full top heading, keeping it about 10 or 12 feet ahead of the bench (which was kept as vertical as possible), and to shoot the heading and bench at the same time. After a shot was completed, the drillers mucked back from the heading sufficient to set up their drill columns, and then set up and started the drilling. In the meantime, the shovel (run by air) was moved up and started mucking out the last shot. This shovel gang would get cleaned up about the time the drillers had the heading drilled and the down holes of the bench finished. The shovel was then moved back about 150 feet. The drillers then drilled lifter holes in the bench.

When all the drilling was finished, the drills, hose lines and fittings were all moved back. While this was being done, the cut holes in the heading were being leaded for springing. These cut holes were sprung and then fired. Then the side rounds and lifters of the heading, as well as all the bench holes, were shot at one time.

This method of keeping the bench close up to the heading allowed the greater part of the muck of each shot of the heading to be thrown back with the bench muck, which was removed directly by the shovel. Where the timbering had to be carried as the heading was driven, the bench was left about 50 feet back. The heading was shot and then mucked by hand, the material being carried to the bench in cars and then dumped. The permanent timber plates were put in and each segment trimmed off, and then lagged and wedged up.

The bench was always kept as vertical as possible. Before shooting the bench, the wall plate was well supported by blocking up, and the last full-length post protected by old timbers. Just enough bench was shot in each round to allow another full post to be put in, and then this muck together with the muck coming from the heading was cleaned up with the power shovel.

DRILLING.—The arrangement of the drill holes was varied somewhat from time to time as the character of the ground changed. The stratification of the rock as encountered in the different parts of the tunnels varied from nearly horizontal (sometimes dipping up, down or to one side) to practically vertical and parallel to the direction of the tunnel. The formation of the ground at No. 1 tunnel was somewhat uniform, in regard to its stratification, lying with a plane dipping about 20° to the northeast, but as the tunnel made the best part of a circle this was encountered at all angles in the face. The stratification of the ground at No. 2 tunnel had not the same general uniformity as that on the other side of the valley. The hardness of the rock, the distortion and other conditions changed every few feet.

The general plan of the drill holes in the heading was to put in two rows of cut holes about 12 feet deep and sloped so as to nearly meet. The side holes and lifters were about 10 feet deep. The distance of the side holes from the tunnel line was judged by the character of the ground. These were varied as much as 2 feet in line. The bench had a row of down holes on the top, about 8 feet back from the edge and about 10 feet deep; also a row of lifter holes in from the bottom of the face, 12 feet deep, so pointed as to go 1 foot below grade. The aim was to break 8 feet of heading and the same amount of bench each round. It was found necessary to change

the number of holes very largely as the rock changed. In tight ground the round of the heading would not break back within sometimes 2 feet or more of the bottom of the holes, while in other ground it might go practically to the bottom.

The rock was of such character that the drilling throughout almost the entire length of both tunnels was most difficult. The formation being crystallized, it was brittle; and having been distorted by upheaval it was in a semi-fractured state. This condition made small wedge-shaped pieces break off in the holes behind the bits of the drills and jam them. Various shaped drill bits were tried, but none overcame the difficulty. The old trick of throwing small bits of iron into the hole was the most effective. The progress of the work was very considerably retarded by the bad conditions for drilling, and although the number of drills was increased to as many as space would permit of working the desired progress was never attained.

MUCKING.—The shovels were the standard No. 20 Marion shovels, with special short booms and dipper arms, and rock dippers with "Panama" teeth. The compressed air was delivered into the boiler, which acted as an additional receiver. The shovels were set as close to one side of the tunnel as possible and had each a special short jack arm to support it on the inner side. There were four shovels, one in each end of both tunnels.

A track of 2-foot gage was used for the cars, and a double track was run in the whole length of the tunnel to a switch, which was kept close up to the shovel. The empty cars came in on one track and the loaded cars went out on the other. The cars were built on the ground and held about 4 cubic yards. One car was switched alongside the shovel and loaded, then run out and replaced by another. It took only about one minute for a loaded car to be run out and another empty switched in place, as the switch was kept as close as possible to the shovel.

The tunnels being on a continuous grade, one end was being driven up grade and the other end down. Where driving down grade, the loaded cars were hauled out by horses and ran back by gravity. Where driving up grade, the loaded cars ran out by gravity (manned by brakemen), and were hauled back by horses.

WATER.—In each tunnel there was considerable water from seepage through the crevices, and small springs were struck in different places. With the ends being driven up grade there was no difficulty, as a ditch at the side of the tunnel took care of this water. In the end going down grade, all the water naturally drained towards the face of the tunnel. To take care of this, a sump hole about 3 feet square and 3 feet deep was put in a few feet back from the face. A pump operated by compressed air kept the water down in the sump hole, discharging out of the tunnel through a 4-inch wooden pipe. A new sump hole was put in from time to time as the face of the tunnel progressed, and occasionally the pump was moved forward as the lift got too great for the suction end.

If anything went wrong with the pump for a short time the tunnel would fill up very rapidly with water. In order to avoid the delay due to this, a second pump was installed, making a duplicate system, so that if anything went wrong with one pump the other could be turned on by merely opening the valves. In the winter considerable trouble was experienced with the discharge pipe freezing near the outlet end in the tunnel. This was overcome by covering the pipe with manure.

ELEVATION.—The elevation at the work being

Inspection of Pipe Sewers

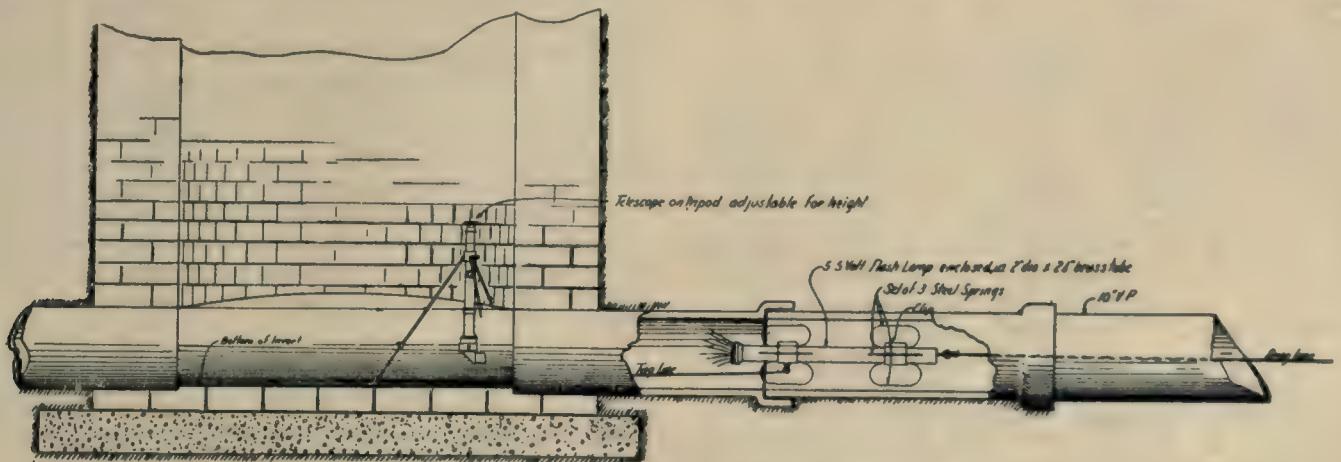
Sewers, like other work constructed by contract, should be thoroughly inspected by a municipal official or agent before being accepted by a city, although such thorough inspection is too often neglected, says the Municipal Journal. Also, all works should be inspected at intervals of a few weeks or months, depending upon the experience as to stoppages and other failures to efficiently perform their functions. In the case small pipe sewers such inspection must be made from the manholes. The more common method of doing this is to use two mirrors, one being held upon the surface and used to reflect sunlight to the second which, held by the inspector in the bottom of the manhole, reflects the sunlight to the interior of the sewer. There are several objections to this, one being that it is not applicable on cloudy days; another, that it requires the inspector to assume an awkward and back-tiring position; moreover, the illumination at more than 100 feet from the manhole is generally inadequate.

Mr. W. W. Dixon, who until recently was Superintendent of Sewers of Summit, N.J., has invented and used in that town an apparatus which apparently overcomes these difficulties. The light is furnished by a

rest upon the benches at the sides of the manhole and the third in the invert of the sewer. The last is furnished with a rack and pinion to permit accurate adjustment of the telescope. In using, the telescope is set vertical with the prism practically in the axis of the sewer. The telescope is provided with a gauge which is set to read zero when the telescope is exactly vertical, and by setting this gauge at the grade of the sewer which is to be inspected the line of sight will coincide with the axis of the sewer. This last adjustment is perhaps an unnecessary refinement, as the observer can easily adjust the telescope from time to time with the rack and pinion so as to direct the line of sight as desired. The inventor who has applied for a patent on this appliance, has used it for detecting flaws, bad joints, seeping ground water, branch connections whose location is unknown, as well as to inspect new lines of pipe to determine their acceptability before final settlement with the contractor for the same.

Inserting House Connections

Mr. Dixon has also designed a method of making house connections with vitrified pipe sewers where no Y branches have been left for that purpose. In fact, we believe the Sewer Department at Summit has not



Use of Torch and Telescope in Inspecting 10-inch Pipe

hand torch carrying a storage battery similar to those which can be purchased at any electric novelty store except that a larger storage battery is employed. This torch is provided with springs just sufficiently strong to support it in position in the center of the sewer. Mr. Dixon proposes to substitute for the dry battery a storage battery located in the manhole and connected to the light by a twin wire, which wire could also be used in place of the cord employed for drawing the torch through the sewer. This twin wire, or a special cord, is attached to the dark end of the torch, by which it is drawn backward through the sewer from one manhole toward a second. A steel tape graduated to 5-foot intervals is also attached to the torch and is paid out from the former manhole, at which the inspector stands, thus enabling him to determine at any time the distance of the torch from that manhole, and thus locate any obstruction or defect which may be revealed.

To avoid the necessity of the inspector's getting down upon hands and knees to look into the sewer a telescope is provided with a power of about 15 diameters, furnished at the object end with a right-angle prism so set as to refract to the eye-piece rays received at right angles to the axis of the telescope. This telescope is mounted upon a tripod with legs adjustable as to length, two of which

recently been in the practice of leaving any such connections in new sewers in front of vacant lots, but intends to make the connections wherever it may be most convenient after the buildings have been constructed. The method employed consists in cutting a hole in the pipe where the connection is desired, this hole being made two or three inches greater in diameter than the house connection pipe. As the pipe is well bedded in the bottom of the trench there is little danger of cracking it during the cutting if ordinary care be taken. This is covered with a saddle or half-pipe which is furnished with a regular T or Y hub, which saddle is so placed as to bring the hub opening directly over that cut into the sewer shell. The outside of the sewer pipe is plastered with about $\frac{1}{4}$ -inch thickness of rich cement mortar and the saddle pressed into place. A little mortar wiped on the inside of the inlet opening seals the joint between the saddle and the pipe at this point. The saddles are made by the pipe manufacturers of salt glazed clay in the form of a double branch pipe 16 inches long, without a bell, the pipe being scored before burning and being split into two pieces after burning, after the ordinary method of preparing "split pipe." For providing a connection for 8-inch pipe a 10-inch pipe is used for the saddle.

The Training of the Engineer-Contractor

Vital Subject Discussed by Readers of the Contract Record—Practical Training and its Value—Reports upon Actual Work—Organization

Montreal, November 11th, 1910.

Editor, Contract Record:

I have read with interest, in your issue of November 2nd, Mr. W. R. Harris' article on "The Training of the Engineer-Contractor. There is something suggestive of further expansion in what Mr. Harris says, and the subject of engineering-contracting is a live subject for consideration.

The usual period required for the college part of an engineer's education is four years, during which time the young man is expected to acquire the technical knowledge which will prepare him for his future work. If he is an apt scholar and works conscientiously, under good teachers, he can acquire this knowledge in the four-year period.

Like most other callings, engineering consists of the common sense application of scientific principles. Theoretical knowledge is the basis of an engineer's work, but his knowledge must be broadened, so that theory may be a help to him instead of a hindrance. This result can only be attained by demonstrating clearly to the young engineer the practical application of the theory he is studying.

How this practical application of theory is to be taught in a college is the question. College professors, as a rule, are not practical men, though there are many exceptions to this rule. The value of the dollar is not usually taught in the college, except that theoretical economics of design is taught as far as the course will permit.

The point that Mr. Harris makes is, that the practical economy of execution is not taught, and that it should be taught, and that the commercial side of engineering should receive more careful recognition.

I have always recognized that the college does not turn out an engineer, but an engineering student, who, if he have common sense, will develop into an engineer.

Now a man must "develop" into an engineer. It is a matter of many years of varied experience. No schooling except that of hard knocks will produce the kind of man Mr. Harris is looking for. The college should prepare him to receive and meet hard knocks, let him know they are coming, and not teach him that everything will be serene in the future so long as he understands the graphic analysis of stresses, and other very useful subjects.

But is the college the proper place to teach these practical subjects relating to construction? I think not. There could not be much harm in having the students do the little exercises that Mr. Harris suggests, but I think they would rather put in the time at some athletic exercise, which would do them good.

With all deference to the teaching profession, one handicap that many students have to suffer is the unpractical professor. If the teachers were practical men, students would soon discover the practical application of theory, and would take more interest in their studies. Blind obedience on the part of a soldier is an excellent trait, but give him an idea of the object he is expected to attain, and his interest and vigor will be doubled, and will not be confined to efforts merely to save his own life; in other words he will work more efficiently. Why does not this apply to all classes of students also? Put early before every student the practical application of every rudiment of his education.

Every ambitious engineering student tries to employ a part of his vacation in work of some sort bearing on the profession he seeks to enter. Many colleges use their influence to

obtain temporary work for their students during vacation, and this is good practice. Now, is proper use being made by the college of this vacation work of the students? Why not consider the vacation periods as part of the college year? All students cannot get employment perhaps, but all students can use their powers of observation. I would suggest that as the college cannot impart the practical knowledge that Mr. Harris refers to, it should encourage the acquiring of such knowledge in every way possible. And is there a better way than by turning to account the practical knowledge gained by the student during his vacation, and by impressing on him the fact that his work during vacation will be given a certain value in the course he is going through in college?

Suppose a student on vacation, employs his time on a railway location survey, a construction camp, assisting on any form of construction, would it not be a good idea for the college to insist on his keeping such notes on methods and costs as would impress the practical features? At the beginning of the term the student should turn in to the college the information he has gathered in the form of a report. The student who does not secure such occupation can always get access to some work in progress, or to some manufacturing industry, and by using his powers of observation, and by enquiring, he can get a great deal of information which he should report in the same way.

These reports should be given a value, and not necessarily by the college staff. Let them be submitted to some practising engineer, who may, perhaps, better appreciate these efforts and make suggestions in individual cases as to where improvement could be made,—more in the spirit of encouragement than of criticism.

A method such as this would enhance the interest in theoretical work, would show its application to commercial engineering, would encourage originality, would give the student a chance to display his capacity in the use of English, in writing his report, and would make the year, one whole interesting period of study, instead of two periods of grind as now generally prevails.

The life of the student can and should be made interesting; and the more practical his education is, the more interesting and useful it will be to him, and to those with whom he will associate in future years.

Yours truly,

Henry Holgate.

Should Students Pay for Acquiring Practical Knowledge?

Toronto, November, 15th, 1910.

Editor, "Contract Record":

The idea expressed by Mr. Harris, namely, that more knowledge of practical subjects should be given the young engineers graduating from our engineering colleges, is indeed a splendid one. I am quite willing to agree with Mr. Harris in this regard, but believe, personally, that the college is not the proper place for such training. It seems clear that the young engineer should attend a training school for the express purpose of obtaining that which cannot be secured elsewhere, i.e., a training in applied mathematics and other fundamental subjects in the science of engineering. Further, to meet a practical question with a practical rejoinder:—Why should a student in a given three months be compelled to obtain his "practical knowledge" by paying for the same, when it might be obtained

to much better advantage in active work where a remuneration would be received?

The majority of young graduates who have sufficient mental ability to cope with the rigid examination requirements of the modern scientific university are undoubtedly in a position to be moulded into useful engineering assistants after six months experience in any special branch of engineering. However, frequently they do not come up to this requirement, and I am strongly of the opinion that the fault lies, in many cases, with the poor organization of the employers concerned.

A gentleman prominent in the world of technical education, once made a statement to the effect that an engineer's usefulness depended upon his ability to locate information upon short notice rather than upon the actual knowledge he possessed.

This statement applies directly to the condition mentioned by Mr. Harris, that costs and estimating information should be taught in technical colleges. The organization of any contracting or engineering firm should be such that complete information on all subjects can be supplied immediately—even perhaps by a fourteen-year-old office boy. Under such conditions the average young engineer will rapidly become valuable to any concern.

The organization of an engineering-contracting firm should bear inspection upon the following points:—

1. Existence of a simple, direct and reliable cost system.
2. Definite policies on all engineering matters and well-defined instruction regarding the same.
3. The absence of exalted officials whose habit it is to cloud the beginner with mystery, or in other words, who follow the very erroneous policy of "putting it up" to new employees. A little patience and a few concise explanations are things rarely given to a young engineer commencing in a new office.

With the above conditions existing, the introduction of instruction in cost systems (except, perhaps, to a limited extent) seems hardly necessary.

Very truly yours,
R. E. W. Hagarty.

Contract System vs. Day Labor

Moose Jaw, Sask., 14th Nov., 1910.

Editor, Contract Record:

Reverting to the discussion of the above subject, I may say that I think the question resolves itself into a purely local one. While the contract system might be the better in some districts, it would be decidedly disadvantageous to the municipality in others.

Consider the average contractor in Ontario who is properly equipped to handle big work and you will generally find in his employ a competent engineering staff quite capable of assimilating and executing the ideas of the designer. And with competent inspectors to look after the routine work, a good and efficient job is generally the result. A point worthy of note is the competition that exists among contractors in Eastern Canada. An engineer there is always assured of several bids on any work which he proposes to do. This leaves him in a position to reject the bids of incompetent contractors. In Saskatchewan the situation is entirely different. To begin with, we find it difficult to get sufficient tenders to make competition keen. It is not an unusual occurrence to get only one bid on a job; in fact I have advertised work for as long as two weeks and not received a single tender in response. Conditions such as these put the engineer in the position where he must do one of three things:

- 1.—Award the tender at an exorbitant price.
- 2.—Award the tender to an incompetent contractor.
- 3.—Do the work by day labor.

The first alternative should be struck out without any consideration. If the second is followed the corporation must spend extra money for inspection, and the engineer must be in almost constant attendance on the work to direct the mode of procedure and explain detail methods of construction—things that

rightfully form part of the contractor's business. Obviously this is not an ideal condition to have existing in the carrying out of public works. If the corporation is required to supply all the technical training required for the work it might as well do the work itself and carry out the original plans and ideas first handed.

We are at present doing work in Moose Jaw by day labor and we find it much more satisfactory than the contract work. I am hopeful, however, that with the rapid growth of the country, competition in contracting and its consequent efficiency will increase. When such a time comes I have no doubt that the contractor's work in Western Canada will establish him in the position where, I believe, he rightfully belongs.

Yours truly,
J. M. Wilson,
City Engineer.

Manufacture of Hydrated Lime

Editor, "Contract Record":

I was much interested in the article on hydrated lime, published in your issue of September 28th. Will you kindly inform me where it is manufactured and what process it goes through to convert it from the stone as it comes from the kiln. Probably there are others who would like this information as well as myself.

Yours truly,
Constant Reader.

Only a small quantity of hydrated lime is manufactured in Canada, compared with the demand. Most of it is imported from the lime district in Ohio, south of Toledo. The process of manufacture is detailed in an interesting article contributed to this issue by Mr. Lucius E. Allen, chemical engineer of Belleville, Ont. In addition to the plants mentioned by Mr. Allen, there is that of the Standard White Lime Company at Guelph, Ont.

Hypochlorite Treatment of Ottawa Water

Ottawa has practically decided upon hypochlorite treatment of its water, pending a decision as to the advisability of bringing in a new supply from McGregor's Lake, or establishing a filtration plant in connection with the existing system. Mr. Allen Hazen's report contains the following extended reference to the subject: "The best amount of hypochlorite of lime to be added would be determined by experiment. Possibly a water with this degree of color would take a somewhat larger quantity than a water with less organic matter. For the present, the estimate on 15 pounds per million gallons, or 50 tons per annum, at \$25 per ton, would be \$1,250. The cost of applying would be represented by the salaries of four men and something extra for supervision, say \$3,500 per annum. The total cost would probably be something like \$5,000 per annum. In order to carry out this treatment all the water should be brought to the pumping station through one pipe. There is now one 40-inch pipe supplying water, and a new 42-inch pipe is being built. It was the intention to give these two pipes separate connections with the pumping station. This arrangement would not lend itself conveniently to the hypochlorite treatment. In order to carry out that treatment advantageously both of these pipes should be connected to a new 60-inch pipe at a little distance from the pumping station, say at a distance of two or three hundred feet, where the two pipes could be brought together and the single large pipe carried to the pumping station. I would put a Venturi meter on this pipe so that the amount of water being pumped could at all times be known with certainty. The hypochlorite of lime could be dissolved and controlled in a space in the attic over the present pumping station which is adapted to this use. The solution would

be carried to the beginning of the 60-inch pipe and would become mixed with the water by the flow through it, and by the flow through the throat of the Venturi meter, so that the water taken to each pump would have its fair share of the substance. Passing through the pumps of course would effect a very thorough mixing. The hypochlorite treatment on present evidence is equal in its effect to the ozone treatment in every respect, and is both surer and cheaper. It would not reduce the color of the Ottawa river water appreciably, nor would it remove any turbidity and sediment in it. Its object would be to remove as many as possible of the bacteria resulting from the sewage pollution of the river. A considerable bacterial purification could be secured in this way. The process is worth installing at once and continuing in use until permanent purification works or a new supply is installed, and I recommend that this be done."

A reduction in the price of cement has resulted owing to a difference between the Canadian Cement Company and the independent manufacturers. At time of writing the price quoted at Toronto for wholesale lots of 1,000 barrels, f.o.b. Toronto, is \$1.55—a cut of 5 cents. It is stated that at some points in Canada the price is down 10 cents, and at others even 15 cents. Mr. Alfred Rogers, of Toronto, who represents the independent dealers, states that the independents forestalled the fight and made the first cut.

The Provincial Government has granted a charter with full social privileges to the Engineers' Club of Toronto. The membership of the club will be limited to 500 resident members, 200 non-resident members, 25 life members and 75 associate members. The provisional directors are: Messrs. A. B. Barry, C. M. Canniff, Willis Chipman, John Galbraith, J. G. Sing, J. B. Tyrell, and A. J. Van Nostrand.

The new lock at Sault Ste. Marie is progressing, and it is expected that the excavation for the lock pit will be completed early in 1911. The contract for the concrete will be let during the coming winter and work on this will be commenced in the spring. The MacArthur Brothers Company has the contract for the western section of the approach canal and John Marsch is the contractor for the lock excavation. The work is under the direction of Col. C. McD. Townsend, and Mr. L. C. Sabin is assistant engineer. This new lock (known as the Davis lock) will be 1,350 ft. long between the gates, 80 ft. wide, and 24½ ft. deep below the level of extreme low water. It will be parallel with and adjacent to the two existing locks: the Weitzel lock (1881), 515 x 80 ft., with a depth of 16 ft., and the Poe lock (1895), 800 x 100 ft., with a depth of 21 ft.

An official meeting of the Board of Engineers of the Quebec bridge was held recently at Quebec. The engineers visited the dry dock at Levis, where they examined the caisson which was brought there recently from the site of the bridge for repairs. After a minute investigation into the damage which the caisson had suffered, and for which it was floated, the engineers decided to meet again on the 23rd instant. In the meanwhile a careful study of the caisson will be made. It was stated that the damage to the caisson was of little importance and would not retard the building of the bridge. The actual work of erecting the iron work of the bridge will be begun in the fall of 1911. The work of removing the steel of the fallen bridge is nearly completed, seven thousand tons having already been cleared away, and the cribwork preparatory to laying the caisson is now under construction. Mr. Vautelet explained that there would be three caissons required for the south shore, which would have to be built next summer. According to contract the bridge will be completed between 1914 and 1915.

Canadian Railroad Development

The city of Ottawa proposes to engage Mr. C. F. Tye, consulting engineer, to report upon the plan of the Canadian Pacific Railway for a tunnel under the city and the closing of a section of Rideau canal. There will also be a report upon a general plan for the entrance of all railway lines, present and future, to the city.

The Alberta Central Railway Company, Red Deer, Sask., is to apply to Parliament for an act to enable it to construct a line of railway from Saskatoon easterly to Hudson Bay, with terminals at both Fort Churchill and Fort Nelson. The Alberta Central Railway Company has now under construction a line of railway 70 miles westerly from Red Deer, and 40 miles easterly towards Moose Jaw. Smith & Johnston, Ottawa, Ont., are the solicitors for the company.

The Canadian Northern Railway is understood to have surveys under way for a railway line in the Peace River and Grand Prairie country, striking off the main line just east of Lac Ste. Anne. This new survey will connect with the old survey made to Fort Assiniboine several years ago. The construction of a line into the Peace River country has been contemplated by the Canadian Northern Railway for some time. The Provincial Government has guaranteed the bonds of the company for the first 50 miles of the line.

The blizzard of Nov. 7, which has ushered in the winter in Alberta at least two weeks earlier than usual, has called a halt to practically all railway construction in the Province. About all grading outfits have closed work and have sought winter quarters. This brings to a close a very active year in railway building in the Province. A total of 400 miles has been built, as follows: C. N. R. main line, 40 miles; G. T. P. main line, 80 miles; C. N. R. Calgary branch, 110 miles; Brazeau branch, 35 miles; Goose Lake branch, 25 miles; Landing branch, 39 miles; G. T. P., Calgary branch, 125 miles. Of the 400 miles, 265 were constructed under Provincial Government guarantees.

Personal News and Notes

The value of building permits issued at Ottawa last month is \$438,925, as compared with \$341,150 for October, 1909.

Mr. F. G. Goodspeed, of St. John, N.B., has been appointed engineer-in-charge of the new Public Works Department at Edmonton, Alta.

Building permits to the value of nearly half a million dollars have been issued at St. Boniface, Man., during the last three months.

Mr. Alexander Morrison, a well-known contractor of Vancouver, B.C., will be a candidate for the mayoralty of that city at the January elections.

There is considerable building activity at Calgary, Alta. It is stated that the construction of no less than six large blocks is to be commenced before December 1.

The Montreal Board of Control have approved the report of Supt. Janin in favor of the construction of a filtration plant and extensive improvements to the aqueduct at a total cost of \$5,000,000.

The first annual convention of the New York Cement Show will be held in Madison Square Garden, New York, Dec. 14-20. The meeting will be managed by the Cement Products Exhibition Company, Chicago.

The building permits issued at Victoria, B.C., during 1910 represent a value of nearly \$2,000,000. The actual figures for the ten months of the year are \$1,962,000, compared with \$1,548,000 for the corresponding period of 1909.

A dispatch from Victoria states that three tenders were

received for repairing the Smith's Hill reservoir. These ranged from \$5,000 to \$32,000. All three were rejected. A further report will be made by the engineering department.

A meeting of the Ottawa branch of the Canadian Society of Civil Engineers will be held at 177 Sparks street on the 23rd inst., when Mr. G. B. Hull will read a paper on Irrigation in Western Canada. Mr. H. V. Brayley is secretary of the branch.

The mayor of Smith's Falls, Ont., has been dismissed from office and ordered to pay court costs for selling cement to the contractors for sidewalk construction in that town. It was decided that the transaction was a violation of the Municipal Act.

There is some little discussion at Montreal as to the merits of the ozone purification system. Ozone plants have been installed at various places in Europe and operated with much success. Lindsay's experience does not appear to be a final disposition of the system, after all.

The annual dinner of the Engineering Society of the University of New Brunswick was held at Fredericton, N.B., Nov. 15. Those present included Mr. C. H. Thomas, mayor of Fredericton, City Engineer Feeney and Professors Stone, Cartmel and Miller, of the U.N.B.

According to a statement published last week, the members of the various building unions at Toronto number nearly 9,000. A proposal is now under discussion for the various unions to consolidate their interests by amalgamation. A committee has been formed, with two representatives from each trade union.

It is expected that the Metropolitan Parks Commission of Montreal will submit a detailed report on the proposed tunnelling schemes early next month. It was in regard to these projects that the Montreal Street Railway was granted a charter at the last session of the legislature. The chairman of the Commission is Mr. J. L. Perron.

The death occurred last week of Mr. Alexander Marshall, superintendent of construction on the Parliament Buildings at Toronto. The late Mr. Marshall was well known in eastern building circles, having been engaged on the construction of the City Hall and King Edward Hotel, Toronto, and the Electrical Development Company's works at Niagara Falls, Ont.

At a meeting of the Vancouver branch of the American Society of Civil Engineers, the following officers were elected for the ensuing year: Chairman, Mr. Geo. Webster; secretary-treasurer, Mr. G. K. Dutcher; executive committee, Messrs. E. C. Cartwright, J. C. Kennedy and H. Bayfield. An interesting paper, entitled, "The Influence of Light on Concrete Pipe," was read at this session by Mr. Wm. Dart.

It is stated that tenders will be called, probably in January, for the construction of the first 150 miles of the Hudson Bay Railway, on the section from the Pas Mission to Split Lake. The competing interests will include J. D. McArthur, M. J. O'Brien and the C. N. R. The Canadian Northern will have the advantage of owning a railway line to the Pas, and rival tenderers must figure upon getting in their supplies over the Canadian Northern line to that point.

The contract for the new Collegiate Institute at Smith's Falls, Ont., resulted in a little mix-up owing to the unfair conditions attached to the carrying out of the work. The contractor was required to put up a marked cheque amounting to 5 per cent. of his tender and to agree to having the Board retain 20 per cent. of the value of work done each month. The lowest tenderer, realizing the one-sided nature of such a proposition, backed out of the job. He would agree to the Board holding 10 per cent. The Board wished to amend the contract to read 15 per cent., but the contractor stood by his guns and the work was awarded to the next lowest bidder on the original conditions.

Canadian City Engineers

Mr. A. K. Grimmer, Medicine Hat, Alta.

The city engineer of Medicine Hat, Alta., Mr. A. K. Grimmer, is a native of New Brunswick, having been born in St. Andrew's in that Province in 1882. At the termination of his high school course he entered the University of New Brunswick, where, in 1904, he graduated in civil engineering. His early experience was obtained in various capacities on the C. P. R. surveys. For a time he was employed as draughtsman on the Transcontinental Railway. After graduating he was appointed chief engineer on the Glenn extension of the York and Carleton Railway, which position he resigned in 1905 to become assistant engineer on the installation of sewers and filtration plant at Fredericton. In May, 1906, he was appointed city engineer of Fredericton, and continued to fulfil the duties of that office until 1909, when he accepted a position on the staff of the University of Manitoba.

Mr. Grimmer has had considerable experience in consulting work on water power development. His investigations in this connection include a report for the J. Gibson & Sons Lumber Co., Limited, on the development of the Nashwash River, N.B., and a



City Engineer Grimmer of Medicine Hat.

similar proposition in Nova Scotia. The town of St. Mary's, N.B., engaged Mr. Grimmer to design their water supply fire protection system.

During the time that Mr. Grimmer was city engineer of Fredericton he specialized in water purification and devoted some months to studying the design and operation of filtration plants in the eastern States. For a thesis on original research work in this connection he received the degree of M. Sc. in May, 1909.

Mr. Grimmer was appointed city engineer of Medicine Hat in April of the present year. That the post is no sinecure may be gathered from a partial statement of the city's operations during 1910. The whole work representing a total expenditure of about \$300,000. The work includes the installation of about five miles of sanitary sewers and four miles of water mains; the laying of four miles of macadamized streets, 100,000 square feet of granolithic sidewalk, and 1½ miles of plank sidewalk; grading 3½ miles of streets, representing an excavation as well as 20,000 yards of material; installation of an electric light plant; building one gas well to a depth of 1,000 feet and a second to a depth of 2,000 feet; also the construction of a new high school at a cost of \$35,000. All this work, except the last named item and the gas wells, has been carried out by day labor under the supervision of City Engineer Grimmer.

New Method of Surfacing Macadam Roads

A new method of surfacing macadam roads to withstand heavy traffic, as from automobiles, has been devised by Mr. C. H. Hoyt, for experiments under way at Ithaca, N.Y., as a part of the road experiments being carried on by the U. S. Office of the Public Roads and Cornell University jointly. This method of Mr. Hoyt's is described in a contribution to "The Cornell Civil Engineer," and is the use of a "prepared filler." It was devised after a study of the effect of automobile traffic in destroying ordinary macadam by loosening up the stone of the road metal, so that the fine material which bound the coarser stone together was easily driven out or blown away. The idea of the prepared filler is to secure a binder substitute for such finer material in the top course only. The bottom courses of the road have been built and rolled as for an ordinary macadam. The top course of stone was laid as usual, but before rolling this was covered with a layer of prepared filler made from stone chips, sand and bituminous material, heated and mixed thoroughly in a concrete mixer. This layer, about 11-2 ins. in depth, was harrowed in with a spike-tooth harrow until the top course stone began to appear through the filler. The road was then rolled until it was firm, and on one section a light paint coat of bitumen was applied, which was then covered with stone chips and rerolled. On a second section a thin surface coat of about 1-2 in. of the prepared filler was spread and the road rerolled. It stated that not as much difficulty was encountered in properly building the road metal by the penetration method of applying the bitumen.

Paint Coatings for Concrete

The use of cement concrete for structural purposes has already become world-wide, and it is increasing at a rapid rate. Heretofore little attention has been paid to coatings for concrete. Enough time has now elapsed to show that cement concrete alone is not as durable as might be wished partly because the cement either contains free lime or develops free lime within itself, after setting. Furthermore, concrete in order to compete with other structural materials has had to be economically handled and roughly finished, and its resulting unsightly appearance has detracted from its desirability. It is therefore clear that there is great necessity for both protective and decorative coatings for concrete. The problem of waterproofing concrete is being studied from several standpoints besides that of applying protective coating. For instance, the endeavor to reduce the voids in concrete to a minimum, as well as to obtain uniformly finely ground cement and to eliminate the tendency of the cement to form free lime in setting, are all absolutely necessary steps in the production of a water-proofed concrete and are the special business of the cement manufacturer and engineer of construction to work out.

Much experimental work is under way with regard to waterproofing concrete by means of the addition of various foreign substances in small quantities to the aggregate. Some of these materials are of mineral composition and others are organic. Many compounds are now on the market, but the composition of most of them is not published. Some analyses have been made recently on a series of compounds widely advertised for use in waterproofing, strengthening, or decorating concrete. Among the materials contained were stearic acid compounds, gums, waxes, soaps, mineral chlorides, inert pigments, and asphalt derivatives. Much interesting information is given regarding the composition of such compounds, although the names of the particular compounds are not given. The possibility of ultimate deleterious effects on concrete from the use of these internal waterproofing materials is a subject for joint study by engineers and paint chemists.

In addition to proving the advantages of such materials as water excluders, it should be determined whether they may corrode the steel used in reinforcing concrete or whether they may affect the set and tensile strength of the cement itself.

It is particularly the province of the paint chemists to study the subject of paint coatings for concrete. Oil coatings have been found to be badly affected by the free lime present, which causes saponification and subsequent solution of the saponified coating. The porosity of cement or concrete surfaces causes an absorption or suction effect that renders it necessary to apply to a given area three or four times as much paint as would cover an equivalent area of wood. Two very important lines of investigation are therefore suggested—the neutralization of the free lime in the cement and concrete and the proper filling and treatment of the pores of the concrete—in order to prevent the suction of any paint that may be applied later.

Life of Metal Lathing

The question is often asked: "How long will metal lathing last under ordinary conditions and in ordinary building?" This is hard to answer, inasmuch as a great deal depends upon the quality of the material that constitutes the fabric, the process of manufacture, and the method of applying the plaster.

For three-quarters of a century prior to the last decade, a wire lathing was quite extensively used in the construction of high-class structures in Europe and America, especially in the United States. These structures have been replaced since by larger and more modern buildings and in the process of demolition, it has been found that this wire meshing was in apparently as good a state after thirty or forty years, as when installed.

A couple of years ago, the Fifth Avenue Hotel, on Broadway, New York, was demolished to make room for a commercial structure, and the wire lathing there was found in as good a state of preservation as when installed, fifty years previous. A year or so previous to this, the Boston Theatre, then one of the oldest buildings of its kind in the United States, was demolished, and the wire lathing there was found in excellent shape. Now, why was this lathing practically imperishable in these buildings? The reason is that, the strands of the mesh were thoroughly imbedded in the plaster slab. That is the solution of the whole problem: Metal lathing properly protected from rust before installation by a coat of paint or, preferably, of zinc or galvanizing, that is thoroughly imbedded in the plaster, will outlast any building in which it is used.

This wire mesh was exclusively used in the United States until about twenty years ago, but the consumption was naturally curtailed by the comparatively excessive cost over wooden lathing, until ingenuity conceived the idea of manufacturing what appeared to be a wire mesh out of high-class sheet steel. This was the birth of expanded metal, which has revolutionized lathing and plastering in recent years, and made possible the erection of thin fireproof partitions, suspended ceilings, and a thousand and one utilities, where heretofore they had been great problems.

Great care should be exercised, however, in selecting the quality of the lathing. If circumstances will permit it, galvanized lathing should be specified in all cases, more especially in Western Canada, where wood fibres and gypsum plasters are used.

Mr. E. D. Hofeller, of Buffalo (manager of the Roebling Construction Co.), who has probably had as much experience in fireproof construction as any man in America, asserts that any metal lathing, the strands of which are less than 28 B.W.G. in thickness, is not fireproof, and this statement is worthy of consideration. If the architect and builder will keep before them the foregoing facts, they can specify metal lathing with every assurance of satisfaction and success.—Contributed.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.

The city engineer has prepared the estimates of the cost of paving Ninth avenue, from Third street west to the river, and also the relative portions of the cost to be borne by the C. P. R. and the city, if the agreement, as framed, is adhered to. The cost to the city is estimated at \$98,770.50, and to the C. P. R., \$47,640.35. Total, \$146,410.85.

Gleichen, Alta.

The ratepayers will spend \$30,000 for waterworks and sewerage. R. B. Owen, provincial engineer, prepared plans.

Hamilton, Ont.

The Works Committee recommended that by-law be submitted to the ratepayers in January next, authorizing the sale of debentures to the amount of \$125,000 for laying asphalt on several streets.

Ottawa, Ont.

The controllers recommended that the council next year make provision for the improvement of the street on which the street railway extension into Bayswater will be made. Estimated cost, \$10,000.

It is stated that tenders for six destroyers and four cruisers for the Canadian navy will be called for within the next month.

Tenders addressed to A. Johnston, Deputy Minister of Marine and Fisheries, will be received until January 3rd, 1911, for construction of a buoy depot here, including the erection of a reinforced concrete wharf, timber approach trestle, power house with chimney, buoy shed, stores, offices and dwellings, also the installation of drainage and water systems. Plans, etc., at Department of Marine and Fisheries, Ottawa.

Pembroke, Ont.

A by-law will be submitted to provide by way of loan the sum of \$65,000 for the extension of the waterworks system here.

Quebec, Que.

Mr. Baillairge, City Engineer, presented a lengthy report of the streets of the city, where improvements will be made during next spring. It was decided to ask the special committee to ask the Legislature to amend the city charter and request leave to borrow half a million dollars for city improvements.

Smith's Falls, Ont.

Notice of a by-law to provide \$10,000 for improvement of the waterworks system was given at the meeting of town council last week.

Souris, Man.

Tenders for delivery during spring and summer of 1911 of water pipes, hydrants, gate valves, valve boxes, pig lead, oakum, standard vitrified sewer pipe, etc., will be received until February 1st, 1911. C. R. Heath, engineer; J. W. Breakey, secretary-treasurer.

Strathcona, Alta.

On Dec. 12th a by-law to provide \$70,000 for the purpose of installing sewers in wards one and four, will be voted on.

Toronto, Ont.

Notice is given of the widening of Elizabeth street. W. A. Littlejohn, city clerk.

Construction of the following asphalt pavements has been recommended by City Engineer Rust: Paton road, from Emerson avenue to Lansdowne, \$3,189; Edwin avenue, from Ruskin avenue to north end, \$11,269; Robinson street, from Palmerton to Euclid avenue, \$1,843. Bitulithic pavements are recommended for Bellwoods avenue, from Arthur to Mansfield, to cost \$7,161, and for Indian road, from Boustead to Bloor, to cost \$8,765.

Victoria, B.C.

The by-law to expropriate the Esquimalt Water Company's works at Coldstream was defeated.

Among the by-laws put through by the city council was that providing for the expropriation of the two lots needed to provide for the extension of View street from Broad street to Douglas street. The city contributes only to the work of paving and laying sidewalks. The widening of Douglas street between Humboldt and Superior to 100 feet in conformity with other sections of that artery, was authorized also. The work will be taken in hand at an early date.

Vancouver, B.C.

The civic water committee have decided to submit a money by-law to the electorate in January for \$200,000, this amount being recommended by the engineer as needed for the ordinary extension of the distributing system, repairs at Capilano intake, installation of hydrants, etc., during 1911. This by-law does not in any way cover the extension of the waterworks system on the north side of the inlet, on which Engineer Burwell recently submitted a report advising expenditures amounting to \$690,000. Noted in last issue.

The joint committees of Vancouver and South Vancouver are stated to have found a basis of agreement by which the two will unite, provided that the terms are accepted by both councils and ratified by the ratepayers. The terms of agreement include an expenditure of \$2,000,000 for South Vancouver, of which \$1,000,000 is for sewer construction.

Wakely, Sask.

A by-law will be voted on to issue \$24,000 5 per cent. road debentures.

AWARDED.

Burnaby, B.C.

The following tenders for laying sidewalks on the following roads were accepted: Messrs. J. H. Harding & J. Harding. North road, Hamilton road, Douglas road from city limits to Lakeview school; Cumberland road, Third avenue and Sixth street, city limits to Edmonds; Royal Oak road, Vancouver road, from Boundary road to Murchie road; Guichon road, Moscrop road, Mara road, Tenth avenue. Booth

road, at \$2.64 per chain for four-foot and \$1.32 for three-foot walks. Messrs. Cederberg & Campbell: Cameron road, at \$1.54 per chain. F. Lugsdin: Edmonds road, Wise road and Vancouver road, from Edmonds to city limits, at \$2.47½ per chain for four-foot and 99 cents for three-foot. J. Davis: Keefer road, Smith road and Gray road, at \$1.81½ per chain and \$2.64 per chain. W. P. Black: Barnet road, at \$2.80 per chain.

New Westminster, B.C.

The Hassam Paving Company is stated to have secured the contract for paving Third street for \$44,760.

Ottawa, Ont.

The contract for the pump and water system of George L. Orme's residence, near Golf Club, has been awarded to National Equipment Company, Toronto.

Prince Rupert, B.C.

Contracts for grading were awarded as follows: Second avenue, to S. H. Watson & Co., \$2,284.16; S. P. McMordie, \$969.74; same contractor for section 3, \$1,200; for section 4, \$3,174.10. To John Viereck, \$229.90. P. J. Swanson for work on Beach place, \$1,574.32; Hays, Cove and Eighth avenue. McInnes & Kelly, \$3,872.14; Reilly & Roberts, \$385.84. A. McLean for work on Fraser street, Fifth, Sixth, Seventh and Eighth streets, \$286.76. C. W. Tankley, piling, Second street, \$197.84.

Quebec, Que.

The following tenders were accepted: Retaining walls, Chas. Cote & Co.; broken stone, J. E. Tanguay; unbroken stone, J. E. Tanguay; Beauport and Chateau Richer stone, J. E. Tanguay; Island ice bridge, E. Verreault, \$199; nails, C. A. Parent; carters' numbers, A. Frienier, \$400. Mr. Tierney was the only tenderer for sand, but as his tender was considered too high it was decided to call for new tenders.

Vancouver, B.C.

The contract for vitrified sewer pipe was awarded to Colin Jackson, \$3,119. Other tenderers were: Evans, Coleman & Co., \$3,664, and C. Gardiner, Johnson & Co., \$3,684.

Railroads, Bridges and Wharves

Edmonton, Alta.

The C.N.R. is willing to build a line to Fort McMurray along the general route of the proposed Alberta & Great Waterways Railway if the Government will give them five years to finish the line and bonding powers of \$35,000 per mile. The Railway Committee of the Provincial Legislature advanced the bill. Wm. Short, C.N.R. solicitor.

London, Ont.

The estimates of cost of new bridge at Wharncliffe road over the Thames are as follows: based on 300 ft. single span pier not being feasible), 30-foot bridge with 5-foot sidewalks and a roadway of wooden creosoted blocks, approaches, abutments and retaining walls, etc., would cost \$91.

000; 18-foot bridge, with 4-foot sidewalks and cement roadway would cost \$50,000. The latter was recommended. A. H. Van-Cleave, engineer.

Ottawa, Ont.

The recommendation of City Engineer Ker that W. F. Tye be engaged as consulting engineer in connection with the railway entrances, etc., to the city, was approved by the board of control.

Owen Sound, Ont.

Town Engineer Macdowall in his report to council on the construction of 10th street bridge estimated the cost of bridge, 66 feet wide with 42-foot roadway, for concrete arch, \$17,000; steel truss, \$19,700.

Oshawa, Ont.

The Canadian Northern Railway gives notice that it will ask for power to construct new branches, from Arnprior to Gananoque, from Pembroke to Cobourg or Port Hope, from Hawkesbury to a point in the county of Leeds or Lanark, and from Parry Sound to North Bay.

Quebec, Que.

Plans for the proposed bridge over the St. Charles were submitted and the committee favored the adoption of the bascule bridge.

Roche Point, B.C.

The Vancouver Dry Dock & Shipbuilding Company will construct a large dry dock here at a cost of \$1,214,154. Work to be started within six months and finished by Dec. 1, 1912. L. Thompson, president; F. Bennett, Jr., secretary. G. T. Keefer, resident engineer for the Government.

Victoria, B.C.

Tenders will be called for at once for clearing right of way for the construction of C.N.R. line on Vancouver Island from Alberni here via Sooke. It is stated that the C.P.R. will proceed at once with the Cowichan lake branch for the E. & N. line from Crofton to Cowichan lake.

Vancouver, B.C.

The council approved of the building of a viaduct to connect Georgia and Harris street—the east end of the city with the west—and also a bridge to continue Duns-muir street so as to intersect the Georgia-Harris street structure. The city engineer was instructed to have plans prepared and estimates made in connection with this bridge and the proposed bridge from Burrard street to Kitsilano over False creek.

AWARDED.

Vancouver, B.C.

The Northern Construction Company of Winnipeg, which recently secured the contract for the first sixty miles of the C.N.R. from Vancouver to Chilliwack, has been awarded the contract for the work as far east as Hope, B.C., a distance of 79 miles from New Westminster. Construction will be prosecuted throughout the winter months. Tenders for the construction of the first section of the island line out from Victoria will be called for at once. Rails for the Fraser Valley section have been ordered from the steel works at Sydney, Cape Breton.

Public Buildings, Churches, Schools, etc.

Alert Bay, B.C.

Tenders addressed to J. D. McLean, secretary, Department of Indian Affairs, Ottawa, will be received until December 30th for the erection of a frame boarding school building at Alert Bay, B.C. Plans, etc., at office of T. F. Neelands, Indian Agency,

Vancouver; W. E. Ditchburn, Indian Agency, Victoria; and at W. M. Halliday, local Indian agent.

Chatham, Ont.

Several citizens, comprising among others, Messrs. N. H. Stevens, P. S. Coate, and Rev. A. J. Spence, have a proposition to erect a Chautauqua theatre here.

Calgary, Alta.

Plans, etc., have been prepared by J. H. Garden, superintendent of construction, for the new college here. The building will be of red brick and stone. Noted previously.

The Board of School Trustees have had plans prepared for a 3-storey addition to the high school building on Thirteenth avenue. It will be 50 feet by 70, and extending towards Twelfth avenue from the present building. The building will be of stone. Messrs. Lang & Donler, architects.

The construction of an incinerator is being discussed by the city. Estimated cost, \$50,000.

Cranbrook, B.C.

Tenders are called until Nov. 22nd for the erection of city hall. Plans, etc., at office of Thos. M. Roberts, city clerk.

Eli, Man.

Tenders were called until November 26 for school house here. Arthur Tooth, secretary-treasurer.

Fredericton, N.B.

It is probable that an option will be secured on the Terrance property as a site for the proposed fire station.

Fort William, Ont.

C. R. Sayer, travelling secretary for the Y. M. C. A. in Western Canada is here in connection with the proposed building campaign.

Glenbow, Alta.

Tenders were received until Nov. 28th for erection of 1-room school here. Plans, etc., at office of the Western Supply Company, Room 7, Crown Building, Calgary, or at the office of Quinlan-Carter, Ltd., this place. R. P. Blakey, secretary-treasurer.

Hull, Que.

The city will purchase the property of Judge Champagne as a site for the public hospital. The proposition was not submitted by by-law, for approval.

Hamilton, Ont.

The ratepayers will be asked in January to vote \$35,000 for a site for the new hospital.

Architects are invited to submit (free of charge) plans and estimates before December 2nd for the House of Refuge, suitable for the county of Wentworth. For further particulars apply to J. W. Jardine, county clerk, Hamilton.

Kamloops, B.C.

The secretary of the Royal Inland Hospital was authorized to write to the Board of Trade to request their co-operation in regard to a new hospital in the city.

London, Ont.

The Methodist Church at Ilderton, near here, was destroyed by fire on the 27th inst. Loss, \$6,000.

Merritt, B.C.

The post-office building will be commenced next spring and will, it is stated, cost \$10,000.

Montreal, Que.

The members of St. Andrew's Club at a recent meeting subscribed the required amount for the erection of the new club house. The site in view is at the foot of

St. Martin street. W. M. Kearna, president. D. A. Bethune, W. S. McNally and J. B. Kinghorn were elected to serve on committees.

A syndicate has purchased the property on St. Catherine between University and McGill street for the purpose, it is stated, of erecting a theatre. Mr. Cecil Short is said to have effected the sale.

An appeal is being made to the citizens and to the people of the province by the committee of Protestant Hospital for Insane for funds to provide a nurses' home and a meeting hall accessible for the patients. Plans and estimates have been prepared and tenders received which show the cost to be \$134,000. An offer of half of this amount has been made by a friend on the understanding that the other half is raised by the Protestant people of the province. Peter Lyall, president; J. C. Holden, 377 Mountain street, honorary treasurer, and Rev. James Barclay, constitute a special committee. Jas. Brown, secretary, 203 St. James street.

New Westminster, B.C.

Tenders will be called for erection of new Y.M.C.A. building on Royal Avenue. Foundations have been laid and plans passed. Mr. E. H. Sands, secretary of committee in charge.

Ottawa, Ont.

The tenders for the erection of the Detention Home were too high, ranging from \$1,575 to \$2,500. The contract will not be awarded until sufficient funds are guaranteed.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until December 5th for purchase and removal of all buildings between McKenzie avenue and Sussex street. The removal of the above will make way for the new Departmental Block.

A mass meeting of the members of the Masonic Order will be held on December 15th to consider the proposal for a Masonic temple. Tenders will be called this winter and work begun on May 1st. J. A. Ewart, architect.

It is understood that the Government will erect a new quarantine hospital on Grosse Isle during the next session. In a recent official report, Dr. Martineau, medical superintendent of the St. Lawrence river service, writes of the obvious necessity of such changes being made.

Owing to the heavy expense involved the addition proposed for the Parliamentary library will not be built just now, but another storey will be erected over the reading room.

The inner doors of the city hall will be of solid mahogany, and will cost about \$425. C. P. Meredith, architect.

The directors of St. Luke's Hospital have decided to add a new wing to the western end of the hospital at a total cost of \$80,000. J. R. Booth, president; Jas. Manuel, Sir Louis Davies, Travers Lewis and J. F. Dowling are directors. Horwood, Taylor & Horwood, architects.

Port Arthur, Ont.

The city of Port Arthur has decided to erect a new collegiate institute at a cost of \$125,000.

Pincher, Alta.

Tenders are being called by the Department of Militia and Defence for erection of armory here until Nov. 25th. Eug. Fiset, Deputy Minister.

St. Henri, Que.

Tenders are being called by the Public Works Department, until Dec. 6th, for al-

terations and additions to postoffice building here. R. C. Desrochers, secretary.

Sarnia, Ont.

The Board of Education have made a requisition to the council for the sum of \$45,000 for the erection of a new school on the site of the present Lochiel street school.

St. John, N.B.

The residents of Crouchville feel the need of a new school. School Inspector McLean is said to be in favor of it.

Strathcona, Alta.

The ratepayers will vote on a by-law on Dec. 12th in regard to a public library for this city.

St. Thomas, Ont.

Provision is being made in regard to land room for the addition to the Scott street school next year.

The management of Alma College have decided to have a new wing erected, or a separate building at an approximate cost of \$30,000. Principal, Mr. Warner.

Toronto, Ont.

The Property Commissioner's recommendation re the site for fire hall in Balmoral avenue was adopted by the property committee.

The congregation of St. Stephen's Church, College street, have announced their intention to erect a new church building and parish house at a cost of \$70,000. Rev. J. B. Broughall, assistant rector.

The award for the design for the new Knox College here has been given to Chapman & McEiffen, of Toronto. Nine plans were submitted for the work. The award includes the commission for designing and superintending the erection of the proposed building. The new building will cost about \$400,000 and will harmonize with the general stone design of the University of Toronto.

The management of the Alexandra Industrial School for Girls require about \$20,000 for a new building, Miss Parrot, superintendent. The Victoria Industrial school requires two more cottages. Beverly Jones, treasurer; W. J. Hendry, secretary.

Victoria, B.C.

D. C. Frame is the architect for the school to be erected at the corner of Bank street and Leighton road. Preliminary plans have been submitted.

A committee has been formed to obtain competitive plans from the best club architects in Victoria, Vancouver, Tacoma and Seattle for the erection of the new Union Club building (6-storey). Estimated cost, \$120,000. F. M. Rattenbury, 606 Fort St., is chairman.

Vancouver, B.C.

The appropriations in the report on schools presented to the council include the building of new schools at Kitsilano (blk. 196), \$57,000; Bayswater street, \$57,000; Broadway and Lakewood, \$92,000; and extensions to the existing schools at Tenth and Cypress, \$92,000; Charles and Templeton, \$81,000; King Edward High School, \$150,000; Britannia High School, \$145,000.

The school trustees will request the council to authorize the submission of a by-law to raise \$967,000 for new schools and improvements; the by-law for construction of city hall will probably be submitted at the same time; also by-law to provide \$45,000 for erection of isolation hospital. Noted previously.

The installation of underground sanitary conveniences was brought forward by Dr. Underhill, who presented plans which were satisfactory and which could be erected for about \$10,000.

A building permit was granted for construction of theatre block, southwest corner of Westminster avenue and Harris, to the Avenue Theatre Company, \$80,000.

Plans for the new labor temple call for a 6-storey building at an estimated cost of \$127,000. Noted previously.

Winnipeg, Man.

The Y. M. C. A. building fund reached a total of \$354,087, which was more than the amount aimed at.

AWARDED.

Charlottetown, P.E.I.

J. M. Clark, Summerside, has been awarded the contract for erection of Queen's County jail.

Goderich, Ont.

Nagle & Mills, Ingersoll, have been awarded the contract for erection of new postoffice here.

Vancouver, B.C.

The contract for the business block at the corner of Pender and Cambie streets has been awarded to Messrs. McDonald and Wilson, \$200,000.

Residences

Hamilton, Ont.

The following building permits have been issued: Nicholson & Beveridge, erection of two frame dwellings on Hillyard street, near Wilkinson street, for L. Mitchell, to cost \$4,000; Geo. E. Montrose, erection of a brick dwelling on Undermount avenue, for Miss E. Warwick, \$3,800; D. A. Culp, erection of two brick dwellings, Main street, east of Trolley street, for J. Walter Gage, \$4,000; Wm. Work, erection of a brick dwelling on Fairleigh avenue, \$2,500.

Ottawa, Ont.

The building permits include H. H. H. Cowan, dwelling, Armstrong street, \$3,000; J. Clothier and Charles Smith, dwelling, Lyon street, \$3,000; A. F. Bennett, residence, Florence street, A. Tracy, architect, \$3,200.

Victoria, B.C.

Building permit was issued to Herbert Bunting & Son, for a dwelling to be erected on Chamberlain street, to cost \$2,500.

Vancouver, B.C.

The following building permits have been issued: Frank Parsons, two storey frame house, 1445 Fourteenth avenue west, \$3,800; H. Greenwood, two storey and basement, 863 Fifteenth avenue west, \$2,000; J. Skeffington, 1817 Bismarck street, \$3,300; R. Reid, 1636 Eleventh avenue west, \$3,000; Bentley & Wear, two houses, 2556 Fifth avenue west, \$7,600; Currie & Wallace, 2305 Sixth avenue west, \$3,500; E. F. Avery, two houses, 1142 Fourteenth avenue east, \$4,000; Lambert & Sedney, 122 Hastings street, \$6,500; A. Darion, 696 Sixth avenue west, \$7,200; I. S. Burton, 1952 Sixth avenue west, two houses, \$5,000; P. H. Fraser, 1826 Grant street, \$2,700; Prudential Builders, 1965 Fifteenth avenue west, \$3,500.

It is stated that the required capital for the large proposed apartment hotel to be erected at corner of Robson and Burrard streets has been secured. Plans call for 12 storeys, steel throughout, with outside terra cotta dressing. Work will not commence until next year.

Business Buildings and Industrial Plants

Blenheim, Ont.

Mr. Theo. Pickering and Mr. E. G. Thompson are interested in the establishment of a canning factory here.

Charlottetown, P.E.I.

Tenders addressed to C. B. Chappell, architect, will be received until December 6th for remodelling the present London House Building for the Royal Bank of Canada.

Calgary, Alta.

Tenders were received until November 23rd for excavation required in erection of wholesale warehouse for A. McBride & Company. Messrs. Lang & Dowler, architects.

Edmonton, Alta.

The central site for the new railway office building for the C.P.R., it is stated, has been purchased, and plans are being prepared. F. W. Peters, representative for the company.

Fergus, Ont.

Two by-laws will be submitted to the people at the municipal elections, viz.:—\$25,000 loan to Beattie Bros., and The People's Railway bonus.

Fort William, Ont.

Wm. Gorman, secretary of the Board of Trade and acting publicity commissioner, has been in correspondence with C. Whitehead, representative of Ely Bros., London, Eng., manufacturers of high grade ammunition, who are favorably considering the location here of their Canadian plant.

Guelph, Ont.

The scheme of Commissioner Carter for a co-operative furniture factory has received the endorsement of the Board of Trade.

Humberstone, Ont.

T. E. Reeb & Sons' foundry and automobile supply was totally destroyed by fire on the 23rd inst. Loss is \$15,000.

Kamloops, B.C.

A new exchange will be erected here by the B. C. Telephone Company. Geo. H. Halse, general manager.

Lisgar, Que.

The store owned by Robert Morrow was destroyed by fire on the 25th inst. Loss, about \$8,000.

Lindsay, Ont.

After concluding an agreement with the town regarding the erection of a shoe factory and intimating to all interested that the erection would be started at once, the promoter, D. B. Thomas, is stated by press reports to have failed to make his promises good.

Midale, Sask.

The building owned by Wedin Bros., general machinists, was destroyed by fire on the 24th inst.; loss on building, about \$7,000; total loss, \$30,000.

Nelson, B.C.

A new exchange will be erected by the B. C. Telephone Company here. Geo. H. Halse, general manager. Accommodation for 1,000 phones or more will be planned for.

Prince Albert, Sask.

Excavations have been made preparatory for construction in the spring on the following: block on First avenue for F. C. McGuire; block on Central avenue for J. H. Mitchell; block on Central avenue for S. McLeod.

Tenders and For Sale Department

Relaying Rails Wanted

We are in the market for a carload of relaying rails, 80 pounds to the yard preferred. Hagersville Contracting Company, Limited, Hagersville, Ont. 48



Sealed tenders addressed to the undersigned, and endorsed "Tender for Fittings, Toronto Central Post Office," will be received at this office until 4.00 p.m., on MONDAY, DECEMBER 12, 1910, for the work mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the office of Mr. Thos. A. Hastings, Clerks of Works, Postal Station "F," Toronto.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering declines to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, November 18, 1910.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 48

Tenders for 60-inch Steel Pipe

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon of TUESDAY, DECEMBER 13TH, 1910, for the supply of three hundred and three feet of Riveted Steel Pipe sixty inches in diameter, for the outfall sewer.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Tenders shall submit with their tender the names of two personal sureties, approved by the City Treasurer, or, in lieu of said personal sureties, the bond of a guarantee company, approved as aforesaid.

Plans and specifications may be seen and forms of tender obtained from the Main Drainage Department, at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with, or the tenders will not be entertained. The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto, November 28th, 1910. 30

Positions Vacant

Advertisement under this heading two cents a word per insertion. Box No. ten cents c.x.ra.

WANTED, Architectural Draughtsman; must be experienced. State references and salary. Storey and Van Egmond, Architects, Regina, Sask., Can. 48

Business Buildings and Industrial Plants

Regina, Sask.

Commissioner Sheffield is stated to have received a communication from a concern in Chicago intending to erect a 10-press linseed mill here. The manager of the American Linseed Oil Company, Chicago, Ill., is said to be the prospective manager.

South Vancouver, B.C.

A Chinese syndicate headed by Sam Kee will erect a large block at the corner of Ferris road and Main street.

Ottawa, Ont.

Mr. G. A. Troutt, of the Vandyke Motor Company, Detroit, has shipped one of their motor cars here. When it arrives he will come to Ottawa in connection with negotiating for an automobile manufacturing industry here.

The Union Bank, it is reported, has secured an option on the southeast corner of Little Sussex and Rideau street.

Sherbrooke, Que.

It is understood that the E. & T. Fairbanks Company here will call for tenders for extension of their plant.

St. John, N.B.

The cooper works of Taylor & White were damaged by fire on the 19th inst. to the extent of about \$5,000.

The specifications for the Atlantic Sugar Company's proposed refinery prepared by the Geo. M. Newell Engineering Company, Philadelphia, have been filed. They call for brick and reinforced concrete. Tenders will be called soon, it is stated.

South Vancouver, B.C.

Work has been started on the site for the structure which the People's Trust Company are erecting on the corner of Fraser avenue and Miles road.

Sydney, N.S.

Mr. Walters, confectioner, is having plans prepared for a large business building to be erected on the property on Charlotte street recently purchased by him. Work will start in the spring.

J. J. Turnbull, druggist, has purchased the Peters building on Charlotte street. Plans are being prepared for the erection of a modern business building to replace the present one in the spring. The new block will probably be built of reinforced concrete and Sydney pressed brick.

Toronto, Ont.

The G. T. R. are removing their South Parkdale station. Plans are being prepared for the erection of a large new station to be erected near the junction of King and Queen streets at Sunnyside.

It is reported that the C. P. R. will erect on their recently acquired property, King and Simcoe, a large office building, as well as the ticket office proposed for corner of King and Yonge streets.

Vancouver, B.C.

Plans have been prepared by Parr & Fee, Granville street, for the erection of a large block on Granville street. The foundations are being dug.

A building permit has been issued to

Messrs. Donnellan & Donnellan, architects, for a building to cost \$650,000.

The corner of Dunsmuir and Seymour streets has been purchased by Mr. Arnold, whose intention, it is stated, is to erect an 8-storey business building. The sale was effected by the British Canadian Securities Company.

It is understood that L. P. Strong, of Calgary, of the Alberta Pacific Elevator Company, is completing arrangements for the erection of a large elevator on Burrard Inlet, work on which will be started next year.

A company recently incorporated as the Canadian Electric Manufacturing Company (capital, \$150,000), it is stated, will erect a factory here to manufacture electric water heaters. J. J. Von Dohlen, of this city, is interested. E. W. MacLean, Vancouver, president.

The management of the British Columbia Electric Railway Company has prepared plans for the utilization of the balance of the block on which its Mt. Pleasant car barns are located, and the improvements will be made in the near future. The present plans contemplate the erection of a large paint shop at Fourteenth avenue and Main street, and the arrangement of the plat between this building and the car barns for storage tracks. Tenders have been called for the work.

Wingham, Ont.

The G.T.R. freight sheds were destroyed by fire on the 22nd inst. Total loss, about \$12,000.

Winnipeg, Man.

The wholesale warehouse and offices of Martin, Bole & Wynne Drug Company were destroyed by fire on the 22nd. The building was owned by Geo. F. Davies, of Honolulu. Loss on building, \$50,000.

AWARDED.

Calgary, Alta.

Messrs. J. A. McKenzie and J. C. McNeill are in charge of the construction of the 6-storey business block on Eighth avenue. Building will start early in the spring.

New Westminster, B.C.

The contract for construction of B. C. E. R. depot here has been awarded to Broley & Martin, of this city, \$80,000.

Mr. W. H. Cawston, superintendent of buildings, is in charge of the erection of new Bank of Commerce building, corner of Columbia and Sixth streets.

Ottawa, Ont.

The contract for the masonry, brick and concrete work of the Blackburn Building has been awarded to Holbrook and Sutherland. It is stated that the contract will reach \$30,000. W. E. Noffke is architect.

The contracts awarded this week in the building being erected for Barrett Brothers are: Dominion Bridge, brick work; McArthur Brothers, brick work; J. W. A. Kirk, cut stone; W. and N. Floyd, masonry; S. N. Morley, electrical work. W. E. Noffke, architect.

W. J. Carson has been awarded the contract for the plate glass, in connection with the 12 new stores on the corner of

Bank and Sparks street. C. P. Meredith, architect.

Vancouver, B.C.

A contract for the construction of the Robson street annex of the Hotel Vancouver has been awarded to Messrs. J. L. Skene and J. S. Christie by Mr. R. Marpole, general executive assistant of the Canadian Pacific Railway. Work on the erection of the main wing of the proposed main hotel building will be started later on. Honeyman & Curtis, architects.

The building contract for a business and apartment block at the corner of Seymour and Smith street has been awarded to E. J. Ryan. Total cost of building, \$100,000. Parr & Fee, architects.

Waterdown, Ont.

Chambers & Simpson, 103 Bay street, Toronto, have been awarded the contract for roof and roofing of Dominion Sewer Pipe Company's new plant here.

Winnipeg, Man.

Messrs. C. Simpson & Company are the contractors in charge of the erection of the carbon factory for the Canadian Carbon Company of Winnipeg, which is estimated to cost about \$15,000. E. W. Hanna, Winnipeg, president; A. Landear, Toronto, Ont., vice-president.

Power Plants, Electricity and Telephones

Coquitlam, B.C.

The ratepayers carried the by-law granting a franchise to the Western Canada Power Company to run power lines through this municipality.

Calgary, Alta.

A further extension of the natural gas business here is planned. The following were elected directors of the company: Senator J. Loughheed, L. K. Kerr and A. E. Cross.

Guelf, Ont.

A \$30,000 Radial Railway by-law is being considered by the council.

The route previously surveyed by the People's Railway Company in 1906, or the route to Hespeler, etc., has been gone over and engineers will proceed to lay out the land shortly. Mr. Hackney, manager Radial Railway Company.

Kingston, Ont.

The light, heat and power and the fire and light committees have recommended a by-law to be submitted to the ratepayers to expend \$13,000 in improving the street lighting system.

London, Ont.

The ratepayers may be asked to adopt a policy of electrical radial railway development. Two proposals are before the council. The promoters of the London & North-western Railway ask the city to guarantee their bonds to the extent of \$150,000 as an aid to the construction of a road from Sarnia to London, via Forest and Arkona. The promoters of the North Midland Company ask for aid on a similar plan to the extent of \$200,000 for a road from Stratford into London, via Lucan and St. Marys. A third line is talked of from Ingersoll to London, but so far no application in its behalf has been made.

Montreal, Que.

The report of the Public Utilities Commission orders air brakes, wheel guards, and the abolition of all the single truck cars.

North Vancouver, B.C.

The B. C. Telephone Company have been refused permission to lay the submarine cable across the inlet. The cable will have to be taken across either at the First or Second Narrows.

New Westminster, B.C.

The Western Canada Power Company is going ahead with the erection of the steel towers to convey the power from Stave lake to this district. A gang of men is engaged on the concrete foundations between Port Haney and Stave lake.

Nelson, B.C.

Among the extensions planned by the B. C. Telephone Company is the line along the north shore of Kootenay lake across from here to Balfour; also another from here to Slocan Junction, then on to Slocan, a distance of 32 miles.

Ottawa, Ont.

The merchants along Sparks street have agreed to pay for the installation of cluster tungsten lamps every 100 feet; the Ottawa Electric Company will supply light at a moderate figure for a term of ten years. The matter was referred to council.

Rouleau, Sask.

It is proposed to construct an electric light plant, to cost about \$60,000. Contract will be let next year. Engineer, J. D. Whitmore, of Regina. W. H. Stewart, city secretary-treasurer.

Regina, Sask.

The report of Engineer Bull in regard to the new power plant and equipment which he reports as necessary, contains the following recommendations for supply of material: One 1,500 k.w. 1875 k.v.a. turbine generator unit, 2200 volt, 60 cycle, three-phase, with direct connected exciter, f.o.b. Regina, \$42,000; foundation for unit and condenser, \$1,200; installation of exhaust piping and valves, \$1,000; surface condenser, \$5,000 square feet, with engine and circulating air pumps, f.o.b. Regina, \$9,595. Total cost for installing the alternating current generator will be \$53,395. City Solicitor Grooch was instructed to prepare a by-law to raise the sum necessary for improvement required, \$134,094.

Sherbrooke, Que.

It is stated that the report of the engineers, Messrs. Ross & Holgate, on the development of the drop-off power on Magog river will develop from 2,500 to 3,000 h.p., about the same as the present city power. Estimated cost, about \$70,000. The Board of Control, to whom the report has been submitted, will recommend that tenders be called for the development.

Toronto, Ont.

Mr. E. M. Ashworth, of the Electrical Department, submitted the following system of lighting to the Board of Control: (a) For residential streets, 100 watt tungsten lamps, 80 c.p. each, mounted on concrete poles, 100 feet apart, on both sides of the street. Cost, \$9 per year each, or 2.466 cents per night. (b) Main business street, ornamental cast iron pillars, each carrying five 80 c.p. tungsten lamps. Pillars to be placed 80 feet apart and to be fed by underground cable. Cost, \$52.50 per year, or 14.39 cents per night. (c) Business streets and important intersections not in the underground district, for locations where the single lamps do not give sufficient illumination, clusters consisting of two, three or four lanterns, placed around the concrete posts, will be provided. No statement of cost. The prices quoted include capital charges, cost of renewals, inspection, and cleaning, and cost of current. The present price of arc lamps

is 19 cents per night, or \$69.35 per year; that of gas lamps, \$20 per year.

Vancouver, B.C.

Tenders were received until Nov. 22nd for tunnel excavation about 600 feet by W. H. Hazlitt, purchasing agent, B. C. E. R. Co., Ltd.

AWARDED.

Calgary, Alta.

The tender for supply of about 1,045 tons of steel rails was divided between J. W. Campbell, of this city, and Gorman, Clancy & Grindley, both representing American firms. Total price, \$105,000; that for A.S.C.E. rail used in suburban lines, \$52.14 for No. 1 grade; for No. 1, Lorraine, \$56.54.

New Westminster, B.C.

See "Business Buildings Awarded."

St. Thomas, Ont.

The committee have awarded contracts as follows: Westinghouse, Hamilton, 1,000 tungsten lamps, at \$1.25 each, f.o.b. St. Thomas; the other tenders were: Ingram & Davey, \$1.28, f.o.b. St. Thomas; Dawson & Company, Montreal, \$4.28 f.o.b. Hamilton; Canadian General Electric, \$1.40 f.o.b. Toronto; Sanram & Roberts, \$1.28 f.o.b. St. Thomas. The tenders of Packard & Company, St. Catharines, for light meters was accepted. St. Thomas gets a ten per cent. discount by combining its order with that of Galt. The Ferranti Company of Birmingham, England, will supply poly-phase or power meters.

Miscellaneous

Fort William, Ont.

The probable list of by-laws and approximate amounts for which the people will be asked to vote will be about as follows: Parks, \$12,000; additions to board of works site \$8,000; publicity, \$10,000; water, \$60,000; electric lighting, \$20,000; telephone, \$25,000; quarry (doubtful), \$25,000. Total, \$152,000.

Hull, Que.

The city council has authorized the purchase of a steam crane for the pump house, to cost about \$1,000.

Ottawa, Ont.

Tenders are being called by Public Works Department until December 9th for construction of two 180 cubic yard wooden dump scows for dredge "Mud Lark," British Columbia. B. C. Desrochers, secretary.

Stratford, Ont.

The ratepayers will be asked to vote on the following by-laws: \$10,000, park improvements; \$15,000, market building; \$41,610, electric light purposes.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until Dec. 31st for supply of gravel, sand, bricks, asphalt, brass, lumber, etc. Specifications with city engineer.

Tenders addressed to G. R. Geary, chairman Board of Control, will be received until Dec. 13th for supply of 303 feet of rivetted steel pipe, 60-inch in diameter, for outfall sewer. Plans, etc., at Main Drainage Dept., office of city engineer.

AWARDED.

Collingwood, Ont.

The contract for the building of the new lake steamer for the Toronto, Niagara & St. Catharines Navigation Company has been awarded to the Collingwood Ship Building Company. The agreement calls for delivery of the boat by June 15.

Steam Turbine Pumps

Comparison of Duty, Efficiency and Cost with Reciprocating Pumps —Test and Service Duty—Intermittent Operation

By C. C. Hurd

There has been considerable discussion at various times during the last three or four years in the engineering societies and water works associations as to the possibilities of the steam-turbine centrifugal pump compared with the reciprocating pump or pumping engine for water works use. The same sort of discussion preceded this a few years in reference to the steam-turbine generator, the general use of which in the modern plant is evidence that these units can compete with the reciprocating type of prime mover for power house use.

In considering the economical advantages of the various types of engines or pumps it is necessary to take into account not only the first cost or interest upon invested capital, but the depreciation and maintenance as well as the operating expense; and unless all of these items are considered it is not possible to come to a proper conclusion as to which would be the most economical type.

In the discussion at the meeting of the American Water Works Association three years ago the statement that the centrifugal pump could show an economy, when everything is considered, against the crank and flywheel type was challenged by representatives of some of the large engine builders. It is a noticeable fact, however, that some of these same builders are now offering on the market turbine-driven centrifugal pumps and guaranteeing duties between 95 and 100 million foot-pounds per 1,000 pounds of steam.

One of the features which is often overlooked in the purchase or designing of a pumping plant is the fact that the machinery may or may not be in continuous operation, also that it may not always be operated at its full-load condition. The specifications for large pumping engines almost invariably specify that the duty trial shall be made under full-load, whereas in practical operations, particularly in towns having a direct-pressure system, it is almost impossible to reproduce these test conditions for any considerable period, and it often occurs that the machinery is operated during the greater portion of the time at from one-half to three-fourths of its capacity rating.

It is well known to engineers, superintendents and those familiar with water works service that the total capacity of a pumping equipment must be largely in excess of the average requirements; provision must not only be made for peak loads in times of extraordinary demands, but there must also be spare units to be bought into service at times of repairs, and it is for such service that the turbine centrifugal, on account of its low first cost, makes a very favorable showing in net economy during the annual period.

In comparing these two types of pumps it is necessary not only to consider the cost of the units themselves, but also the cost of foundations, buildings and boiler plant, as it will be readily seen that the total cost of delivering water will include both the fixed charges and operating expense of the entire plant. It is also obvious that a high fixed charge may mean a low cost of operation, or a smaller investment in the pumping equipment, and correspondingly lower duty, a higher boiler-room expense and additional boiler capacity.

In making the comparisons a plant has been selected with an average pumpage of 10,000,000 gallons per 24

hours, which is perhaps slightly larger than the average water works plant in the United States. In designing an equipment to take care of the service for the average city, it would be considered poor judgment to make the pumping capacity less than twice the average consumption. While perhaps it would be better to divide the installation into three or four units, particularly if the plant is to operate in connection with a direct-pressure system, for the purpose of this paper we assume that the city has a reservoir of such capacity that two 10,000,000-gallon units would be sufficient.

As to the cost of such a plant it is understood that the figures can only be approximate, and that they will vary in both cases according to the conditions and demands. In assuming the operating conditions, we will consider the price of coal at \$2.50 per ton, fired into the boilers, and the head pumped against to be 200 feet. The cost of such a pumping plant using vertical, triple-expansion pumping engines, for 20,000,000 total capacity, would be about \$180,000. With interest and depreciation at 9 per cent. the fixed charge would amount to \$16,200 per year, or \$4.33 per 1,000,000 gallons pumped. It would be fair to assume that the centrifugal pumping plant, to do like service, including boilers as above, would cost not more than \$90,000, making a fixed charge per 1,000,000 gallons of \$2.16.

In the case of the triple-expansion engines under most favorable conditions the station duty would not exceed 150,000,000 foot-pounds per 1,000 pounds of steam. With the centrifugals it would be fair to assume a duty of 80,000,000 foot-pounds per 1,000 pounds of steam, and in both cases that the water evaporated be 6 pounds per pound of coal. One hundred and fifty million foot-pounds duty is equivalent to 18.2 pounds of steam per water horse-power-hour; 80,000,000 pounds duty is equivalent to 24.75 pounds per water horse-power-hour. By using 18.2 pounds per water horse-power-hour and a total head of 200 feet the steam required is 11,232 per 1,000,000 gallons pumped, and with 6 pounds evaporation 1,872 pounds of coal will be used, which at \$2.50 a ton would mean that the cost of fuel is \$2.34 per 1,000,000 gallons pumped. Also, for the equipment using 24.75 pounds per water horse-power-hour 20,800 pounds of steam are required per 1,000,000 gallons pumped, with the same evaporation, 3,460 pounds of coal would be used at a cost of \$4.33 per 1,000,000 gallons.

Assuming labor, depreciation and maintenance to be the same in both cases, this gives a difference of \$8,100 per year in the fixed charges in favor of the centrifugal plant, and approximately \$7,300 per year difference in operation in favor of triple-expansion installation, or a net balance of about \$800 per year in favor of the less expensive plant. With an average pumpage of 10,000,000 gallons per day this would represent a saving of 21 cents per 1,000,000 gallons pumped.

These figures are not intended to be accurate in all the various details, but are fairly approximate for the conditions assumed. The writer, in making estimates on cost of plants of this character, has come to the following conclusions: For large water works plants, where the pump will be in almost constant service, the high-duty pumping engine is the better investment. This is particularly true in districts having a high cost of fuel. On the other hand, for smaller plants and plants where the machinery is liable to be out of service more than half the time and for auxiliary equipment, the turbine-driven centrifugal will show a marked economy over the larger and more expensive unit.

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Tenders for Paving Work

A short time ago a Toronto alderman put forward the proposal that the city engineer, before recommending the paving of any street, should call for tenders for the different classes of pavement and circulate petitions concerning the contract prices. It is hardly to be supposed that City Engineer Rust, who was asked to report in this connection, would regard such an innovation with favor. Naturally enough Mr. Rust is opposed to any change in the present system except so far as it might empower him to designate the class of pavement to be laid.

There are many objections to the alderman's scheme. In the first place, as Mr. Rust points out, there is the constant worrying of property owners by agents of the various companies. The educational value to the public of operations of this kind is questionable. Without the technical knowledge that would enable him to discriminate between the claims made by the various representatives, the average citizen is more likely to form a biased view and to be led to entertain unmerited objections against certain material. Moreover, he is not sufficiently cognisant, in some cases, with local conditions to arrive at anything like the proper solution of the problem.

Another objection to the alderman's suggestion is that after the tenders were put in some time might elapse

before the property owners would be prepared to have the pavement laid. During such a period the prices of material and labor might increase and various other unforeseen complications ensue. The contractor in such a case would certainly not be prepared to undertake the work upon the conditions under which he bid for it, and it is doubtful whether any contract of such a nature would be considered binding upon him. Lastly, it is not likely that many reputable paving concerns would be anxious to figure on different classes of pavement and then have their bids hawked around the city.

In the minds of city aldermen, councillors and such people strange things are originated. This is a fair example.

An Opportunity for the Reader

We will pay ten dollars each, for copies of this paper, that can be shown to be free from errors, either typographically or in statement of supposed facts. The search may cover the entire twenty years of the paper's existence. The proprietors have long cherished the hope that some day a perfectly accurate issue could be brought forth. If there has been such it escaped our attention and we should like to see it.

We will pay double that sum for a similarly perfect copy of any other paper.

Bring on some of your mistakeless paragons who find it so easy to criticise the papers and we will give them the chance of their lives to find out whether they are really human. If there be man-made perfection anywhere, in anything, we want to see it, and will gladly pay the price.—Exchange.

The city council of Victoria, B. C., have finally rejected tenders for the Smith's Hill reservoir and instructed the city engineer to make another examination and report. The bids received ranged from \$5,010 (C. G. Betts, Spokane), to \$32,500 (S. Rutter, Esquimalt, B. C.). Tenderers submitted their own specifications and none of these were considered satisfactory. In the discussion of the matter before the city council, the Mayor stated that he had a theory that the reservoir had suffered a structural injury, which if located might possibly be repaired for \$50. This is a far cry from the \$30,000 estimated in the first place by Mr. A. L. Adams. For that matter there is quite a difference between \$50 and \$15,000, as estimated by Mr. G. H. Bryson, acting city engineer, or \$6,000, as figured by City Engineer Smith.

Reckless expenditure of the public's money may be entertained for a time but it's a good thing for those implicated to have an aeroplane ready to escape when sentiment changes.

It is estimated that there are 1,500 new houses now under construction in Vancouver and suburbs.

Great Rock Crushing Plant at Montreal

**Built for Messrs Laurin & Leitch—Noteworthy in many Respects:
Size, Cost, Operation and Equipment — Detailed Description**

BY PAUL C. VAN ZANDT

The rock crushing plant of Messrs. Laurin & Leitch, engineers and contractors, Montreal, is unusually interesting from its enormous capacity of production and remarkable flexibility of operation.

Having obtained from the Montreal Water & Power Company, the contract for constructing within four years a reservoir of 43,000,000 gallons at Outremont, one of the city's suburbs, they recognized the advantage of crushing and marketing the rock at the time the excavation is made instead of piling it on a waste bank, the usual custom in the past.

As the reservoir will be 800 feet long, 400 feet wide

proximately 20 feet has been commenced. From this point the quarry face will be gradually cut back towards the mountain in parallel with the lower edge of the reservoir. The rock as fast as quarried is loaded direct by steam shovels into six yard side dump quarry cars, which are made up into trains of four each, to be hauled to the crushing plant. The rock is drilled by Temple electric drills, along the quarry face which is 800 feet in length, and after blasting, the cars are brought to the proper location alongside of the steam shovel, close to the bank of blasted rock, by Shay locomotive, which is of the geared type so as to take the grades, pushing



General view showing incline for cars and track arrangement.

and 40 feet deep, formed partly by excavation and partly by enclosing walls, it will be necessary to crush within four years approximately one million tons of hard trap and granite rock, and to provide storage for approximately one hundred and fifty thousand tons in various sizes after crushing so that it can be marketed to the best advantage.

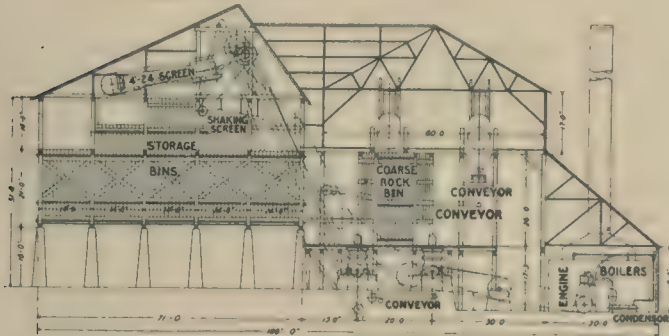
The limited time at the disposal of the contractors and the enormous quantity of stone to be removed within that time necessitated the erection of one of the largest rock crushing plants in the world.

Quarry.—The site of the reservoir from which the rock is quarried is upon the north slope of Mount Royal, and quarry operations have been started at the lowest point in the reservoir site, where an excavation of ap-

proximately 20 feet has been commenced. From this point the quarry face will be gradually cut back towards the mountain in parallel with the lower edge of the reservoir. The rock as fast as quarried is loaded direct by steam shovels into six yard side dump quarry cars, which are made up into trains of four each, to be hauled to the crushing plant. The rock is drilled by Temple electric drills, along the quarry face which is 800 feet in length, and after blasting, the cars are brought to the proper location alongside of the steam shovel, close to the bank of blasted rock, by Shay locomotive, which is of the geared type so as to take the grades, pushing

Hoisting System.—The crushing plant is advantageously located upon an excellent site about 1,500 feet from the centre of the reservoir, and to bring the rock from the excavation to the crusher a haulage system has been installed operating in balance, drawing a train of four loaded cars up the haulage incline of about 4 per cent. to the foot of the two incline trestles leading from the ground to the dumping hopper over the large crusher. At the same time, a train of four empty cars is lowered down the haulage incline back to the quarry, balancing in part the up-going load. At the upper end

of the haulage incline there is a third track for empty cars, and the trains of loaded cars which are gathered upon first one and then the other of the two outside tracks shown upon the cut accompanying this article, are hauled up these incline trestles of approximately 20 per cent. grade, one at a time and alternately upon each of the two trestles, so that the large crusher is receiving a



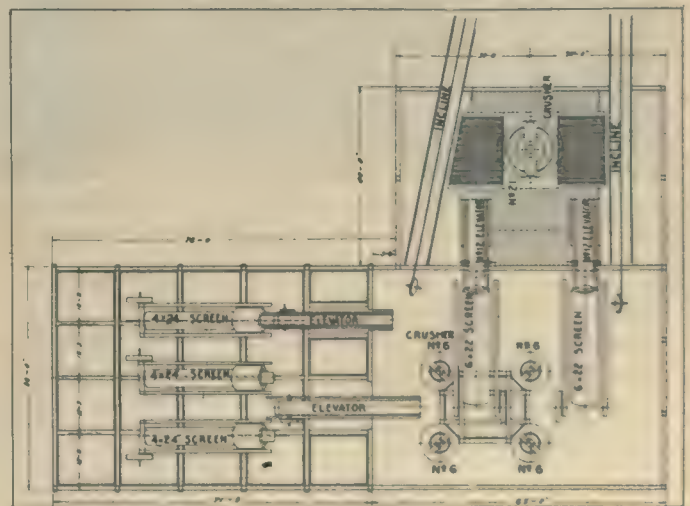
Section of Plant, Showing Conveying, Screening and Storage Equipment

carload of rock first upon one side and then upon the other, making its operation almost continuous. The empty cars are dropped to the middle track for assembling into trains for the down-going trip on the haulage incline. All the switches shown are spring switches operating automatically, excepting the one that delivers the empty trains to first one and then the other of the haulage tracks going back to the quarry.

Crushing Plant.—The crushing plant contains five Allis-Chalmers gyratory crushers. One of these is a No. 21, which is the largest gyratory crusher in use at the present time, having a capacity of 1,000 tons per hour. It has two openings 42" across by 8' in length, each opening easily capable of receiving a piece of rock 3' x 5' x 10', weighing 10 tons, which is the limit in size of any single piece that can be loaded on a single truck. This crusher, which weighs 225 tons, has crushed a piece of rock this size in forty seconds, down to pieces the size of a man's head and smaller. The primary object of this large crusher and the great advantage in its use are the elimination entirely of hand sledging in the quarry, and almost entirely of the re-drilling and re-blasting of large pieces of rock which may have been broken from the ledge in the quarry by a primary blast. Almost everything that comes down after a blast in the quarry can be loaded at once by the steam shovel and sent up to the crusher without further work being done upon same. As hand-sledging, re-drilling and re-blasting of pieces once broken from the quarry face, when smaller primary crushers are used, are always the largest item of expense is quarrying, it can readily be seen that the use of so large a crusher effects a great saving, even if we eliminate consideration of its large capacity. This crusher is made with a double discharge, each discharge spout delivering to a No. 18 bucket elevator and each of the two elevators delivering to a 6' diameter screen having approximately $2\frac{3}{4}$ " openings. At this point a rough separation of the rock is made and any incidental fines from the first break that pass these openings are delivered to a cross belt conveyor, which in turn delivers them to a short elevator and from this to a rotary screen 24' long over the rock storage bins. These incidental fines in this way bypass the secondary crushers and are delivered to the bins direct ready for shipment. The rejection or over-

size from the 6' diameter screens is delivered to two bins which feed six No. 6 Allis-Chalmers gyratory crushers. One of these bins and four of the crushers are installed at the present time, and a spout is arranged to take the oversize from one of these 6' diameter screens and deliver it direct to the present bin. The rock in this bin runs out of the four corners into the four No. 6 crushers automatically, and these crushing continuously reduce this over-size rock to marketable size ($2\frac{1}{2}$ " and smaller) and all four deliver to a common belt conveyor, from which the recrushed rock is received by a No. 8 elevator, which in turn delivers it to two rotary screens 24' long, duplicates of the one already mentioned, located alongside of it over the finished rock bins. The smallest product from these three screens consists of rock $\frac{3}{4}$ " and smaller, which is divided again up three shaking screens into dust, $\frac{1}{8}$ " product (which is a fine, clean, sharp sand), $\frac{1}{2}$ " product and $\frac{3}{4}$ " product. The remaining sections in the 24' screens separate the crushed rock into $1\frac{1}{4}$ ", 2" and $2\frac{1}{2}$ " sizes. Each of the above sizes is spouted directly into a compartment in the storage bins, directly beneath the point where it is screened, with the exception of the dust, which is conveyed in a dust-tight screw conveyor to a bin compartment properly covered over. The rock, which is very hard and clean, sizes very accurately, producing the very best of marketable stone.

Storage System.—The storage bins mentioned above have a total capacity of from 2,000 to 3,000 tons, and the bulk of the product is spouted direct from these bins into cars and wagons for shipment. The shipping tracks shown upon the illustration run under three of the compartments, the remaining two being for teams. The spouts and gates from the storage bins are so ar-



General Plan of Rock Crushing Plant

ranged that any bin may be made to deliver its product to a car or wagon in the compartment on either side as well as the one directly beneath the bin, making it very easy to load more than one size into a car at the same time or to load the same size into two or more cars at the same time. No provision is made for re-crushing any of the different sizes of rock, but the excess of any size that does not market as fast as made is stored on one of four storage piles. The capacity for storage being approximately 150,000 tons, is sufficient to take the entire product of the plant for about 75 working days. When rock is to be stored the particular size of which there is an excess, is drawn from its

bin on to a belt conveyor, which carries it out from under the bin to the system of storage conveyors extending over the storage yards. There are two belt conveyors extending under the bin, so that two sizes of rock may be piled at the same time, and the conveying system is so arranged that any size can be piled on any pile. The amount of rock to be stored cannot be predetermined, and it is not the same throughout the year. Moreover, some sizes are marketable only during the summer time, while other sizes are marketable during the entire year, thus making the flexibility of the storage system above described of paramount importance. The conveyors used in this storage system are partly 20" and partly 24" belt conveyors of the Stephens Adamson make, and the long storage piles are provided with moveable trippers, which distribute the rock over the pile where desired. On account of the extreme hardness and sharpness of the rock, the belts are made of the best Diamond Rubber Company's brand, with 8-16" rubber cover for the narrower belts and $\frac{1}{2}$ " rubber cover to the wider. One specially interesting feature of the conveying system is the distributing centre, where the two belt conveyors leading out from under the bins deliver the

delivered upon cars is only a cent or two more than that delivered direct from the bins.

Power Plant.—The power plant consists of two 250 horse power Erie City water tube boilers, and one 720 horse power vertical triple expansion Belliss & Morcom engine, this engine being connected by an English system rope drive to the main line shaft which is in turn belted to the various machines mentioned. The belt conveyors are driven by Allis-Chalmers-Bullock induction motors, and the electric current for these (as well as for the Temple drills in the quarry and for lighting), is supplied by 175 k.w. Allis-Chalmers-Bullock generator. This generator is of the belted type, receiving power from the main line shaft, but is placed in the power house in line with a McEwen automatic high speed self-oiling engine of sufficient power to drive the generator when used either for operating the motors or the drills or the lighting system, when the main engine is shut down. The big engine is run condensing, delivering the steam direct to a Knowles pump and condenser located alongside of it. The hot water from the condenser is elevated by a McDougall centrifugal pump to a water cooling tower just outside the power house. Condensed

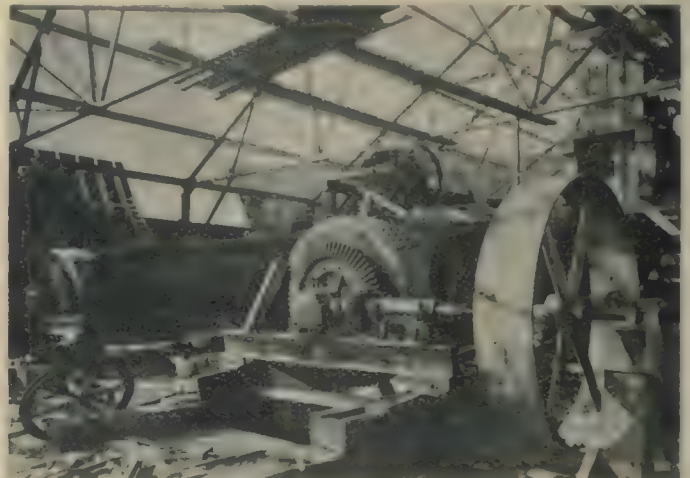


No. 21 crusher. Hopper openings 42 inches across by 8 ft. long each capable of receiving one stone 3 ft. by 5 ft. by 10 ft., weighing 10 tons.

material into two small hoppers, where the product from either of these belt conveyors may be delivered to the same piling conveyor, or to any one of the three piling conveyors, without interfering with the other.

Shipping Arrangements.—The rock loaded directly on the cars from the bins is brought out upon the track shown in the illustration, past the scales (which are of the Fairbanks-Morse recording type), printing upon a ticket the gross and tare, and from this point the railroad track leads to the street railway system of Montreal, upon which it can be distributed to any point in the city, or to any railroad or wharf for further shipment. The wagons leave the property from the other side, passing over another set of scales of similar type.

When the rock that has been piled on one of the storage piles is shipped, it is loaded in a railroad car or wagon placed alongside of the pile by steam operated clam shell derrick crane, made by the Bay City Industrial Works, which has a one-yard clam-shell bucket upon a 40' boom, so that it can reach from the car to any point upon the storage pile adjacent to it, so that the additional cost of rock taken from the storage pile when



Coarse screens, each 6 ft. by 22 ft., under construction.

steam from the auxiliaries is sent through a McDougall water heater and steam pressure upon the boilers is maintained at a constant amount of 160 lbs. by an automatic blast arrangement. The steam plant is one of the most economical that can be installed, the advantage of which is seldom appreciated in a rock crushing plant.

Hoists.—The hoists are of the Allis-Chalmers friction type. There are three hoists, one for the haulage system with a 4' drum long enough to wind 1,500 feet of rope upon it, which operates the haulage system with two ropes, the down-going cars balancing in part the weight of the up-going loaded cars. The hoist is reversible and operated with a rope speed of 250 feet per minute, bringing a train of cars from the extreme end of the quarry to the plant, in approximately five minutes. The remaining two hoists are for the two incline trestles, hoisting by a friction band and lowering by a band brake. The speed of these hoists is also 250 feet per minute, bringing a car from the foot of the incline trestles to the crusher hopper in about 45 seconds. The three hoists work in unison and are all controlled by one operator located above the crushing floor, at a point where he can see the cars, both at the bottom of the incline and at the dumping point. The speed of the hoisting equip-

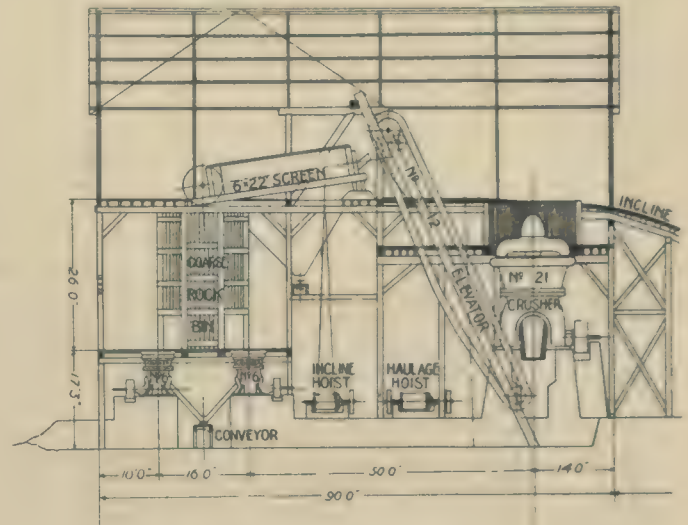
ment is such that by the time a train of four empty cars has been lowered to the quarry and four loaded cars have been crushed and returned to the empty track, four additional loaded cars have been brought up from the quarry.

Auxiliary Apparatus.—Over the No. 21 crushers are installed, two Yale & Towne triplex chain blocks, of 20-ton capacity each, for handling any of the heavy parts of the crusher should occasion require to make repairs. The track for these blocks, which are fastened to a trolley or crawl, may be seen upon the illustration, showing how any part may be lifted clear of the building or a new part lifted in. Smaller crawls and chain blocks are provided over the number sixes and elsewhere around the plant. There is a belt conveyor for carrying coal direct from cars to the boiler house. There is a large machine and blacksmith's shop alongside of the plant, provided with a 24" x 18" lathe, a planer, radial drill, blacksmith's forge, steam hammer and other proper equipment. This shop is driven by an Allis-Chalmers-Bullock induction motor, so that it may also be operated when the crushing plant is not running, receiving current from the power house.

Reservoir.—The reservoir, which will be the largest in Montreal, was designed by Mr. Frank H. Pitcher, chief engineer of the Montreal Water & Power Company. Approximately one-half of this reservoir is to be completed first and put into operation, while the remaining half is being completed. The main water pipe leading from this reservoir is now being laid by Messrs. Laurin & Leitch, and consists of a line of 60" east iron pipe, the laying of which, with its valves, etc., is in itself an item of considerable interest, but which is dwarfed in comparison with the quarrying and crushing operations going on.

General.—This plant is unusual in many respects: primarily, on account of its size and initial cost in proportion to the amount of work to be done under this contract. The size of the plant and the excellence of its equipment are resulting in a saving in the cost of construction of

way it is immediately disposed of and is out of the way. The rock is excellent in quality and instead of being thrown away on a waste bank, as was the case of the rock taken from the excavation for the Chicago drainage canal, for example, is made to yield a profit. Messrs. Laurin & Leitch use a very great quantity of crushed rock in their own work on other contracts, noticeably street paving, concrete work, and other engineering work of similar character, and a portion of this rock will be used in this way, the cost of which will be less to them



Sectional View of Crushers

than rock purchased upon the open market. The plant, which was designed and equipped by the engineering force of Allis-Chalmers Company, possesses an unusual flexibility of operation in addition to usual economy of production, so that it may be operated to suit both the work of excavation and the market for crushed stone, producing rock for the lowest possible cost of production. The plant is exceedingly compact, resulting in the smallest possible buildings, and is well arranged for operating with the smallest crew of men. One man handles the hoisting and haulage equipment, two men the dumping of cars and feeding of crusher, two men the handling of cars at the foot of the incline trestles, one man for the spring floor, one man for the number sixes, one man for the transmission and hoist floor, one engineer, two boiler men, one oiler and two men upon the conveyors, loading, etc., and these men constitute the entire operating force of the plant. One side of the haulage incline may be operated independently of the other if necessary, as can also one of the incline trestles. One side of the No. 21 crusher with its elevator and screen, can be operated independently of or without the other. Any one or all of the number sixes may be cut out temporarily, and when the balance of the plant is shut down rock may still be loaded or piled on the storage piles, or the drills at the quarry may be operated.



Dumping Rock Into Hopper

the reservoir and the disposal of the rock taken from it which should pay for the entire equipment. It has sufficient capacity to crush the rock as fast as taken from the quarry, so that the product can be marketed immediately after excavation. The rock is handled but once from the excavation to the marketing, and in this

The annual convention of the Union of Manitoba Municipalities was held at St. Boniface, Man., Nov. 24-25. One of the principal matters discussed at this meeting was the good roads question. Mr. H. McGillivray, Highways Commissioner for Manitoba, read an interesting paper dealing with methods of construction and maintenance, and the manner of distributing cost. A resolution will be forwarded to the Provincial Government suggesting that municipalities receive more substantial assistance in good roads projects.

Pavement Construction and Maintenance

Failure not always attributable to Contractor—Improper Sub-Drainage and Excessive Sprinkling among the various Sources of Trouble—Guarantees*

BY GEORGE C. WARREN

I propose to show that the success or failure of a pavement is fully as likely to depend upon causes beyond the contractor's control, both preliminary to the construction of the pavement and subsequent to its completion, as to perfect or faulty workmanship or materials; although, when a pavement fails to sustain traffic, the public universally, and officials generally, attribute the result to a combination of inefficiency and poor material, for which the contractor is held responsible.

At the outset I believe we shall agree that water is the great enemy of pavements, and the most common cause of their undoing, even when blocks of sandstone or other comparatively soft stone are used. The only material that is not seriously injured by the destructive influence of excessive water is granite, and even that is injuriously affected.

The source of deterioration from water may be summarized as follows: (1) Improper sub-drainage. (2) Excessive sprinkling or flushing. (3) Lack of efficient cleaning. (4) Sub-drainage, due to the absence of pavements, or to their improper construction, between and around railroad tracks. (5) Too flat crown or grade to provide proper surface drainage.

All of these features are absolutely beyond the control of the contractor, yet they provide most fruitful sources of dispute between him and municipalities as to the expiration as well as during the maintenance periods of paving contracts.

Sub-drainage.—Perhaps there is no part of street pavement construction which is given so little intelligent consideration by engineers, or in which local custom is so blindly followed from decade to decade, as this matter of sub-drainage. And yet practically every writer on street pavement construction from John Macadam to the present day has referred to sub-drainage as the first essential to successful road or pavement construction. We find cities where the prevailing subsoil is clay, that affords inadequate natural drainage, providing no artificial drainage for their pavements. We find other cities where the subsoil is either sand or gravel, that affords the best possible natural drainage, providing for their pavements elaborate systems of sub-drainage that are of course wholly unnecessary. Again, we find cities adopting systems of sub-drainage in use in other cities where the subsoil, and, consequently, the artificial drainage requirements, are radically different.

In a certain city which I have had especial opportunity of studying during the past twenty-four years, the pavements have proved to be better than those in any other city I have visited, although the subsoil is generally clay, the poorest medium for natural drainage. Apart from careful construction and selection of material used in the pavement, which have not been greater than the care shown in similar work in other cities, where the results have been far less satisfactory, I attribute the unusual excellence of these pavements chiefly to the elimination of water, both from the

under and upper surfaces. This has been accomplished by an efficient system of sub-drainage; and by thorough dry cleaning and entire absence of wetting down the dirt by excessive street sprinkling and flushing.

The system of sub-drainage in this case, which was adopted in the year 1886 and has been strictly adhered to since, is as follows:

(1) A trench 1 ft. wide is excavated under the curb to a depth of 3 ft. below the top, or 18 ins. below the bottom, of the curb.

(2) In the bottom of the trench is placed a narrow culled hemlock board for which other cheap lumber may be substituted, and the pavement side of the trench is boarded up with the same material, up to the bottom of the curb, to prevent the earth under the pavement, as it dries, from falling into the drain.

(3) On the board in the bottom of the trench is placed a line of 3-in. half-round porous tile, open at the bottom and with open joints.

(4) Over the tile the trench is filled to within 2 ins. of the bottom of the curb with hand-placed field or cobble stone, over which is spread a thin course of finely crushed stone, slate shale, or slag—fine enough to fill the chinks in the field stone at the surface, but coarse enough not to run into and fill the spaces between the pieces of field stone.

(5) Over this is spread about an inch of loam or clay (not gravel or sand), which, when dry, will hold together and not sift into the drain.

(6) Over this curb is set in the usual way—if the curb is of stone, it is bedded in either gravel or concrete; and if the curb or gutter is of Portland cement, it is laid directly over the drain. Of course the drains are connected with catch basins.

This method of construction is the best, most efficient, and most economical system of sub-drainage I have ever known. No cross drains have been necessary, although the natural drainage conditions are very poor.

Systems of surface drainage of which I thoroughly disapprove, either because of inefficiency or unnecessary expenses are those that include too shallow drains at the curb; and trenches filled with crushed stone in the centre of the road with similar cross drains at intervals.

The cross drains tend to attract water from outside the roadway and carry it under and to the centre of the pavement, where it percolates into the otherwise dry subsoil. This is not only an unnecessarily expensive system of sub-drainage, but one that is really less efficient than no drainage.

It may be set down as a fact that with any of the modern, nearly waterproof forms of pavement now in vogue, unless there are actual springs under the roadway (an extraordinary condition that requires extraordinary treatment), the subsoil under the pavement will be practically bone-dry if no water is allowed to percolate from back of the curb. To prevent this a drain having a depth of 3 ft. below the curb is all that is necessary. As indicated above, if the subsoil is gravel or sand, providing natural drainage, through

*From a paper read before the American Society of Engineering Contractors St. Louis, Mo.

which water percolates, no artificial drainage is necessary.

Causes of Failure of Pavements.—The most frequent causes of failure in pavement construction, all of them being entirely under the control of city officials, and just as entirely out of the control of the contractor, are as follows:

- (1) Inefficient or no drainage. This was considered above in considerable detail.
- (2) Improper back-filling of trenches.
- (3) Insufficient crown and gutter grade to carry off water and prevent pools standing near the centre and in the gutters of the roadway.
- (4) Lack of cleanliness.
- (5) Excessive flushing or sprinkling of streets.
- (6) Inadequate pavements, or none at all, between and along railroad tracks.

Watering and Cleaning.—Recognizing that water is the enemy of all pavement surfaces, the effort of those engaged in the improvement of road-surfacing material of every kind is directed toward reducing the porosity of the roadway surfaces, and otherwise protecting them from the ravages of excessive wetting.

On the other hand, the efforts of some street cleaning interests are directed toward keeping the streets wet by various forms of sprinkling and flushing machines, without properly cleaning the surface of the pavements. Still other interests engaged in street cleaning advocate dry cleaning and are developing methods to accomplish their purpose. Their objects are feasible, but, pending the advent of machines that will efficiently and economically do the work, all municipalities should take a middle ground and follow one of the following courses:

- (1) Thoroughly wash the pavements nightly without pressure, using either a washing machine or fire hose, and immediately follow the washing with hand squeegees to remove all excess of water from the gutters and slight depressions.
- (2) Sweep nightly with machines, lightly sprinkling the pavement in advance of the sweeper, and using enough water to lay the dust but not enough to convert it into mud—exactly as a dirty floor is cleaned by light sprinkling and hand sweeping.

No one would think of wetting a floor to such an extent as to convert the dust into mud, and then expect to remove the mud by sweeping. Yet the equivalent of this is done in most cities where the attempt is made to clean pavements by rotary brooms, immediately following a thorough wetting by sprinkling wagons. After such an operation, is it any wonder that covered with water and earth or sand (a mixture that will sharpen and wear away the hardest steel) pavement surfaces are literally butchered by the grinding they receive from the wheels of the traffic.

Either of these methods specified, if carefully and properly applied, will provide a well-cleaned pavement surface which will require no sprinkling through the day, if hand-cleaned by patrol system by day. The adoption of such a system will insure a pavement that will always be in the best condition for horses, automobiles as well as pedestrians on the sidewalks, being free from dust and mud, and capable of sustaining traffic without deterioration.

Track Construction.—Railroad beds improperly constructed, or tracks poorly laid, are common sources of injury to pavements, and the damage will extend not for only a few feet from the rails, but sometimes across the entire width of road-bed. The same undesirable results are often produced by faulty construction

in the pavement itself between and along the rails. If the rails or the ties are not securely laid as to prevent vibration, the pavement, whatever may be its construction or the material used, will be sure to break and allow water to work its way through and settle beneath the pavement. I have seen, in a number of cities, first-class pavements laid outside the track area, from the rail to curb, or from within two feet of the rail to the curb, while between and around the rails there would be absolutely no pavement at all. In such cases from 1 to 3 ins. of water will accumulate between the tracks during every heavy rainfall or spring thaw, and have no outlet except into and under the pavement; and if the pavement is not more or less destroyed it is only because Nature has provided conditions which permit the water to drain nearly vertically into and through the soil.

Maintenance Guarantee.—Turning more specifically to the subject of pavement guarantees and maintenance, I am firmly of the opinion that pavement guarantees extending beyond a term of one year, which is ample to test the integrity of material and construction are against the best interests of the taxpayers. In support of this view I offer the following reasons:

(1) Guarantees are always of doubtful legality. On assessment work, which is the basis of payment for over 75 per cent. of the street pavements laid in the United States and Canada, the courts have frequently, if not generally, declared maintenance guarantees to be illegal, because they provide for indirectly assessing abutting taxpayers for the cost of maintenance, which city charters usually say shall be paid for by the city at large.

(2) There is always likely to be more or less dispute between the contractor and the city regarding the contractor's obligations to make certain repairs, especially when the damage done can even remotely be attributed to causes such as those to which we have referred as lying outside the jurisdiction of the contractor, and, similar contentions will arise between the contractor and the city as to the extent of repairs and nicety of condition of maintenance of the pavement which is proper under the guarantee. It is not an exaggeration to say that under guarantees, cities generally endeavor to require contractors to make repairs to pavement surfaces that they would not think of making at the expense of the city.

(3) When guarantees for maintenance are required, prudent, conservative contractors always include in their bids the interest on the cash retained, and the cost of the surety company bond premiums required by the city, and a sufficient amount to cover a conservative estimate of maintenance charges. It has been calculated that if surety company bonds for five years' maintenance were required on all pavements laid in the United States and Canada, the premium, always added to the contractor's bid, would each year amount to more than a million dollars.

(4) Maintenance guarantees tend to produce lax inspection, or the loss of control of construction by the proper city officials, as the contractor in case of dispute or disagreement as to the methods of construction, will notify the city officials, that if he is not permitted to do the work in the way he thinks best he will not be responsible for the guarantee.

(5) Maintenance guarantees encourage the acceptance of proposals from incompetent or inexperienced contractors, and the selection of pavements of doubtful desirability. How often do we hear the statement made in connection with the awarding of street pavement

contracts: "The contractor may not be reliable, or the pavement may not be successful, but we have the surety company bond, or the cash retained to back the five-year guarantee."

In twenty-five years' experience in the street paving business I have seen many paving contract guarantees defaulted, but I have never seen a pavement made good through a guarantee bond or a cash retainer, when the pavement or contractor failed, or when it was against the business interests of the contractor "to make good." There may be such cases, but if there are, they are usually the "exception which proves the rule."

General Policy.—Finally, the best interest of the city in the construction of pavements will be conserved, as it is in all other classes of construction, by the adoption of the following policy:

(1) Decide upon the form of construction best suited for each particular case.

(2) Prepare careful plans and specifications for the work, and give the construction the closest and best expert inspection and supervision.

(2) Take entire responsibility for the results. In the long run this policy will produce better pavements and at lower costs, than will the apparently attractive, but misleading maintenance guarantee system.

Separately Molded Members for Canal Construction.

At a number of places in southern Germany small rectangular canals and flumes have recently been constructed in part of separately molded members. Some of them are used as flumes for small power plants and some for the water supply of industries. Two conditions have led to the adoption of this construction; in some cases the new structures replace older ones and the separately molded type was adopted in preference to the monolithic in order to lessen the length of shut down, the newer type lending itself to more rapid construction than the older; in the other cases the flumes and canals were built in the ground where the use of forms would have required considerable extra excavation, increasing the cost and the required time. The separately molded parts are in the shape of an angle, each being a section of one side wall and a portion of the adjacent bottom. The length of the attached bottom and the reinforcement are varied in accordance with the depth of the flume. The sections are placed side by side forming continuous side walls. Grooves in the ends of the sections are filled with mortar to make a tight joint. The reinforcement of the portion of the floor between the ends of the molded pieces is then laid and attached to the rods projecting from the sectional members. The floor is concreted in the usual manner. It is claimed that very good interior surfaces are obtained and that the friction loss is very low.

One of the flumes described in "Armierter Beton," from which these notes are taken, is 11.15 ft. wide, and 3.94 ft. deep. It is built in a cut and the side walls are reinforced to take the earth pressure with the flume empty. The top of the wall has a thickness of 3.15 in. and the bottom, just above the junction with an increased section near the floor, 4 in. The ground at this point was not sufficiently firm to allow the canal to be placed directly on it and a base course of lean concrete 6 in. thick was laid. Upon it is the reinforced floor, 3.15 in. thick. In some cases the flumes have been covered, separately molded slabs, reinforced to take the fill, being

used. A construction of this type was also employed in Munich for a new underground line for the post office system. In this case the tunnel was built in a sheeted open trench which later was backfilled. The construction described is known as the Eschenbrenner system.

Water Proofing Concrete

According to Professor Ira L. Baker, when alum and soap are used as water-proofing for concrete, the alum in powdered form may be mixed with the dry cement or the sand, and the soap may be dissolved in the water employed in mixing the concrete, or both the alum and the soap may be dissolved in the water. The former is probably the safer method in practice, since with the latter method the water must be thoroughly stirred while the two are being mixed, or the precipitate may form in large masses, which it is practically impossible to break up; and, further, the water must be kept stirred to prevent the compound from accumulating on the surface. However, the alum is more easily dissolved than the soap, and hence the alum may be dissolved in, say one-fifth of the water, and the soap in the remaining four-fifths, and then the two portions may be mixed together. The alum and the soap combine and form a finely-divided flocculent, insoluble, water-repelling compound which fills the pores of the concrete and decreases its permeability. The best proportions are: Alum one part and hard soap two parts, both by weight. Soap varies in its chemical composition, and hence a single proportion cannot be stated which will be chemically exact for all cases. The above proportion is in round members the relative combining weights of alum and average hard soap. Any reasonably pure soap will do. It is difficult to dissolve more than 3 per cent. of hard soap in cold water, and hence this practically limits the amount of alum to 1.5 per cent. and of the soap 3 per cent. These amounts will give a precipitate equal to about 3 per cent. of the weight of the total water. The amount of precipitate formed in the pores of the mortar or concrete will depend upon the amount of water used in the mixing.

CONCRETE CASINGS FOR WOODEN PILES have been used with great success in wharf and bulkhead construction on the San Francisco water front by the Board of State Harbor Commissioners. These casings are reinforced-concrete hollow cylinders cast in any required size on shore and allowed to set there until needed. In the application of these casings the wooden pile, of whatever size and length required, is first driven to the desired depth, and the casing then slipped over the pile, and in turn, is driven as far as desired. Then the interior of the casing is pumped out, the mud or sand removed to the required depth and the annular space around the wooden pile filled with concrete. For the bottom of the casings special shoes are provided which fit reasonably close around the wooden pile and serve to space the casings around the pile thus ensuring a uniform thickness of concrete filling and preventing any large amount of mud or sand from entering the casing during the driving. In the San Francisco work casings 24 ins. in diam and from 22 to 56 ft. long have been used. For longer lengths a special splice is provided.

The competition for plans for the new tuberculosis hospital at Winnipeg resulted as follows: (1) George Teeter, (2) C. W. Chivers, (2) Wm. Bruce.

Causes of Faulty Concrete Construction

Details of Experiments—Inefficiency and Haste most Frequent Causes of Failure—Practical Notes on Building Walls and Floors

A common occurrence in the failure of concrete work caused by faulty aggregate, and in which the cement had been hurriedly and ignorantly asserted to be the cause of failure, is where a clay ballast or brick-rubbish aggregate is used, which contains an excess of sulphate of calcium or similar harmful ingredients, says the Builders' Journal (London).

Experiments to illustrate such an instance of concrete failure due to the aggregates employed have been arranged, with the following results. In the case of a large bulk of concrete composed of six of aggregate to one of cement, a well burnt and clean clay ballast was used with furnace cinders and sand in the proportions of three parts, two, and one respectively.

The concrete bulk after some weeks hardening commenced to expand and disintegrate and, as usual, the quality of the cement was first suspected. After a very thorough investigation, however, into the quality of the cement this alleged cause was abandoned, as the produce was found to be sound in every way. Then an inquiry into the separate aggregates took place, and sample blocks were prepared as follows and kept under supervision, viz.:

- A. Cement and furnace cinders.....(3+1)
- B. Cement and sand(3+1)
- C. Cement and ballast(3+1)

And after some ten days' exposure to the atmosphere it was found that block "C" disintegrated in the same way that the bulk concrete had expanded and fallen to pieces. The two sample blocks of the same cement when separately mixed with the sand and cinders forming the other portions of the aggregate were perfectly sound in every way. An enquiry was then made into the quality of the brick rubbish or ballast used as the main aggregate, with the result that it was found that an average sample contained sulphate and sulphite of calcium equal to 9.51 per cent., and the concrete bulk expansion must be attributed to expansion caused by those substances. In explanation of this result it might be added that the sulphate is contained in the original clay probably as pyrites, and upon burning the clay for ballast the sulphate becomes a sulphite. But in the concrete the oxygen contained in the atmosphere enters into combination with the sulphite, and forms a sulphate again, and in so doing expands and disintegrates the concrete.

Old Plaster Cement.

Great care is necessary in dealing with old concrete floors where plaster of Paris was the matrice. An instance has occurred where old concrete made 40 years since was broken up and re-used with Portland cement as a matrice, the result of which was the concrete expanded, and a failure was the result. It was necessary to raise an old floor of plaster concrete, and of the same age, 2 ins. This was done with Portland cement concrete, which, after the lapse of some time, heaved up in various places, and examination showed that it was the old plaster concrete that had swollen through contact with the water in the cement.

It is often discovered that monolithic concrete walls after erection frequently disclose ugly cracks, almost amounting in some cases to fissures, and although no great diminution in strength is supposed to result, these cracks militate much in its disfavor. This has always been an objectionable feature to contend with in concrete.

These are caused through the natural phenomena of expansion and contraction with change of temperature. This change of form has been put down to a peculiarity of concrete which other wall and paving substances are not liable to. But this is a mistake, for it is simply the materials of which the concrete is made that expand and contract, and their conversion into concrete in no wise affects this property of contraction and expansion. True, there is none, or but little, palpable evidence of change of form in brick or stone walls, or brick or stone paving, but there is no mistaking it in concrete walls, or concrete paving. The reason is that the change is distributed so evenly throughout the multitudinous mortar joints of brick and stone work that it is imperceptible; brick walls built with cement will often show cracks here and there, usually put down to settlement, but which, in reality, are more often the result of contraction and expansion; if these cracks are watched it will be found that they close in mild weather and open again when the temperature falls.

The use of an unyielding material like Portland cement in jointing long lengths of coping or ridge tiles will cause the same thing. Massive brick piers at the end of a long wall, and against which the stone coping abuts, have been pushed more than an inch from the perpendicular, and ridge tiles lifted completely off their bed and broken from the same cause. According to experts, the linear expansion by heat from 32 degrees to 212 degrees of granite is one part in 1.267, of ordinary brick one part in 1.818, and of fire brick one part in 2.365, or $\frac{1}{8}$ -in. in 24 ft., and this ratio would apply to concrete walls or concrete paving where the aggregates were of a similar nature, and pro rata to the amount of variation of temperature they were subject to.

It has been usual to charge the matrice with the cause of expansion and contraction in concrete walls, but the quantity used is so small, if seasoned it is so little subject to change of form, and is so evenly distributed, that it perhaps has next to nothing to do with the result, and this is proved by the fact that good cement concrete, no matter whether used for walling, or paving, or other purposes, is unaffected in this way until a considerable change of temperature takes place.

To save the bulging of walls in floor concrete construction, it is best to insert wood expansion strips round all floors before commencing, as was the practice when plaster of Paris was the matrice, and to remove them when the concrete is set, filling in the cavities with sand, and calling the attention of the architect or clerk of works to what had been done, and with what motive. The cost is trifling, and any future trouble need not then interest the floor contractor.

Increased Use of Metal Building Material

**Some Interesting Facts concerning its Development—Fireproof Qualities
a Strong Recommendation—Its Adaptability—Classic Styles of Design**

The extent to which metal has forced its way into architecture in modern building is remarkable when it is considered.

A noteworthy use of metal building material is that of embossed sheet steel interior finish. Architects and builders have taken advantage of every opportunity to incorporate other metal building material in their work, and few of the experienced, progressive ones have made



Louis XIVth Ceiling in Hyatt Avenue Methodist Church, London, Ont.

an exception in the case of metal ceilings. A material combining to so large an extent exactly the artistic and practical qualities required for the purpose has more than ordinary claim upon the favor of the architect and builder. An art metal ceiling is no longer considered merely a "decoration." It is recognized that from the standpoints of fire-protection, sanitation, durability and beauty of appearance its use is almost a necessity in the construction of such buildings as stores, theatres, hotels, club-houses, etc. Nearly every city, town or village in the Dominion has demonstrated the fire-proof qualities of metal ceiling. Fire meets a decided check in a metal ceiling. If the walls are also covered with this material the fire is almost certainly confined to that room.

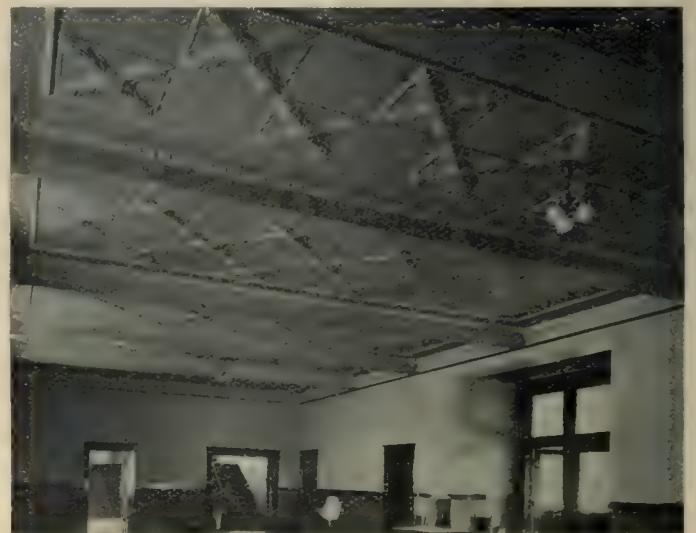
Other important facts that an architect should consider in this connection are: that a metal ceiling is unaffected by ordinary dampness or heat such as would warp, stain and crack, wood or plaster; that it is not loosened or injured by the vibration or jarring of the building; once up it remains as long as the building stands without any attention whatever except, possibly, an occasional coat of paint. The only enemy metal has is rust and this is prevented from damaging a metal ceiling. When desired this material may be applied both sides and all edges of each piece by the makers. It is therefore permanent.

The cost is little, if any, greater than that of plaster and any but the most elaborate and complex designs may be erected by an ordinary mechanic with the as-

sistance of the construction plan supplied free with each ceiling. When desired this material may be applied over damaged plaster by first covering the latter with half-inch wood. These practical or useful advantages of metal ceilings. Its development from an architectural as an interior finish.

So much for the mechanical features of embossed metal ceilings. Its development from an architectural standpoint is a story in itself. When the Germans first used steel plates for the inside lining of factories and other such buildings (about 1840), they did so altogether for the fire-protection afforded and paid little or no attention to the appearance. The embossing was shallow and done mostly to make the sheets rigid and more easily fitted together. For some fifty years thereafter the only improvement made in the appearance of the material was to stamp in it stereotyped patterns, mostly to make the sheets rigid and more easily fitted together. For some fifty years thereafter the only improvement made in the appearance of the material was to stamp in it stereotyped patterns, mostly indiscriminate and reckless jangles of lines with no effort to produce anything better than a pleasing effect.

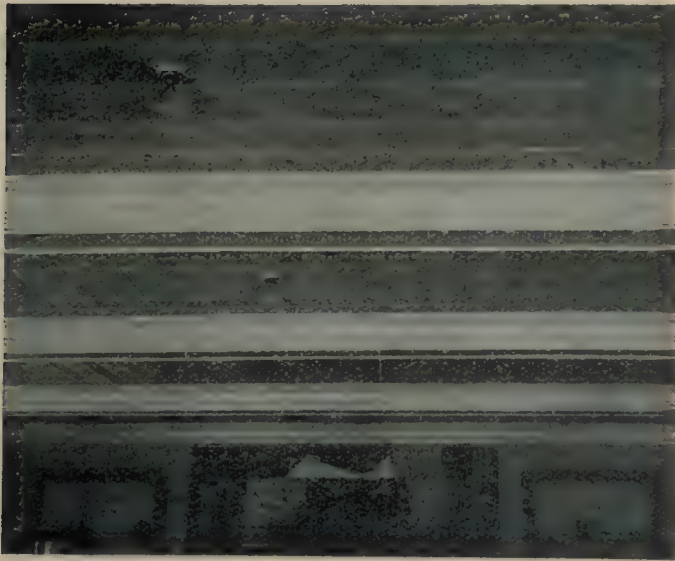
Then about fifteen years ago came a realization of the wonderful possibilities of art metal ceiling and with it a revolution of the industry. A specially, soft, "tough," cold-rolled steel plate was made which permitted of much deeper and finer embossing. The idea of classifying the designs was also originated—possibly the most important step forward—raising metal ceiling from merely a "fire-proof lining" to a high class interior finish. By this system, instead of aiming merely at ornament, the designers drew and modelled their patterns after the



A Graceful Ceiling in a Winnipeg Public School.

various styles of interior decoration developed at different periods of the world's history.

The idea has been further developed, until to-day the purchaser is offered designs that are founded on such



A dainty, tapestry-like Empire Design in Columbia Hall, Sault Ste. Marie, Ont.

classic styles as Louis XIV. Greek, L'Art Nouveau, Romanesque, Gothic, French, Italian and German Renaissance, Rococo, Empire and Colonial Art. From the hundreds of designs offered it is easy to select a pattern to suit a room of any size or shape, or to harmonize with any architectural style.

It is difficult to foretell the future of embossed metal interior finish. Though its use has heretofore been largely confined to ceilings it is now coming into use as a well-covering and it should prove just as popular for this purpose. At any rate, the development of the metal ceiling industry has helped to solve the problem of a fire-proof and attractive interior finish for stores, churches and other such buildings, and as the qualities of the material become better known it should be more largely used in residential work.

In building New York's greatest tunnel, the engineers in charge have decided to go back to Roman methods, the rock tunnel being considered cheaper and more durable than iron pipe through the earth.

The real development in tunnel building began in Rome more than three hundred years before the Christian era, when the first of its nine great tunnels was designed by Censor Appius. Shafts were sunk and borings made through solid rock, but the engineers of that day differed from those of to-day in that they did not go far into the earth, immense stone aqueducts being built across rivers and valleys. There was little knowledge of explosives and very little machinery compared with that in use to-day, but skilled workmen using such chemicals as were known to have expanding power and employing wedges of dry wood which expands through absorption of water accomplished wonderful results. The work, of course, was slow, but tunnel-building came to be the special ambition of each successive ruler of Rome during the republic, just as pyramid-building had been with the rulers of early Egypt. No expense was spared to realize the ambition of each ruler, and they still form monuments to their memory. Thirty thousand men were employed part of the fourteen years it took to construct the Claudia, a famous Roman tunnel which cost about three million dollars of our money. The tunnels of different periods varied in length, the longest probably being the Anio Vetus, which is forty-three miles in length and eight feet in height, part of it being in aqueduct form made with huge blocks of stone.

Careful study of the present condition of these Roman tunnels built so many years ago convinced a board of eminent engineers that a return to the first principles of tunnel-building, with a modern use of explosives, would give the people of New York an enduring work. The proposition met with great opposition at first, but the plan has been finally adopted by the Board of Estimates and bids will soon be asked for accomplishing the great undertaking.

The course of the tunnel will be as follows: Receiving the Catskill water supply at the Hillside reservoir near Yonkers, it will pass under Van Cortlandt Park, the Jerome Park reservoir, under the Harlem river at Highbridge, under St. Nicholas and Morningside Parks and then diagonally across Central Park. Thence the tunnel will be carried under Sixth avenue to Thirty-fourth street, and then directly south to the Delancy street terminal of the Williamsburg bridge. It will continue directly south to the terminal of the Manhattan bridge in Brooklyn, and from that point will be carried under Fifth avenue to Fort Hamilton, Manhattan. The Bronx and Brooklyn will receive the water direct from the tunnel, while huge mains under the narrows will carry the supply to Richmond and into Queens. The capacity of the new tunnel will be 500,000,000 gallons daily, or about the amount at present being consumed in the city.

The following figures give some idea of the diameter and depth at different points:

At its beginning the tunnel will be fifteen feet in diameter and will gradually be reduced to ten feet at Fort Hamilton. The most remarkable thing about this greatest of all water tunnels is the immense depth to which it will be sunk that it may follow the solid rock. At Yonkers it will be 200 feet under ground. It takes a dip to get under the Harlem river, going down 450



A Handsome Panelled Ceiling in Hotel Rotunda.

feet. From West 106th street to about 34th street it will be only about 200 feet below the surface. Where it passes under the East river it will be about 800 feet below the sea level. This great depth is rendered necessary by the weakness of the underlying rock which supports Manhattan Island at that point. Such a depth insures, in the opinion of the engineers, strength enough to render the tunnel absolutely safe and free from leakage.

The entire tunnel is to be lined with a thick layer of concrete.

The Contract System versus Day Labor

Interesting Letter from the City Engineer of Fort William—Contractors should have No Difficulty in Obtaining Work at Profitable Figure

Fort William, Ont., Nov. 24, 1910.

Editor "Contract Record":

With reference to your discussion of the day labor question, I think possibly the experience of the city of Fort William may prove of interest.

Fort William during the past five years has spent about two and a half million dollars on construction work of all kinds, of which over two millions have been carried out by day labor, under the writer's direct administration. Consequently, I feel that I can speak with some authority on the respective merits of the two systems as applied to the conditions, location and population of the city of Fort William, which at present has a population of about 23,000 people, and at the time of the writer's first connection therewith in 1906 had probably only 7,500.

At the outset, it is also reasonable to state that conditions that are almost controlling features in Fort William would be entirely unknown in a large city or even a small one located closer to the large centres of population.

Fort William is in a comparatively isolated situation, a long distance from the haunts of the true contractor. By "true contractor" I mean one of experience and training, and possessed of plant and a following of capable superintendents and foremen. Personally I have made serious efforts to persuade such contractors to tender on our work, without success, although this result is easily understood. No contractor wants to do comparatively small work a thousand miles from his base, in a portion of the country with which he is unfamiliar. As a result, only local talent has, in the past, been available for our work. Consequently it has not been difficult, as a general rule, to do day labor work at a lower cost than by contract, and the quality of the work has in no way suffered, in fact quite the reverse.

Local conditions have practically forced us to do a large amount of day labor work, and this being so, we have endeavored to bring its efficiency to as high a point as possible. Of course, this point does not yet approximate perfection, and probably never will, but we have tried to eliminate many of the usual objections to the day labor system.

The city council, although divided on the respective merits of day labor and contract work, are thoroughly agreed that my hand shall be absolutely untrammelled in the execution of the work. Resolutions are duly passed to this effect, and council, both individually and collectively, have loyally lived up to their letter and spirit. Council sets absolutely no limit as to wages paid either for laborers or foremen, and has never refused any plant or equipment asked for. As a consequence, we have nearly a hundred sewer men, mostly Finns, selected from some three or four thousand men, who have passed through our hands during the past five years. These men are paid from 25c. to 30c. per hour according to the difficulty or arduousness of the work, whereas the average wage is from 20c to 22½c. Foremen have been retained by the same process of selection, and we have discovered several of the first grade paid from \$4.00 to \$6.50 per day. We have not a single political or aldermanic favorite on any job. For any man to pose as such insures the fact that he will get no work on any city gang. The only concession made—that a contractor might not make—occurs when work opens in the spring and jobs are not plentiful, when preference is given,

other things being equal, to married men with families, but there have always been enough of these men in the front rank of our selected gangs to avoid the least detriment to the work.

I agree that work of any size needs an inspector, whether done by day labor or contract. In the former case, the inspector keeps an elaborate daily cost record, which is essential to the success of any system of construction.

Employers liability insurance is carried on all important work.

We have also organized a city yard that is self supporting. All material, plant and equipment passes through it with a sufficient percentage added to cover cost of handling. Plant, such as concrete mixers, trenching machines and steam rollers are charged against each job on a rental basis that will repay their cost well within their life and the job stands minor repairs. Tools are valued on their return from a job and credit given on a conservative secondhand basis, and every effort is made to have every job stand on its own feet in every particular.

Material is bought largely by tender and the cost has averaged appreciably lower than that purchased by contractors.

The maintenance problem is met as far as possible by charging the job an estimated amount to cover repairs for one year—as in our contracts. Up to the present this has practically meant regarding the street in which any trench has been opened. Sidewalks by day labor have all been on streets involving raises of from two to four feet in grade. They have been therefore built "hollow" with reinforced concrete slabs supported on two walls. Some have been down four years, but we have not had to spend a cent in repairs so far.

Our paving is all asphalt block and no repairs have been made within the period of guarantee.

In bidding against a contractor, or, in other words, advising council what is a fair price for the work, a practice made necessary by unscrupulous contractors in the years that have gone, it is fairer to do so before bids are opened as one's judgment is not clouded by other opinions as to the probable cost; but I certainly make every effort to place myself in the contractor's position and give him every chance. Often the contractor is lower than my estimate, and then almost invariably he gets the work, but when ordered to be done by day labor, nine times in ten, the cost is considerably below the estimate, due often no doubt, to good weather and favorable conditions, but certainly not to any scamping or cross charging or any of the other peccadillos suggested by some of your correspondents, and if the estimate is exceeded I have no qualms about saying so. Of course, it is up to me to say why, and it is very seldom that excellent reasons do not exist. Again, necessary changes in the work are paid for in the case of the contractor as extras without question, but the engineer's only remedy is an explanation which may not be believed. Briefly, any contractor who has secured work in this city within five per cent. of my figures has made good money—although they are not well equipped for the work.

I consider too, that any contractor who cannot, by his personal presence, knowledge, training and ability, make a fair profit under the figures I ask him to compete against, in the large majority of cases, has no right to call himself a contractor. But, being only human, I occasionally under-

estimate, and also unforeseen circumstances sometimes arise which swamp engineers as well as contractors.

There seems to be a disposition in this correspondence to assume that an engineer is anxious to do work by day labor. Personally, I think it adds a great deal to his work and worries. Broken machinery, collapsing cofferdams, keeping the work supplied with material, floods, storms, the vagaries of dynamite, caved-in tunnels and other troubles borne by the contractor, cause many a continuous spell of from 18 to 48 hours work for which he gets little credit, less thanks, and no pay. Some contractors give a great deal of trouble also, but fortunately they are a small minority.

As to the clauses making the engineer sole arbitrator, I think this arrangement is best for both sides, if the engineer will act in a perfectly just and impartial manner. He knows, better than anyone else, the troubles that have arisen on the work and can collect and keep data enabling him to reach a just decision, and as I understand the law, if his interpretation of the specifications is not just and fair to both parties, no court would uphold his decision. The contractor would be in a better position to get an adjustment than the city, if the engineer were otherwise than just.

It may also be a surprise to "Contractor," of Montreal, to know that with most city engineers the retention of their job is the last thing they worry about. If he will compare the names of the present city engineers of Canada, and particularly Western Canada, with those of five or even two years ago, the extraordinary number of changes do not indicate a serious or determined effort on the part of the profession to hold their positions at the cost of either honor or self respect.

In conclusion, I think there is no reason, at least in the average Canadian city, why both systems of doing work cannot be made satisfactory. Both have merits and both have faults, and it depends very largely on local conditions as to which system will develop the largest proportion of merit and demerit. There are also many classes of work that are especially adapted to one system or the other. Every city should use the same freedom of action as a railway company in the prosecution of its work.

Yours truly,

H. S. Hancock, Jr., City Engineer.

1910 a Busy Season at Ottawa

Building Materials still in demand—Current Prices—Much Development Work Contemplated—Trade Notes of Interest

Ottawa, Nov. 26, 1910.

It has been decided that hypochlorite will be added to Ottawa's water supply. Engineer Hazen in his report on the water supply for this city recommended that it be taken from McGregor's lake which is of sufficient altitude to do away with the present pumping system altogether, but if, in the meantime, the supply became impure to the extent of causing disease, the water might be treated with hypochlorite. City Engineer Kerr was of the opinion that the supply up to the present time was good, and as a proof there is little or no contagion in the city whatever. The council nevertheless did not want to take any chances, and for this reason decided to install the system. The tanks will be installed in the present power house and the hypochlorite will be added to the water in the intake pipe before it reaches the cylinders. Going through the pumps will be sufficient to properly mix it. The system will cost about \$1,000 to install and about \$5,000 a year to operate.

Consulting Engineer W. F. Tye, of Toronto, and City

Engineer Ker will cooperate in presenting a report to the council on the railway entrances and exits in connection with this city. There are four railway companies to deal with. The Grand Trunk, Canadian Pacific, and Ottawa, and New York lines, all now come into Central station. However, the C.P.R. is not satisfied with present conditions and wants permission to close up the Rideau canal for some distance, place their tracks in the bed and tunnel under the city in order to connect with the Union station and proceed west. At present the company's trains have to go through Hull to get from one station to the other. Then the Canadian Northern is applying for entrance into the city. To take up the entire question and put the council in a position to permanently settle its course in this regard is the undertaking of the engineers.

Nineteen hundred and ten has been a heavy year in street improvement work in the city, and the indications are that next year will be even heavier. The city officials expect next summer that the 12 miles of sidewalk and 4 miles of pavement, the approximate figures this year, will be exceeded.

There is a motion at present before the city council to issue debentures to pay for extensions to water mains. It has heretofore been the practice of the waterworks committee to pay for water main extensions out of current account, while other cities issue debentures for this extensions. The cost of extensions of water mains this year was in round number \$40,000 and it is a heavy drain on the resources of the department. Since these mains last for upwards of 20 years they should be paid for by 20-year debentures instead, is the argument of the chairman of the waterworks committee.

The construction companies report that the demand for building materials is very heavy for this period of the year. This is much influenced by the big buildings in course of construction. In the fall, of course, contracts are being signed up for masonry and the like at slightly lower prices in the case of big jobs than could be secured at other seasons of the year. For example, one contract was signed this week for masonry work at \$5 per tois, which is particularly low. It usually runs about \$6 to \$8. This, of course, is where the contractor only furnishes the labor. The ordinary stone for walls is sold, delivered, at \$8.50 per tois which is about the same as it has been all summer. There is a slight drop in the price of cut stone for sills and lintels. It is being quoted now as low as 50 cents per running foot, both native and Indian stone. Rough stone for this purpose is sold at about 20 cents per superficial foot. Large stone to be cut is sold at about 30 cents per cubic foot. The prices charged for laying brick remains pretty steady. One contract for solid brick work was signed up for \$8 per thousand where the contractor furnished only the labor. Where the brick-layer furnishes the lime and sand, the prices range from \$9 to \$12 per thousand, the higher prices for veneer work.

A campaign will be started very soon to raise upwards of \$80,000 for the enlarging of St. Luke's hospital, which is much too small for present. Horwood, Taylor & Horwood are preparing preliminary plans. The building will be fire-proof construction.

There has been an exceedingly heavy demand for cement in Ottawa during the past year. An inquiry from the different firms selling cement in this city and Hull, produces the calculation that about 110,000 barrels were sold since January last. The prices remain very steady, with no decreases as yet. In carload lots it is selling at \$1.70 and in lesser amounts at \$1.90.

The Otis-Fensom Elevator Company are installing nine elevators in the city just now. Four in the new central station, four in the Chateau Laurier and one in the Hope building.

The Cost of Company and Contract Work

An Example of the High Rate of the Former in Railway Tunneling — A Threadbare Fallacy: "Saving the Contractor's Profit"

Although most railway managers have demonstrated again and again that contract work is cheaper than work done with company forces, every once in a while the decision is made that some important or difficult piece of railway construction had better be carried out by forces employed directly by the railway company. An instance of this kind was the building of the Cascade Tunnel by the Great Northern Railway in 1897 to 1900. It so happened that in 1886 to 1888 the Northern Pacific Railroad built the Stampede Tunnel through the same range of mountains by contract, and at a time when wages were higher. Since these two tunnels are so nearly comparable, in the character of excavation and in length, the N. P. tunnel being 9,844 feet long, and the G. N. tunnel being 13,813 feet long, a tabulation of cost becomes very instructive. The following costs are brief abstracts of much more detailed statements given in the 1910 edition of the "Handbook of Cost Data," by Halbert P. Gillette.

COST OF NORTHERN PACIFIC TUNNEL.

	Per lin. ft.
Excavation, standard section, at \$78.00	\$ 78.00
Extra excavation, 3.2 cubic yards at \$4.50	14.40
Traffic charges	0.77
Total	\$ 93.17
Timber lining, 305 feet B. M. at \$35.00	10.68
Brick and concrete lining (by company forces)	54.08
Track and ballast (by company forces)	2.47
Engineering	5.00
Grand total	\$165.40

COST OF NORTHERN PACIFIC TUNNEL.

Labor excavating tunnel	\$ 60.60
Explosives	7.40
Power	22.50
Tools	10.00
Machinery	16.20
Buildings	3.50
Personal injuries	2.10
Hospital expenses	1.10
Total	\$123.40
Timber lining	9.40
Concrete lining	43.50
Track and ballast	2.80
Engineering	4.80
Grand total	\$183.40

We see that the Great Northern tunnel cost 11 per cent. more than the Northern Pacific tunnel; but if we compare only the work done by contract on the Northern Pacific tunnel with the corresponding work done by company force on the Great Northern tunnel, we have \$93.17, as compared with \$123.40. This shows that the company force work cost 33 per cent more than the contract work.

It remains only to determine whether or not the contractor for the Northern Pacific tunnel made a profit. Fortunately, careful costs were kept, and, as recorded in Gillette's "Handbook of Cost Data," it is clear that the contractor made a handsome profit, in spite of the fact that the lowest priced

workman received \$2.50 per day. Moreover, the contractor made more rapid progress on the Northern Pacific tunnel than was made on the Great Northern Company work.

Doubtless the knowledge that this contractor had made a splendid profit was the chief actuating motive that led the Great Northern to attempt to "save the contractor's profit." When will all engineers come to a realization of the fact that a contractor's profits are merely his salary for expert supervision and management? When will all engineers see clearly that a successful contractor is a manager who has been appointed to the position by the most astute selecting agent in the world—competitive strife? When will all of us invariably apply the fundamental law of business management? Namely: "All payments for work should be proportionate to work done."

Incidentally, we may add, the contractor for the Northern Pacific tunnel through the Cascade Mountains, was himself far ahead of his time in that he used a bonus system in paying his employees. Mr. Nelson Bennett, the contractor, was one of the great railway builders of the West. We believe he is still active in the railway construction world. The history of his work on the Stampede Tunnel through the Cascades is a real romance of achievement. It serves to the ear a story as keenly interesting as the best of fiction.—Engineering-Contracting.

Rust, as shown in the Removal of a Seventeen-Storey Building

The Gillender Building, a seventeen-storey structure at the northwest corner of Wall and Nassau streets, New York City, was built in 1896, and removed in 1910.

When built, all the columns were encased in solid brick-work. The steelwork received one coat of paint in the shop and two after erection, but on removal, showed little evidence of ever having been painted at all.

From the top to the bottom, wherever the spaces between the brick and steel were filled with Portland-cement mortar, there was no rusting, but, wherever the mortar did not fill such spaces completely, rusting had begun. Generally, the under sides of the top and bottom flanges of the floor-beams had begun to show rust, while the web and upper surfaces, having been in contact with mortar, were in good condition.

The worst rusting of all was from the sixth floor down, on the northeast corner, where the columns had been against the adjoining building, on the north side. The cover-plates of these columns looked as if they had never been painted, but had stood in the open, exposed to all weather, for six or seven years. On these columns one-half, in volume, of many rivet heads could easily be removed.

This building had been erected by first-class contractors and with first-class materials; and although the rusting had not yet made the building unsafe, there is no telling how soon it would have become so.

It would seem that if the columns had been encased and filled with wet concrete there would have been little danger of rust, and they could thus have been easily protected from electrolysis. Oil or oil paints should not be placed on steel to be thus encased.



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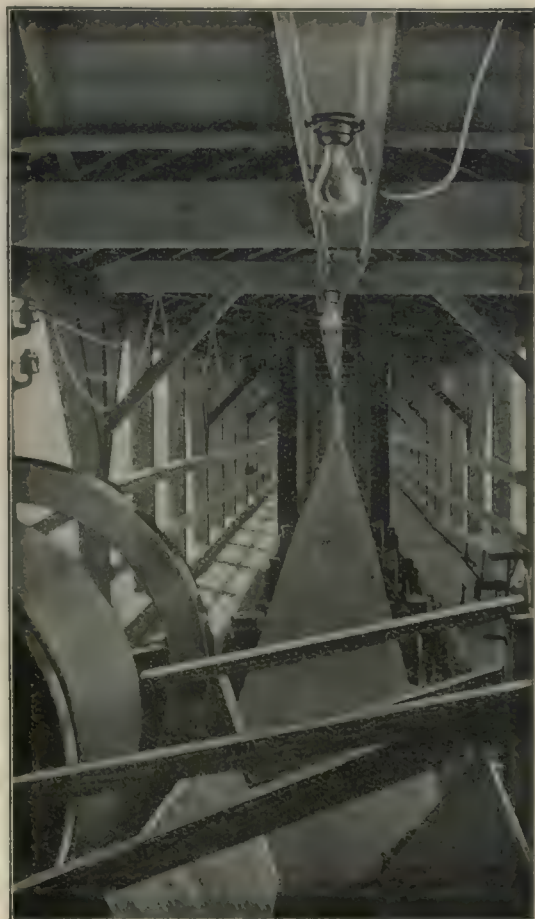
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Personal News and Notes

Mr. Willis McLachlan has been appointed city electrical engineer of London, Ont.

The corner stone of the Royal Alexandra Hospital at Edmonton was laid last week.

A Truro, N.S., dispatch records the death of Mr. K. W. Handy, a well known building contractor. The late Mr. Handy was born at Yarmouth, N.S., in 1846.

We regret to record the death of Alderman J. Z. Resther, the well known Montreal architect. The late Mr. Resther was born at St. Hyacinthe, Que., in March, 1867. He was



The late Mr. J. Z. Resther.

prominently identified with the Province of Quebec Association of Architects and the Royal Architectural Institute of Canada. He was elected vice-president of the latter body at the Second Annual Assembly in Toronto, in October, 1909.

The steamer Rupert City arrived at Vancouver, B.C., last week, from Portland with a consignment of 8,000 barrels of cement for the Wells Construction Company, Vancouver.

The building permits issued at Vancouver during the first half of November totalled one and one-half million dollars. This total includes a permit to Donnellan & Donnellan,

architects, for a 12-storey office building to cost \$650,000.

Mr. F. H. Tingley, C.E., who, for some time, has been connected with the engineering staff of the I.C.R., has resigned in order to accept a position with the public works department at St. John, N.B.

The National Trades and Labor Council, of Toronto, suggest now that the civic building by-law is up for discussion, the question providing better regulations governing the erection and inspection of scaffolding should be taken up. A recommendation to this effect will be sent to the city council.

Mr. Henry Holgate, of the firm of Ross & Holgate, consulting engineers, Montreal, was a recent visitor to Halifax, N.S. Mr. Holgate considers that the streets of Halifax compare favorably with those of any other city in the Dominion, and that the various kinds of paving material used show excellent judgment on the part of the city engineer, Mr. F. W. W. Doane.

Important additions to the Royal Alexandra Hotel, Winnipeg, are contemplated by the G.P.R. In this connection Mr. A. E. Anderson, representing Messrs. E. & W. S. Maxwell, of Montreal, and Mr. E. C. Shankland, consulting engineer, of Chicago, had a conference last week. At the time of writing no decision had been reached.

Mr. F. P. Jones, general manager of the Canada Cement Co., denies the statement recently published by the Toronto press, that there is a shortage of cement. He states that at no time this year has the company had less than 325,000 barrels of cement in stock. The only delay has been caused by shortage of cars. At the present time he says that the company has 400,000 barrels of cement on hand and that the production just now is away ahead of the demand. A large quantity will be carried over into next year. The mills at Belleville and Lakefield, Ont., were not operated owing entirely to the lack of demand.

Mr. Pocock, manager of the London Concrete Machinery Company, Limited, was honorably acquitted at London, Ont., last week on a charge of having detained a posted letter addressed to the Ideal Concrete Machinery Co., of that city. It appears that a Toronto man had been negotiating with the latter concern for a concrete mixer, for which he issued a cheque for \$75. The letter was sent by mistake to Mr. Pocock's company. Mr. Pocock called up the Toronto customer by telephone and both thought they were on the right terms. The court held that there was not the slightest evidence of any wrong doing on Mr. Pocock's part, and that if there were any responsibility for the mistake it rested with the purchaser. Mr. Pocock is an alderman of the city of London, and is regarded with the utmost confidence in the building world, with which he has a large connection.

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Clay Products

The merits and claims of clay products are so universally recognised and the possibilities of the industry are so great that no apology is necessary for the publication of a number devoted exclusively to this field. In an article contributed to this issue, Professor Gillespie writes: "Begun in prehistoric days when primitive man fashioned the clay and baked it in the sun; developed and improved with the accumulated experience of succeeding ages and perfected in recent times through the investigations of the ceramist and the chemist, the brick-maker's art commands a respect and possesses a prestige analogous to that which attaches to an old and honorable family. The product has been tested and proved through use in all ages, and for it there will always be a demand."

By a broader application this includes the whole field of clay working. New uses may be found for other materials and doubtless we shall live to see many innovations in concrete and other forms of construction, but clay products will go on forever; the earliest constructive material, it will probably be the last. It will be instructive to consider the condition of this ancient and honorable industry.

To begin with brick, the progressive manufacturer is making a continuous effort to produce the best article for the least money. Any good man in the business will acknowledge that this is essential. So far, so good. But there is another thing that must be regarded as essential, and that is educational publicity. The trade is fully alive to the merits of brick. But what about the public? The brick manufacturers are scattered and what they do, they do individually. It has been well said that brick dealers would be better advised to seek to increase the general use of brick by endeavoring to get the business of the nine people out of ten who favor some other material than by devoting their attention exclusively to the one who intends to use brick.

Examples of what may be accomplished in the way of publicity are plentiful but they do not emanate, to any great extent, from the manufacturers of clay products. Why should not they have an annual exhibition, the best of its kind that money and brains can provide? The funds are surely obtainable and there are certainly enough intelligent men in the industry to organize a thing of this kind. The one thing lacking is enthusiasm, and this is indispensable to success.

We would emphasize the necessity of the manufacturer's keeping uppermost in his mind the improvement of his product. The industry collectively suffers for every low grade article turned out by the individual. If the undisputed excellence of clay products is to be used as the principal argument, it must not be weakened by the production of an inferior article. Eternal vigilance is essential. The manufacturer must watch the market closely, increase his output, cheapen his production and ever be alive to the latest trade developments—such as improved appliances. Clay products must be improved and the sphere of their adaptation widened. The interest of the architect, the engineer, the builder and the municipality must be stimulated by extending the scope of manufacture as regards texture, color and purpose. It is upon these things that the actual progress of the industry is dependent. Canadian manufacturers, generally, recognize this. To quote once more from Professor Gillespie's article: "They have shown a commendable enterprise in keeping pace with a progress that insists on an article, structurally and artistically the best that skill can produce. In these two particulars the products of our best Canadian plants are not surpassed in America."

In a short outline of the work of the Canadian Clay Products Manufacturers' Association, published elsewhere in this issue, we have discussed briefly the need for the establishment of a ceramic school. Extended comment is unnecessary. Suffice it to say that the manufacturers should make an insistent and determined effort to obtain the co-operation and assistance of the authorities, for the consummation of this project will mean much to the industry.

The Situation and Outlook

Nineteen hundred and ten has been a record year in building construction all over Canada. The demand for all lines has been well maintained throughout the season, and the year is closing with the market steady and in excellent shape for 1911. There is a noteworthy demand for the higher grades of pressed brick, the prices of which are being well maintained. People are becoming educated up to the possibilities of the material, and a gratifying tendency to use the best that money can buy is increasingly evident. A feature of the market is the manner in which porous terra cotta for fire-proofing is coming into favor with the architects. The demand for common brick has been heavy and insistent all the season. No accumulated stocks are to be found, even with the advent of winter.

The extensive paving operations, new sewerage systems and the erection of many notable public and commercial structures have resulted in general activity in the industry. A perusal of our Contracts Department will disclose the fact that many important public improvements are contemplated. These will involve the use of all kinds of brick, sewer pipe, roofing and building tile, and various specialties. Every indication points to a record breaking season for manufacturers next year. All branches of the industry are optimistic, and everywhere special preparations are being made to meet the growing demand.

Production, Export and Import

We are indebted to the Department of Mines for some interesting statistics relating to clay products. The figures for 1909 may be of additional value in view of the fact that

the report of the Department is still in press. Owing to the large number of manufacturers, and the indifference of many in answering circular inquiries, the statistics of production are more or less incomplete. The figures given represent actual sales. The material produced and held in stock until the end of the year was not recorded until disposed of.

According to the returns received, the total value of the clay products sold in 1909 was \$6,450,840, as compared with \$4,500,702 in 1908. The manner in which these totals are distributed is shown in the following table, which also contains a similar statement for 1907:

Production of Clay Products, 1907, 1908 and 1909.

	1907.	1908.	Value 1908.
Bricks—			
Common	\$3,455,524	\$2,611,554	\$4,212,424
Pressed	794,722	517,180	630,677
Paving	72,354	59,456	67,408
Ornamental	47,288	18,535	8,866
Firebrick and fireclay shapes, etc.	131,322	110,302	78,132
Other clay bricks and blocks	89,389	170,211	113,886
Pottery	253,809	200,541	285,285
Sewer pipe	667,100	514,362	645,722
Tiles, drain	260,609	298,561	408,440
Totals	\$5,772,117	\$4,500,702	\$6,450,840

The decrease shown for 1908 is the second in the ten-year period from 1900 to 1909, during which the advance recorded is more than 100 per cent. This will be seen from the following figures: 1899, \$2,988,099; 1900, \$3,195,105; 1901, \$3,382,706; 1902, \$3,625,489; 1903, \$4,034,289; 1904, \$3,841,560; 1905, \$4,709,842; 1906, \$5,072,635; 1907, \$5,772,117; 1908, \$4,500,702; 1909, \$6,450,840.

A noticeable feature in connection with the returns is the uniformity of the gains, this indicating the healthy progress of all branches of the industry.

Practically all our productions of clay find a market in Canada. The only export recorded is brick, the highest annual return being \$12,786 for 1902. In addition to our own production we import for our consumption a considerable value in clay products, including building and paving brick, tile and sewer pipe. The total imports for 1909 were \$815,033, as compared with \$1,079,556 for 1908. The decrease is significant perhaps of the increased opportunities for profitable buying of Canadian manufacturers. This is only natural, having in view the fact that during recent years important extensions have been made by most of our large plants and improved appliances added, these things resulting in the production of a better article in a greater quantity and at a decreased cost.

The value of the production of common and pressed building brick is shown by provinces for the years 1907 to 1909 in the next table:

Production of Common and Pressed Brick, 1907-09.

	1907.	1908.	1909.
Nova Scotia	\$110,338	\$56,064	\$114,795
New Brunswick	36,937	54,573	44,330
Quebec	715,922	601,874	690,918
Ontario	2,311,499	1,664,184	2,557,068
Manitoba	465,282	254,591	544,548
Saskatchewan	125,459	87,566	144,316
Alberta	353,672	240,336	441,606
British Columbia	131,137	169,546	305,520
Totals	\$4,250,246	\$3,128,734	\$4,843,101

The manufacture of paving brick is at present limited to Ontario. The returns for 1909 total \$67,408, the average price being about \$20. There is a duty of 20 per cent. on imported paving brick. During 1909 the quantity brought into Canada represented a value of \$101,187, compared with \$61,346 for 1908.

The value of the sewer pipe produced in 1909 showed an appreciable increase for 1908, the totals being \$645,722 and \$514,362 respectively. Contemporaneously with this increase may be noted a decrease in the value of imported drain tile and sewer pipe. The 1909 total for the latter products was \$106,399, compared with \$125,747 for the preceding year. Here the same argument is applicable: that the improved facilities for home manufacture are making foreign competition increasingly difficult.

The Work of the Geological Survey on Clays

AS one of the most important, from the industrial standpoint of all mineral products, clay has always received more or less attention from geological investigators. As a rule, however, the general public has so far failed to realize the prominent position clay takes in the mineral industry.

In the United States, remarkable for its enormous coal, oil, iron, copper, silver and other mineral industries, clay and clay products furnish 7 per cent. of the annual value of the entire mineral production (total mineral production say \$2,000,000,000, clay \$140,000,000), and it must be borne in mind that from the nature of the industry complete returns cannot be obtained. It is an industry that does not mature early in a new country, consequently, in Canada one would expect to find it occupying a comparatively subordinate position, yet it forms six per cent. of the annual value of the mineral products, exclusive of what is used in Portland cement.

The Geological Survey of Canada, from its organization in 1842, has given attention to Canadian clays. In the excellent volume, "Geology of Canada," published in 1863, summarizing the results of geological investigation to that date, much valuable information is given relative to the clays of Ontario and Quebec. In almost every report issued since that date some information regarding the distribution of the clays or shales of the district reported upon is to be found. In 1885, Dr. R. Chalmers, of the Survey, issued a report on the surface geology of New Brunswick, in which the occurrences of the clays figure prominently, and from that time forward his attention was devoted to the study of surface geology, including the distribution of the clays in the Maritime Provinces and Quebec. In 1905 and 1906, he was studying the surface geology of the Northwest Provinces and British Columbia, and, at the time of his death in 1908, he was preparing a work on the clays of Canada, in which would be compiled the information gathered up to this time on the subject. Owing to his death this project has, for the time being, necessarily been abandoned.

Mr. Joseph Keele, one of the younger members of the Geological Survey staff, was selected to take Dr. Chalmers' place as an expert on clays. Mr. Keele's experience in survey work had been varied, covering practically all parts of Canada, and the knowledge thus gained of the geology of the country formed a good foundation from which to specialize on clays. For the past two years, Mr. Keele has been working on clays under the guidance of Dr. Heinrich Ries, Professor of Economic Geology in Cornell University, the recognized authority on clays in America.

Last year Dr. Ries, assisted by Mr. Keele, studied the shales and clays of the Maritime Provinces. Their study embraces not only the occurrence of the clays in the field, but also exhaustive laboratory tests as to the qualities and industrial uses of the various materials found and collected. Dr. Ries' complete report of this work is now in press and will shortly be issued by the Geological Survey.

The work of Dr. Ries and Mr. Keele in the Maritime Provinces included not only an examination of the worked deposits, but also the unworked ones throughout the area studied. At all points where beds of a promising nature were found, they were carefully sampled so as to obtain an average lot for testing. These samples were then shipped to the laboratory for further examination. The tests included a determination of the plasticity, air shrinkage and tensile strength of the raw clay; its fusibility; and its fire shrinkage, color, and density at different temperatures.

These tests were made for the purpose of obtaining data that would be of value to the practical man.

The results of this work have demonstrated the fact that the provinces of Nova Scotia and New Brunswick contain a number of clay and shale deposits of value and interest to the clay worker.

The fertile resources of the two provinces should be mentioned separately.

Nova Scotia.

The investigation carried on by the Geological Survey has shown that the most important clays and shales are found in the coal measures, while second in importance are the deposits of surface clay. The former were examined with especial care.

In the Sydney field it was found that there are a number of clay and shale exposures outcropping along the shore line from the Big Bras d'Or to Cow Bay. In places, sandstones and shales occur in rapid succession, so that the one cannot be mined without the other, but at other points the shales are prominent. One type found on Cranberry Head, near Sydney Mines, approaches closely in its characters to those of a paving brick shale. A second type, a soft red, at times gritty shale, outcrops on the north shore west of the base of Cranberry Head, and forms an excellent brick material, being one of the best red burning materials in the region. This shale works up either wet or by dry press methods. The same shale type is found along the coast to the westward, and even in some other coal measure areas. In addition to these, several other occurrences of importance were noted. Of the coal-measure shales of the Sydney coal region, there are a number of deposits, although not of unlimited size, that might be used for common or red pressed brick. One at least (Cranberry Head) may serve for making paving brick. One buff burning clay (Toronto Mine), was found to occur under a coal seam. No true fire clays were found, although there were many rumors of their occurrence. These probably originated from the fact that it is a common custom among coal miners, to speak of every "under-clay" as a fire clay.

The Pictou coal field was found to contain more and heavier shale beds than the Sydney area, but they show a greater development in the central part of the region. Those occurring there are adapted to the manufacture of pressed brick, sewer pipe and flue linings, and some of them are among the most refractory clays found in the coal measures. The laboratory test showed that in some cases there was an appreciable difference in the refractoriness of shales occurring in neighboring beds. Near Westville a shale is mined which makes a hard buff brick.

Most of the shales in the Pictou field have to be carefully burned, because of their high carbon and sulphur contents. Important deposits of red and buff burning clays, suitable for pressed brick manufacture, were also found near Woodbern, on the northeastern edge of the area.

An important discovery was that of a very plastic, buff burning, fire clay, suitable for stoneware manufacture, overlying the 13-foot seam at Inverness, C.B. This deposit is traceable for some distance.

The most widely distributed materials are the surface clays, which are now used almost exclusively for common brick manufacture. A belt of these occurs in the Shubenacadie Valley, and another in the Annapolis Valley. They are smooth, highly plastic, red-burning clays, and, although utilized now only for

brick and drain tile, they could, in many cases, also be employed for common earthenware, art pottery, and perhaps even roofing tile and fireproofing.

Most remarkable of all, however, is a deposit of whitish and mottled clay found at Shubenacadie and in the Musquodoboit Valley, between Middle Musquodoboit and Elmsdale. The material is a very plastic, fire clay, often of good grade, and of a type used in the manufacture of fire brick, stoneware, and terra cotta. It is not worked at present, but with the development of transportation lines must become an important clay resource of the province.

New Brunswick.

The work of the Survey was confined to the eastern part of the province, but here some important results were obtained. Thus it was found that in the Grand Lake coal area, which is crossed by the new transcontinental railway, the coal areas are at several points associated with shale beds of some value. One from the Evans mine, near Salmon Bay, yielded especially good results, burning to a fine, buff, speckled product. Another fine shale, was that discovered from Flower Cove, which also burns to a buff product. Other good, but red burning shales, were found near Albert Mines in Albert County, and at Beersville, twelve miles southeast of Harcourt. All of these New Brunswick materials referred to are undeveloped, but should not remain so.

Western Work in 1910.

During the past season Dr. Ries and Mr. Keele have been investigating the clays and shales of the Northwest Provinces and British Columbia, and the results promise to be as important as those obtained in the Maritime Provinces. While a good beginning has been made along lines that will be most helpful to clay workers, the field in Canada is so vast that it will be years before anything like completeness can be attained, but the work is so important and the industry has such potentialities that the investigation will be pushed forward as vigorously and as rapidly as circumstances will permit.

The geological survey investigations in the West have covered in reconnaissance, the region between Winnipeg and the Pacific coast. In this area there are extensive deposits of surface clays, which are worked at a number of localities. In Manitoba, the Pierre shales, so widely distributed, should form an important source of supply, while the cretaceous and tertiary shales of Alberta already promise to become the basis of an important clay working industry. Fire clays are worked at Sumas Mountain, near Vancouver, and surface clays at several points near that city, as well as in the vicinity of Victoria.

At the present time pressed, hollow, and fire brick are imported in large quantities from the United States, but there is no apparent reason why many of these should not be manufactured in the Western provinces.

These later investigations will be made the basis of a detailed report, which will include tests of all the more important materials occurring in this western area.

When you shut down for the winter, instead of letting your machinery stand and rust, keep things alive by starting in early to make whatever repairs, alterations and additions are necessary to put you in excellent shape for the next season.

Reduce your kiln waste as much as you can without making the reduction cost more than you get out of it and then remember that crushed scraps of brick and burnt clay make an excellent road material, the next best thing to brick paving, in fact.

It is not only interesting to observe that for proper decoration concrete people must turn to clay products, but it is also worth while to note that in some of the best reinforced concrete buildings one finds them turning to hollow clay blocks for fireproof partition walls and for other fireproofing work.

Use of Brick in Municipal Construction

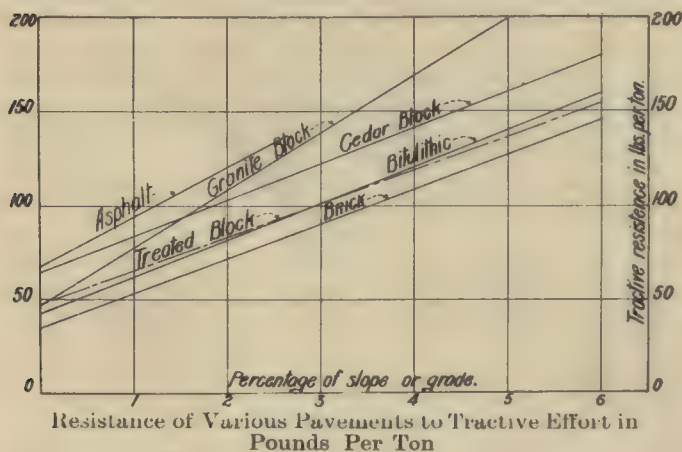
Various Advantages Outlined—Brick in Paving Work—Details of Various Tests—Conditions Favorable to Use of Brick in Sewer Construction

Specially Contributed by A. C. D. BLANCHARD, A.M.CAN.SOC.C.E., Toronto

In view of recent developments introducing a large number of comparatively new constructional materials, it becomes a matter of interest to consider briefly the status of brick among the most important of such materials, and to give a short resume of its uses and advantages in municipal construction.

In the first place, a little thought will show that brick, concrete and stone work are allied types of masonry, in which the common binder is cement mortar. It is not strange, therefore, that the field of one should encroach upon the bounds of the others, and that frequently each of the different types are used for identical purposes in different localities. The two influences causing such variations in usage are: first, the judgment of the designer, and second, local conditions.

It is safe to say that the merits of brick as a base of construction have not been laid before the public by any extensive campaign of advertising on the part of its manufacturers, excepting in one or two isolated instances. On the other hand,



during the past decade, a vast amount of literature has appeared in the technical press, newspapers and innumerable pamphlets and catalogues, setting forth the economy and advantages in general of concrete, plain, reinforced, and in the form of blocks, of patented paving materials; and of many other articles which are now being thrown on the market in ever-increasing numbers for many uses. It is only natural that these latter materials are cutting into the field formerly occupied by brick alone; yet, at the same time, owing to the tremendous expansion in business of the country, it is still difficult for the brick manufacturers, doing business at present, to keep pace with the demand for the best quality of brick for engineering work.

While it might be interesting to hazard the amount of increase in demand consequent upon the reduction of price of the article itself and of the skilled labor necessary for bricklaying, it is not the intention at present to discuss the economies of the subject, the law of supply and demand, or the effect of downward fluctuations in prices.

Brick in Pavements.

Probably the chief use of brick in municipal work is in the construction of pavements. In this connection it is easily reckoned one of the best, being durable, easily maintained and easily repaired. It offers a minimum resistance to traffic, more especially on streets which are approximately level and where the joints are sufficient to afford a firm foot-hold for horses.

It is not out of place at this stage to describe some experiments made by the writer two years ago, in order to show the different amounts of tractive effort required in hauling loads up various grades. Incidentally, these experiments offer an interesting comparison between the respective classes of paving surfaces which were used in the demonstration.

The information obtained formed the subject of a short paper read before the Canadian Society of Civil Engineers, and a diagram showing the results of the test is here reproduced, in order to illustrate the excellent position of brick pavements among its fellows. The experiments were made with a lorry hauled by two horses. The lorry and load together weighed over five and one-half tons.

The excellence of brick as a paving surface is well described by the city engineer of Toronto, in his last annual report, wherein he states that, "It is a great pity that more of this pavement could not be used, as it is one of the most satisfactory we have."

The usual method of laying a brick pavement is by spreading upon a concrete base a cushion of sand and laying the paving bricks as close together as practicable. The bricks should be laid with their lengths at right angles to the line of the street. The thickness of concrete base depends upon the probable traffic. After the bricks have been properly laid to grade for a short section, grout is poured into the joints.

In order to achieve good results, brick must be specially manufactured for pavement work. In some cases the ordinary standard shaped brick is used, giving a somewhat cheaper, though less efficient, pavement than the vitrified blocks. The blocks are somewhat larger than ordinary brick, being $3\frac{1}{2}$ inches wide, 4 inches deep and 8 to 9 inches long. Since joints are always a source of weakness, these blocks are more satisfactory from the standpoint of wear. It is usually found that under heavy traffic the joint wears slightly below the upper edge of the brick, and the brick is slowly broken down as far as the joint. The joint may disintegrate finally to a sufficient extent to cause a noticeable roughness, and the wearing process, though extremely slow, eventually tells on the life of the pavement. It follows, therefore, that in laying brick pavements, one of the chief features is the grouting; upon this depends the efficiency of each joint. A Portland cement grout is the best filler and should be applied with a scoop shovel dipped from the grout box. If any other method is used, such as tilting the box or flushing over a large area with a pail full of grout, the fine cement will carry the farthest and the joints nearest the box or pail will be filled mostly with sand, the result being patchy and imperfect. It is better to have a pavement of softer blocks with properly filled joints than to have blocks of the very best quality poorly jointed. A pitch or asphalt filler is sometimes used at street intersections where the traffic will not permit the time necessary to allow the proper setting of cement. Pitch filler is not so durable and requires more attention in summer as it becomes soft under the heat.

Such bricks as are used for pavement work require most rigid inspection. They must be thoroughly and evenly burned and must be of such density as to have the quality of absorbing an extremely small amount of water. Vitrification must be carefully obtained in order to leave the brick tough and free from unevenness in burning. Upon its qualities of toughness and absorption, the life of the pavement depends, for it is not

only subjected to the wear of heavy traffic, but must also withstand the demoralizing influence of frost.

Three tests are usually made on brick submitted for use in pavements, as follows:

(1) THE RATTLER OR ABRASION TEST.

This consists in placing a number of brick in a rotating receptacle, together with a specified amount of iron balls, or other weights. The rattler, which is standardized by the Brick-makers' Association, is revolved for a definite number of revolutions, and the brick are thrown against each other and struck by the weights. After the specified number of revolutions, the bricks are taken out and weighed. This process is extremely severe and only the best quality of brick will stand up under the test. The results of a number of tests are given in a succeeding paragraph.

(2) ABSORPTION TEST.

This test is made in various ways, but is usually performed by removing a large fragment from the centre of a brick. This fragment is first dried in an oven or retort until all water is expelled. It is then weighed and placed in a vessel containing water. At the end of a period of six to twelve hours the fragment is again weighed and is found to have taken up a certain amount of water. This amount is expressed in a percentage of the weight of the fragment and indicates the absorption of the brick.

(3) TRANSVERSE TEST.

This test is usually applied for paving brick or blocks, but is seldom used in connection with other work. It indicates the toughness of the brick, and is usually made by supporting the brick on its flat side on two knife edges six inches apart. A load is then applied centrally on the brick until the point of failure is reached.

Through the courtesy of Mr. F. G. Marriott, Engineer of Tests for the city of Toronto, I am able to supply herewith the average results of a large number of tests on paving brick of fifteen or twenty different brands.

ABSORPTION TEST—

Period of immersion, 6 hours.

Number of samples tested, 49.

Average gain in weight, 2.93 per cent.

ABRASION TEST—

Number of samples tested, 49.

Average loss in weight under 1,000 revolutions of rattler, 13.4 per cent.

Average loss under 2,000 revolutions, 21.6 per cent.

TRANSVERSE TEST—

Number of samples tested, 36.

Average size of blocks, 3½ inches by 4 inches by 9 2-3 inches.

Average breaking strength, 9,100 lbs.

Distance between supports, 6 inches.

The following statement shows the approximate cost of construction for several of the more important classes of pavements in Toronto.

The figures are, of course, approximate only, and depend largely on local conditions.

	Cost of Construction.	Nominal Life.
Pavement and foundations.		Years.
Asphalt (heavy), 6-in. concrete.....	\$2.00 to \$2.25	10
Asphalt (medium), 5-in. concrete.....	1.75 to 1.85	10
Asphalt (light), 4-in. concrete.....	1.40 to 1.60	10
Bitulithic, 4-in. concrete	2.12 to 2.25	10
Brick (heavy), 6-in. concrete.....	2.60	10
Brick (light), 4-in. concrete.....	2.40	10
Treated wood block, 6-in. concrete.....	4.00	10
Cedar blocks, sand	1.00	5
Granite block, 6-in. concrete.....	3.25	10
3-in. asphalt block, 4-in. concrete.....	3.30	10
4-in. asphalt block, 6-in. concrete.....	4.40	10

In considering the above figures it should be borne in mind that the repairs to the cheaper pavements are heavier than in the case of those more expensive, and that brick, when compared with other pavements, subjected to heavy traffic in business sections of large cities, stands most favorably in point of first cost and durability. Repairs are almost a negligible factor. Practically the only expense in maintaining the pavement is caused by tearing up the street for underground construction. The ease of making repairs in such case is a further recommendation in favor of brick.

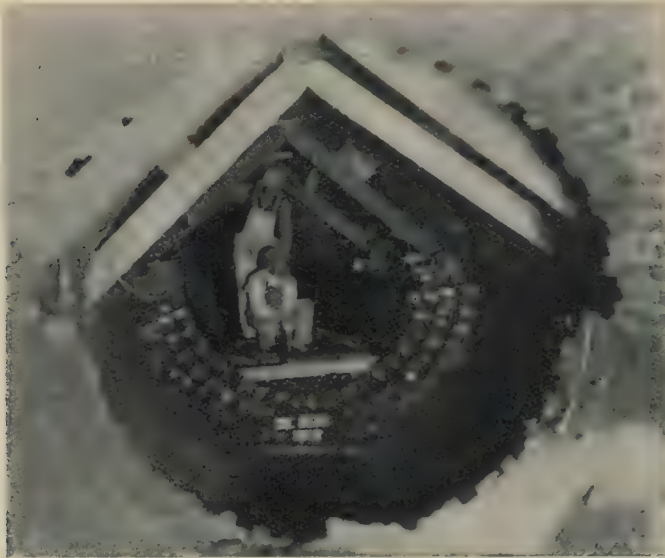
Brick in Sewers.

Present conditions indicate that a large quantity of brick is required for the construction of sewers in Canada. Practically all egg-shaped sewers which are used in sewerage systems for



The Four Stages in Laying a Brick Pavement : 1, Concrete Base; 2, Sand Cushion; 3, Placing Bricks; 4, Grouting.

combined flow, as well as circular shapes up to five and six feet in diameter, are constructed in brick. For sizes of sewers two feet and under in diameter, vitrified tile pipes have an almost undisputed field. Clay products thus fill the need pretty thoroughly in the usual sizes of sewers constructed for towns and cities. Moderate sized circular sewers are now being built, not only of brick, but of concrete, reinforced concrete and reinforced concrete pipes as well, and after the sizes reach five feet in diameter, the economy and convenience governing the use of brick or any other material may depend altogether on local conditions. It is plain that in these larger sizes, the cost of excavation diminishes in comparison with the cost of masonry, whereas in the smaller sizes, the character of the excavation practically governs the cost of the completed sewer. Where sewers are built in tunnel, especially in the smaller sizes where headroom is a consideration, brick comes to the front as the most suitable and adaptable material for ordinary conditions. Not only can a greater speed in construction be attained, but the operation of excavating and constructing the masonry of the sewer can go forward alternately in the tunnel heading without any loss of time. The centres supporting the brick arch can be removed practically as soon as the arch has been completely turned, and



Brick Sewer in Tunnel, Junction of Two Headings

connection between the heading and the shaft is maintained at all times. Soft ground, in fact all ground excepting solid rock, is apt to give trouble if left unsupported for even a few days. By the use of brick and by constructing the invert and arch for short distances at a time, most troubles in respect to bad roof are overcome, and frequently a large saving is effected in timbering.

Climatic conditions, especially in northern countries, are favorable to the selection of brick for constructing sewers in the winter, as much greater care must be taken in constructing and protecting a thin arch of concrete in the winter than in building a similar arch in brick. In very large sewers, say from seven to eight feet in diameter upward, concrete may perhaps be substituted to advantage in the arch and for backing behind the brick invert, where the work is done in open cut. This does not apply so readily with work done in tunnel.

Other Uses of Brick in Municipal Work.

There are many other uses to which brick is put in municipal improvements which have not been touched upon. The building of municipal conduits for service wires and pipes, the construction of manholes, the laying of sidewalks, all this must be taken into account, apart from the use of brick in municipal architecture.

Brick as a material for sidewalks and pavements, in fact,

wherever it can be seen, is both durable and aesthetic. If it is placed underground, removed from the possibility of ordinary inspection, providing it has been properly selected and placed, there is that confidence in its durability and efficiency which lightens the load of responsibility on the shoulders of the overburdened construction engineer and contractor.

Moving the Front of a Brick Building

A large building of the Federal Sugar Refining Company, at Yonkers, N.Y., stands so close to the right-of-way of the railroad that the front interfered with the recent location of the fourth track, and it was proposed to tear it down and rebuild a wall with one end in the same position and the other end about five feet transversely from the original position. The building has steel roof trusses and floor beams supported on steel columns built into piers of the brick face wall 92 feet long, 30 feet high and 20 inches thick. The wall was supported on a continuous concrete footing, and was divided into panels 16 feet 8 inches long, between the centres of the columns. In the centre of each panel there is a door 7 feet wide, and above it are two windows and a cornice, while a steel canopy is bracketed to the face of the wall below the windows and protects the doors.

It was at first proposed to tear the wall down and rebuild it in the position, making, as above stated, a slight angle with the original position and intersecting it at one end. Inside of this wall an interior partition, with doors and windows corresponding to those in the wall, was to be built parallel to the original position of the wall and about 7 feet from it. The contractor decided that it would be more advantageous to move the wall than to tear it down and rebuild it. This modification was acceptable to the owners, and, according to the Engineering Record, the work was carried out rapidly and successfully.

Continuous 12 x 12-inch horizontal sills at the surface of the ground were bolted together through the wall from end to end, and 12 x 12-inch vertical timbers 30 feet long were bolted to the face of the wall on each side of each door, the bolts passing through the brick work and engaging wooden bearing pieces on the inner face of the wall. Horizontal turnbuckle rods 1½ inch in diameter were passed through the feet of the vertical timbers, with nut and washer bearings on their outer faces, and their opposite ends were secured to the interior steel columns. Similar 1-inch rods engaged the upper ends of the vertical timbers and were secured to the tops of the interior steel columns. The interior partition was built, the ends of the floorbeams were supported on shores in the plane of the partition, and the beams were cut off just beyond it and were provided with connection holes to fit the lugs of the columns, and the short ends were removed.

The new concrete footing was built in the required position for the new face of the building, one end of it intersecting the old wall and the other end being about 5 feet distant from it on centres. Horizontal concrete bridges or girders about 20 inches wide were built between the old and the new footings at the base of each column and midway between these points. Small holes were cut through the old footings just below the base plates of the column pedestals, and in them were placed horizontal 8 x ½-inch steel track plates, greased on top, seated on the concrete bridges and extending across the tops of the new concrete footings. Corresponding holes were cut through the brickwork in the centre of each panel, and similar track plates were placed in them on the concrete bridging with short bearing plates between them and the brickwork. The plates were wedged up to bearing and grouted underneath. After the grout had set the brickwork was cut through horizontally between the plates at the top of the concrete footings, thus throwing the entire weight of the wall on the sliding plates and providing a slight clearance between the footing and the brickwork. A horizontal piano wire was stretched tightly from end to end of the wall about 3 feet above the surface of the ground, and when all was in readiness the turnbuckles in the horizontal

rods were operated by one or two men at each, and the wall was easily moved over to position on the new footing, being virtually revolved about a vertical pivot where the old and new footings intersected. Alignment was maintained by watching the piano wire and not permitting the wall to be pulled more than 1-8 inch away from it, while the verticality was easily checked by plumb bars. The upper part of the wall was fitted by 2 x 4-inch struts wedged up against the turnbuckle rods and shifted as necessary.

The work was done without interfering with the business carried on in the building and without obstructing the doorways through which heavy trucking was in constant progress. Sliding platforms or bridges were provided at each doorway, resting upon the floor in the interior of the building and on the moving door sill, and protected hand rails on each side. These offered no obstruction to the movement of the wall, and permitted the trucks to pass back and forth without interruption. The wall was moved from the old to the new position without any injury and without causing any cracks or breaking any glass. The movement of the wall required only about 4 hours, and it is estimated that this method of executing the work effected a large economy over the cost that would have been incurred by removing and rebuilding the wall.

The Use of Brick in Government Buildings

Turning back to 1867, the year of Confederation, we learn that the few buildings then the property of the Dominion consisted principally of stone structures, with a small number of brick buildings and less of wood. The Parliament Houses at Toronto and Quebec, the Government House at Quebec, the Toronto Custom House and the Port Dalhousie Custom House were of brick, the Parliament House at Quebec being of fire brick and the others of local brick. A number of buildings like the old post office at Toronto—later the Inland Revenue Offices—were brick on flanks and rear with stone fronts. In the Maritime Provinces none of the buildings acquired by the Dominion Government through the union of the provinces were brick, until the entry of Prince Edward Island into the Confederation, when the court house and post office, a brick building covered with stucco, became the property of the Government and which, when destroyed by fire in 1884, was replaced by the present elegant brick structure.

As the confederated provinces grew, the new buildings were principally of stone although some prominent examples such as the Toronto Examining Warehouse and Toronto Post Office were of brick. In the early days of Manitoba the Winnipeg post office, custom house, lands office and Lieutenant-Governor's residence at Winnipeg were of brick, as was the penitentiary at Stony Mountain; while in later days the examining warehouse, immigration hall and Fort Osborne barracks were of like material.

The Lieutenant-Governor's residence at Regina and the penitentiaries at Prince Albert, Sask., and New Westminster, B.C., are of brick.

All the most important of the armouries or drill halls, with the exception of those at Montreal, Quebec, Kingston, and Brockville—which are stone—are built of brick. Among the number are those at Toronto, London, Stratford, Brantford, Guelph, Ottawa, Peterboro, Regina, Sherbrooke, St. Johns (P.Q.), Three Rivers and Victoria. The Military Colleges at London, Ont., and St. Johns, P.Q., are of brick.

A large number of the post office and Customs buildings in the smaller cities, towns and villages are of brick, many of them being of an ambitious character. Some of the most important are those at Charlottetown, P.E.I., Sarnia, Ont., Bowmanville, Ont., Brantford, Ont., Stratford, Ont., Peterborough, Ont., St. Johns, P.Q., and Lewis, P.Q.

Brick Paving at St. Catharines, Ont.

Contributed by MR. D. BENZIE, City Engineer.

The city of St. Catharines commenced the laying of permanent pavements in 1906. The material adopted for the first pavement laid was vitrified brick. The size of the brick used in pavement work in St. Catharines is 8½ inches long by 3½ inches wide by 3⅞ inches deep. The area of brick pavements laid in the city is 26,000 square yards. In 1906 the area laid was 17,000 square yards. Since then 9,000 square yards have been put down. The total area laid represents approximately one and one-half miles of brick paved streets.



St. James Street, St. Catharines, Ont.

All the brick pavements have been put down on business streets subject to very heavy traffic and up to the present time, with few exceptions, very little sign of wear is apparent, showing clearly that vitrified brick is an excellent material for this class of work. Of course it is essential that the very best brick should be used. The brick must be hard, tough, dense and impervious to water.

The bricks are laid on a concrete foundation 5 inches thick, and a sand cushion 1 inch thick, and the joints run in with a strong cement grout. Along the curb line is an



William Street, St. Catharines, Ont.

expansion joint of asphalt, the width of joint being governed by the width of pavement. The usual width of joint is from 1 to 1½ inches.

The prices paid for brick pavements laid in St. Catharines, exclusive of excavation, with construction as above described, ranged from \$2.17 per square yard in 1906, to \$2.07 per square yard in 1909.

Western Clays, a syndicate of Edmonton business men, has been organized to develop the brick clay deposits at Strathcona. The construction of the necessary buildings is being pushed forward expeditiously. The machinery for the plant is being brought from England. The company expect to find a big market for terra cotta.

The Ideal Paving for Streets and Highways

Vitrified Brick: Its Durability, Economy and Attractive Appearance —Details of Construction—Noteworthy Examples of Successful Use

Specially contributed by W. P. BLAIR, Secretary National Paving Brick Manufacturers' Association

Not more so in other countries than in Canada is the subject of streets and highways discussed in its various phases and relationship to the public. Their utility, their economy in construction and maintenance, their comfort and satisfaction to the user, are phases receiving serious consideration, and more so now than at any time in the past. There was a time when mere convenience demanded immediate relief in some kind of street or highway that would answer merely for the occasion, but the demand of the present time must, to a very great extent, take into consideration the wants of the future.

The problems of road building have nowhere kept pace with the advancement of civilization in almost all other lines. It is true that the states of eastern Europe have had a system of maintenance, regardless of original construction, that has afforded in case of the much-used thoroughfares fairly satisfactory conditions, but in Canada and the United States the uses to which our streets and roads were subjected have been entirely revolutionized in the past ten years. There seems to be a universal insistence that larger and heavier loads shall be carried.

With highways it is the same as with railroads. It seems that yesterday a forty or fifty thousand pound capacity car was regarded as sufficient, but to-day such cars are being eliminated from use and eighty and one hundred thousand pound cars are taking their place. And so it is with the traffic upon our streets and roads. The advent of the automobile has had something to do with this. Trucks hauling from seven to fifteen tons are being exploited by automobile manufacturers, and accepted with avidity by commercial interests. With this situation confronting us, the demand is simply to build roads for the loads. In no other way is it possible to meet the advance of our commercialism. By what, then, and how shall this demand be met, from economical and financial standpoints? If any community has worked out a reasonable solution of this question, the manner and method by which such solution was accomplished, no matter where, should attract serious attention from all parties concerned. Probably no other place has met with such success in this particular as Cleveland, Ohio, and the adjacent country.

The material with which Cleveland's streets and roads are surfaced is vitrified brick. It is true that in such central states as Ohio, Indiana and Illinois ninety per cent. of all the pavements are laid with vitrified brick, but Cleveland, Ohio, and the vicinity afford a more noteworthy example of ideal roadway construction of vitrified brick than any other place in the world. Many of these streets and highways have been in use from ten to fifteen years, subjected to average and heavy traffic, without the expenditure of one single penny for repair. They are in such a state of preservation that their present value would reasonably be appraised at from ninety to ninety-five cents on the dollar.

Cities and communities following the example of Cleveland

will find that new roads can be built with the funds that would otherwise be expended for maintenance. The cost of a road must always be reckoned by the expenditure for its original construction, to which must be added that which is expended for maintenance. If no maintenance charge is necessary, then the cost of a road is simply the original charge for its construction.

In what way has Cleveland furnished such a worthy example for imitation? First she has selected the material that is conceded to be the most durable for the wearing surface of her streets and roads. She has then seen to it that the brick road was so constructed that it should give to the brick the greatest advantage in resisting the wear and tear of travel. A strict adherence to certain simple rules were followed. Where natural drainage was not afforded the roadbed was carefully drained. Where the natural foundation of sand or gravel was

not found, an artificial one of broken stone or concrete, finished to a smooth surface, was supplied. Upon this uniform surface was placed a compressed bed of 2-inch sand. Upon this sand cushion was laid, on edge a good quality of vitrified brick, sometimes of one size and sometimes of another. These were compressed, by a roller weighing not more than five tons, into this sand cushion, bringing them to level surface. The interstices of the brick were filled with a one to one mixture of Portland cement and sand. This mixture was applied so that this proportion



Brick paved street in Cleveland residential district

of sand and cement was maintained in place—that is to say, the sand and cement were in equal proportion throughout every inch of the work. The details of construction were those laid down in the directions for construction published for free distribution by the National Paving Brick Manufacturers' Association of the United States. These directions followed carefully in detail will enable any other city to secure like results.

There are many instances where the cost of streets and roads, and that of their maintenance, exceeds the value of the property abutting the same. This is an economical condition that the tax-paying public must get as far away from as is possible. That such relief is to be found in the use of vitrified brick for paving purposes has been demonstrated beyond question. It cannot be regarded as experimental. The question has been fully and completely solved.

A striking example may be found in the construction and use of the Indianapolis motor speedway, a celebrated track built for racing purposes. In the first place, the promoters of the track had it constructed of bituminous macadam, and in the very first series of races after its construction the track was rutted and torn by the severe use to which it was subjected. Accident after accident followed, and seven people were killed. The Cleveland ideas of brick street construction were then adopted, and the great racing track, two and one-half miles in circumference and fifty feet in width, was constructed of vitrified brick. Race after

race has followed. Record after record has been broken. The track has been subjected to the most severe tests and no accident has occurred during the race. The speedway remains intact, promising great durability unmeasured by years of use.

Nor are the foregoing all the advantages to be found in a properly constructed vitrified brick street. It originates no dust; no contamination of the soil underneath is possible from the offal to which the street is subject, and it is easy to clean. To its durability, comfort in use, and perfect sanitary condition must be added another advantage that should never be lost sight of in street construction:—its beauty. Nowhere in the world is to be found a residential district adorned with more beautiful streets than Wade Park, Cleveland.

All this is not suggestive theory, but facts as they exist, furnishing evidence entirely sufficient to persuade the investment of any large sum. Thousands of dollars of public money are be-

sion Cushion," "The Filler."

Unusual clearness is given these comprehensive directions by illustrations showing every step of the process. There are full-page photographic views showing work in actual progress. All those engaged in laying vitrified brick pavement, or interested in brick pavement, or pavement of any description, for that matter, should secure a copy of this valuable booklet.

Rattler Tests on Paving Brick

At the recent convention of the American Society of Municipal Improvements, Prof. Orton, of the University of Ohio, Columbus, O., gave a very interesting talk descriptive of some work designed to standardize rattler tests on paving brick. This work is being carried on in two independent series of carefully planned tests being made by Prof. Orton at Columbus, and by



Construction of Brick Pavement—Applying the Filler

ing expended in streets and roads every year. Why not take advantage of the best investment?

Directions for Laying Brick Pavements

Directions for laying vitrified brick pavements have been printed in pamphlet form by the National Paving Brick Manufacturers' Association and may be obtained upon application to the secretary, Mr. W. P. Blair, Board of Trade Building, Indianapolis, Ind.

These directions, while comprehensive, covering every step in the process of constructing a high-grade brick pavement, are clear, simple and direct, thus preventing all chances of mistake. They include directions under the following heads: "Substructure or Grading," "Curbing," "Marginal Curb," "Foundation," "No. 2 Paving Block Foundation," "Sand Cushion," "Brick," "Brick Laying," "Rolling and Tamping," "Expan-

the National Paving Brick Manufacturers' Association at Indianapolis. So far as is humanly possible, the conditions surrounding the two sets of tests are absolutely identical. The two rattlers are identical in design and construction; a liberal number of brick is chosen from the product of various kilns and divided into two equal parts and sent half to one laboratory and half to the other.

On the first series of tests it happened that one of the laboratories started in before the other. Notwithstanding the identical test conditions which it was supposed had been established, the results were widely divergent. It turned out on investigation that at the Indianapolis laboratory shot from a local foundry had been used on this first series of tests, instead of awaiting the arrival of the Indianapolis portion of the joint order for both rattlers. After the tests had been started up again, with shot from the same foundry, further divergences resulted, and on looking into the matter it was found that the foundry had not

followed the specifications for the iron for the cubical and spherical shot—one being harder than the other. The lesson to be drawn from this experience is that minute attention must be given to every detail surrounding rattler tests of paving brick, in order to ensure comparable results. It may be added that the reason for entering upon this extensive series of tests was that since the standard rattler test of the Paving Brick Manufacturers' Association was adopted, some years ago, considerable complaint has been made that the results obtained in different places were not at all comparable.

Studies are being made to determine the best sort of material for rattler staves. To this end there are now being tried staves made of cast-iron, of channel-iron lined with steel, of manganese-steel and of three thicknesses of steel plates: $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ -inch.

Before the tests were concluded, they will run into thousands in number and several carloads of brick from many manufacturers will be tested. Only one product will be used until a

The Two Big Bills

Specially Contributed by J. A. Riddell de Cobb

BRICK WORKS, like all other industries, come generally under one of three classes: First there is the large corporation, backed with ample capital, directed by clear-headed business men and managed by practical and technical officers. Second, there is the smaller company, generally comprised of a group of men who, having other callings and a few hundred dollars each with which they are anxious to take a "flier," have credit enough at the local bank to give them what they consider a start. The management in this case is generally entrusted to some man whom one of the shareholders knows "to know all the tricks," or else to one of themselves, who perhaps has spare time on his hands, is a good fellow, and, having made a success of some other line, is admitted to have head enough to "run a brick-yard." Under this



Construction of Brick Pavement—Applying the Filler, Finishing coat

given series is run out. The revolution speed of the rattler will be kept uniform within a very slight variation. It is hoped that altogether the irregularities in the rattler, the shot, etc., can be so reduced as to bring everything within 1 per cent. of variation from uniformity.

Prof. Orton remarked that if brick will stand "the rattler test," he cares nothing about the cross-breaking or absorption tests. It was brought out in the discussion that the standard brick specifications adopted last winter by the organization of city officials which met at Chicago, eliminated all tests except the rattler test and the absorption test.

The name of the Brandon Brick & Lumber Co., Ltd., (manufacturers of sand lime brick) has been changed to the Brandon Sand-stone Brick Co., Ltd.

class might also be included those men who have chosen brick-making for their calling, and the sons or creditors of the third class, who are tired of the "old man's" methods—or rather lack of them.

The third class is made up of the cross-roads farmer brick-maker, who "runs" work just as his predecessors have done for generations—works the farm week about with the yard—votes the way his father and grandfather did, knows the whole thing, and manages some way or other to keep the interest on his mortgage paid.

The first class, managed by the experts, do not need general help—their officers attend conventions, study trade papers, compare notes and watch for improvements. The third class would scornfully refuse it. But the parties of the second part need such help, are looking for it and deeply appreciate it.

But they all have two big bills—Labor and Fuel. The total of these items causes nearly all managers to break the third commandment, and the municipal ordinance against profane language. It is a hard thing to see a superintendent, who has a reputation as a class leader, jumping on his hat and trying to swear in iambic tetrameters. The labor problem is the result of changing conditions. "The same old gang" that used to be depended on year after year, who knew their job, and whose weaknesses were so well known that they could be provided for, have disappeared, and are being replaced largely by immigrants and floaters. Many of these never consider either their own or their employer's interests and seem incapable of appreciating the fact that the one embodies the other. Arranging gangs for piece work is out of the question in some localities, owing to the irregular and careless habits of the available labor. A yard foreman cannot possibly move from one place to the other quickly enough to keep the gang going either steadily or correctly. In trying to do so, he uses so much foot energy that he has no opportunity to study his work intelligently.

Value of Sub-foremen

The change in conditions has come so rapidly that the ordinary superintendent has had no chance to adapt himself to them, but the astute managers of large industries have a system that is worthy of every brickmaker's consideration—viz., the uses of sub-foremen or straw-bosses. It may be applied first in the clay pit by selecting the best digger and giving him an advance of about ten per cent. to keep the rest busy and to follow the foreman's directions. The foreman may then visit his bank once through the morning and once through the afternoon, lay out his benches and give this man instructions enough to carry on his work until his next visit. Then, if he comes on next morning and finds one or more men off, he can supply green hands (perhaps) and leave them to the pit boss. The same idea can be carried out by giving the moulder a "stripe," and further, by selecting a good hand at the kiln end.

Large yards necessarily have to have departmental heads, but the medium sized operator, who has always handled his yard piecework, or had a regular gang, cannot understand why he has to have several bosses, when a year or two ago he did not need any. However, it has its redeeming feature. It tends to the selection and building up of the best class of men and in these degenerate days of no-apprenticeship, it looks like the best way to provide capable men for the future.

While the fuel bill is not so large, it really appears larger, because it is not paid out like wages, but in large accounts. The place to start saving on this bill is at the power house, and the best way to start is by retaining a consulting engineer. Boiler insurance companies will insure a boiler for \$5,000 for three years for \$50, and generally speaking will give more than the value of the premium paid within three hours, if their advice is appreciated and intelligently followed. Yards of the first class depend on their chief engineer and would smile sweetly on any inspector who tried to give them a pointer. Most of them have another guess coming. The head engineer may be a very capable man, but very seldom has he had the chance to study the different plants that an inspector has had, or to gather up so many good points. The yards of the third class are either run by horse power, or by an ancient boiler and engine, coated with dirt and grease, leaking steam everywhere, and held together with hay-wire. The boss of this yard would not tolerate an inspector for an instant.

The Sphere of the Inspector

Yards of the second class are the ones that really appreciate the inspector. A good inspector has been known to effect a fuel saving of hundreds of dollars a year, with an expenditure of about five dollars—things too simple for the "chief" to see.

A power plant in a brickyard should be run without any sign of waste, either from the stack or exhaust pipe. Start with the boiler and find out which is the cheaper—wood or coal. In some parts of Northern Ontario soft coal costs from \$6 to \$7 per ton,

and even at that costs considerably less than wood. Should coal be decided on, buy the heat unit. A cord of sound dry maple is worth more than a cord of punky pine, and so is a ton of good coal better than a ton of cheap coal. And the difference of costs between the good and the bad coal is only a fraction of the difference between good and bad wood. Whichever you use, give some thought to getting the fuel to the boiler. If wood, use the trucks with detachable shafts; and if coal, use dump carts.

Next, take hold of the boiler and get information about the Dutch oven. It is worth considering. Build your boiler high enough (you can't build it too high), and if you are burning wood, use the V-shaped fire box, which by rolling the wood to a narrow grate, will in itself reduce your wood bill to an extent that will surprise you. If burning coal, use the coking system of firing, and start covering the grates by putting fire-brick flat along both sides and the back. Ninety per cent. of the fireboxes will stand this treatment. Take every opportunity to keep adding bricks, first the nine-inch way and then the four-inch way, until it is evident that this is being overdone. Then come back half a brick, and if the engineer is watching this movement intelligently he will have a much easier time and your fuel bills will be lighter.

Assuming that the yard has a good engineer, there will be no steam leaks, but it is safe betting there is a surplus of bends, bushings and other fittings that could profitably be dispensed with. The same engineer will have a well set up and quiet running engine, but the exhaust steam must be saved. If dryers are used, every particle can be condensed in the coils, and the live steam needed can be so regulated that it is all used. Watch the steam trap. The levelling of one recently raised the heat of a dryer over 20 degrees. Conduct the condensation from the trap to a receiver to which is connected the boiler feed pump, controlled by a float valve in the receiver. If properly set up, there should be no loss of exhaust steam, and the water can be fed into the boiler at times as high as 112 degrees.

Kiln fuel is a subject for kiln builders to discuss. No yard can expect to get out of the elementary stage without adopting a permanent system of kilns, and let the advocates of the different types show their saving.

Consulting Engineers for the Industry

It does seem a pity that the ceramic industry does not afford a consulting engineer—one who could advise how to work the banks, what kind of a machine best suits certain clays, the dryer most adaptable, and lastly the most profitable kiln to build. At present we are dependent on the agents of some of the other machinery firms, and although good fellows, they naturally have to secure orders for their own product. The average foreman is not competent to distinguish the good and bad points of machines and appliances he has never seen. Many thousands of dollars are thus wasted annually on installations which are not the best adapted for the work they have to do. The machine that is suitable to one stratum of clay may be a dismal failure in another. The same may be said of dryers and of kilns. As now situated, it is necessary to try out everything at heavy cost to learn its value.

A good man would save a lot to the industry, but his time is not yet. The big yard man knows it all, the small yard man's father knew it all, but the small investor generally finds out (after some years) that he knows nothing about it, and cannot get in touch with anyone who does. We look to see the time when there are enough yards of the second class in Canada to guarantee some capable man in opening an office.

The Citizens' Association of Montreal have sent a communication to the Board of Control urging a more efficient inspection of new buildings erected in the city.

Building permits for the year at Vancouver, B.C., will total 13 million dollars, according to the prediction of Building Inspector Jarrett of that city. The twelve-million mark has already been reached.

Brick Masonry in the Light of Recent Tests

Commendable Enterprise of Canadian Manufacturers—Results of Experiments Made in the Laboratory—The Need for a Revision of the Building Code Exemplified

Specially Contributed by Peter Gillespie, Department of Applied Mechanics, University of Toronto

Few, if any, of the constructive arts have a more venerable history than that of brick making. Begun in prehistoric days when primitive man fashioned the clay and baked it in the sun; developed and improved with the accumulated experience of succeeding ages and perfected in recent times through the investigations of the ceramist and the chemist, the brick-maker's art commands a respect and possesses a prestige analogous to that which attaches to an old and honorable family. The product has been tested and proved through use in all ages and for it there will always be a demand. Especially have Canadian manufacturers shown a commendable enterprise in keeping pace with a progress that insists on an article, structurally and artistically, the best that skill can produce. In these two particulars, the products of our best Canadian plants are not surpassed in America, and, in this expanding period of Canada's history, the outlook is particularly bright. For the further development of this and related industries, a school of ceramics would be of invaluable assistance, and it is hoped that steps, already taken, looking toward its establishment, will not have been in vain.

There have been conducted in the testing laboratory of the Faculty of Applied Mechanics of the University of Toronto during recent years, a large number of crushing tests on brick and brick piers. In the case of the latter, the age, the mortar jointing, the quality of bricks and the height have been various and, in consequence, the results show the influence of a large number of variables. These results and others that are available, have been examined with a view to reaching some generalizations regarding the strength of brick masonry and the permissible stresses to which it may be subjected. The results of some of these experiments are appended.

The physical tests ordinarily conducted on brick in a laboratory are the crushing test, the cross-breaking test, the rattler test and the absorption test. The two first mentioned enable us to judge the fitness of the brick to resist direct and bending stresses, the third is intended to be a criterion of its capacity for wear and abrasion and the last a measure of its hardness, its durability and the completeness of the burning. The modulus of rupture, as found from the cross-breaking test, while determining neither the tensile nor compressive strength, is doubtless a function of both and a means of comparing classes and individual bricks. As in all granular materials, the modulus of rupture, numerically, lies between the tensile and compressive strengths. That there is some relation between the porosity and the crushing strength is generally conceded, for when the absorption is high the strength is likely to be low. The truth of this statement is evidenced from the following table of results taken from the report of Tests of Material collected at the Louisiana Purchase Exposition, St. Louis, Mo., 1904.

Brick	Absorption.	Strength pds. per sq. in.
Dark buff	6.2%	8,620
Common red	13.9%	4,700
Light red, face	20.4%	3,050
Dark red, paver	3.5%	11,990
Light gray, sand lime	13.2%	5,280

That there are glaring exceptions to this general rule is proven by an examination of almost any considerable number of results of tests on the resistance of brick to compression. Of the tests enumerated above, the crushing is probably the most frequently made. The strength is quite variable, running from

1,000 pds. per square inch for inferior clay bricks, to 16,000 pds. per square inch for vitrified pavers, ordinary clay bricks averaging 2,000 pds. per square inch. Mr. James Howard reported in the Proceedings of the American Society for Testing Materials, a test conducted by him at the Watertown Arsenal, in which the crushing strength exceeded 38,000 pds. per square inch. The brick was a vitrified shale manufactured by the St. Louis Vitrified and Fire Brick Company. Our concern in the present article is, however, largely with brick masonry and those things which contribute to its strength. Next to the brick itself is the quality of the jointing. A strong mortar employed with weak bricks, or weak mortar employed with strong bricks, is an unwise combination where strength of masonry is a *'sine qua non.'* Of the two, the latter is of more frequent occurrence. The ideal condition would occur with a mortar jointing whose elastic properties and crushing strength are identical with those of the brick. The structure would then be a homogeneous monolith, with the exception that it would have transverse planes of weakness. The condition, however, is probably never attained and in the general case the strength and rigidity of the brick are of small importance since the mortar is the weaker member. The following table of results from the Watertown Arsenal Report for 1904, shows that the strength of a pier may sometimes be as great as 45 per cent. of the strength of the brick, but ordinarily is much less than that. The influence of the ratio of height to diameter was probably present in the tests recorded. The piers were 12 inches by 12 inches by 8 feet high. Three kinds of mortar were employed, viz., neat Portland cement, a cement and sand mortar, and a cement and lime mortar.

Pier.	Jointing.	Age.	Strength of Pier, pds. per square in.	Strength of Brick, pds. per square in.	Strength of Pier in terms of Strength of Brick.
Face, dry-pressed	Neat Cement	1 mo.	2,880	9,490	.30
do	1 C: 3 S	6 mo.	2,400	9,490	.25
do	1 L: 3 S	6 mo.	1,517	9,490	.16
Face, repressed	Neat Cement	6 mo.	1,925	6,780	.28
do	1 C: 3 S	6 mo.	1,925	6,780	.28
do	1 C: 3 S	6 mo.	1,670	6,780	.24
do	1 L: 3 S	6 mo.	1,260	6,780	.18
Face, wire cut	Neat Cement	6 mo.	4,021	13,720	.29
do	1 C: 2 S	1 mo.	2,410	13,720	.18
do	1 L: 3 S	6 mo.	1,420	13,720	.10
Hard, W. Cambridge	Neat Cement	1 mo.	4,700	10,490	.45
do	1 C: 3 S	1 mo.	1,800	10,490	.17
do	1 L: 3 S	6 mo.	994	10,490	.09
Light Hard					
W. Cambridge	Neat Cement	1 mo.	1,510	7,090	.21
do	1 C: 3 S	6 mo.	1,519	7,090	.21
do	1 L: 3 S	6 mo.	732	7,090	.10
do	1 L: 3 S	5 mo.	809	7,090	.11
Hard,					
East Brookfield	Neat Cement	6 mo.	1,969	4,840	.40
do	1 C: 3 S	6 mo.	1,800	4,840	.37
do	1 L: 3 S	6 mo.	733	4,840	.15
do	1 L: 3 S	5 mo.	866	4,840	.18
Light Hard,					
East Brookfield	Neat Cement	6 mo.	1,061	4,470	.24
do	1 C: 3 S	6 mo.	1,224	4,470	.27
do	1 L: 3 S	1 mo.	465	4,470	.10
Hard, Mechanicsville	Neat Cement	6 mo.	1,400	5,810	.24
do	1 C: 3 S	6 mo.	1,411	5,810	.24
do	1 L: 3 S	6 mo.	718	5,810	.12

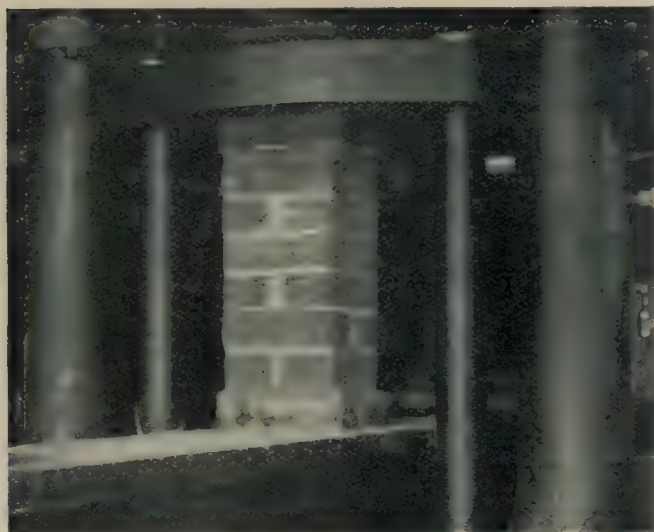
From the above, we obtain the following averages:

Strength of pier in terms of strength of brick:—

When laid in neat cement.....	30 per cent.
When laid in cement mortar.....	25 per cent.
When laid in lime mortar.....	13 per cent.

The manner of failure, shown in the accompanying photograph, is typical. At first, longitudinal rupture of the pier always occurs, occasioning the transverse splitting of the individual bricks. This shows that the tensile strength of the brick is really of very much importance.

There was published in the Transactions of the Association of Civil Engineers, Cornell University, 1900, the results of a series of tests made on brick piers 13 inches square and 80 inches in height, the jointing being a 1:2 cement mortar. It was shown that a wire netting laid in every horizontal joint increased the crushing strength of the pier 53 per cent, and when laid in every second joint, only 10 per cent. Iron straps in every fourth, sixth and eighth joint reduced the strength from 17 to 20 per cent. With solid steel plates in every fourth joint, the strength was reduced 7 per cent. The surprising thing about it all is the simplicity of the most efficient method.



Brick Pier Before Testing

A comparison of costs for piers similarly laid is interesting. Brick work laid with $\frac{3}{8}$ -inch to $\frac{1}{2}$ -inch joints requires $\frac{1}{3}$ cubic yard of mortar per cubic yard of masonry. If we assume lime at 30 cents per hundred pounds, sand at 50 cents per cubic yard, cement at \$1.50 per barrel, and labor at current rates, we will find the prices of mortar to be substantially as follows:

Lime one, sand three.....	\$1.75 per cu. yd.
Cement one, sand three.....	3.93 per cu. yd.
Neat cement	11.60 per cu. yd.

If the cost of the lime-sand brickwork be assumed to be \$8.50 per cubic yard, that of cement-sand brickwork will be \$9.23, and of neat brickwork, \$11.78 per cubic yard. The relative costs will be

Brickwork laid in lime mortar, 109.
Brickwork laid in cement mortar, 109.
Brickwork laid in neat cement, 139.

From this, it would appear that for the prices assumed, an increase in cost of 9 per cent. through the use of Portland cement will give an increased strength of 92 per cent., and that from an increased outlay of 39 per cent. the strength is augmented to the extent of 131 per cent. These are ample returns indeed and if strength be a desideratum, the use of Portland cement in the mortar jointing is an economical method by which to secure it. Outside of experimental laboratories, neat cement mortar is almost never used. Moreover, mortars high in cement do not trowel as nicely as those containing lime. In cases where working stresses are low, and where water is not likely to be en-

countered, the lime mortar jointing will commend itself, because of its cheapness.

From the tests on Canadian products, whose results are appended, it will be seen that the average crushing strength of brick masonry laid in lime mortar is 67 tons per square foot, and when laid in cement mortar, 122 tons per square foot. The Toronto building by-law gives as the permissible stress for

Kiln run brick laid in lime mortar, 3 tons per square foot.

Ordinary brick laid in cement mortar, 5 tons per square foot.

Hard brick laid in lime mortar, 6 tons per square foot.

On page 37, of the same code, the permissible load per square foot for different kinds of soil, is given as follows:

Gravel and coarse sand, well cemented.....	8 tons.
Dry hard clay	4 tons.
Sand, compact and well cemented	4 tons.

Apart altogether from the evidence of tests, does it not seem preposterous that a "well compacted sand" should be capable of sustaining more load per unit area than any kind of brick masonry however poor, or that a "well cemented gravel" should have a sustaining power of nearly three times that of the latter?



Brick Pier After Testing

The building codes of several American cities give the following as permissible stresses in tons per square foot for brick masonry:

	Boston	Buffalo	New York	Chicago	St. Louis	Philadelphia	Denver	Toronto	Montreal	San Francisco	Baltimore	Minneapolis
Hard Burned Brick Laid in												
Portland Cem. Mor..	18	15	12 1/2	15				12	15	15	18	15
Cement Mor. & Lime	12	11 1/2		11 1/2	12			9	12	10	11 1/2	11 1/2
Lime Mortar ..	8	6	8	6 1/2	11	8	8	6	8	7	8	8

In the light of tests and the precedents of other cities, Toronto's code relative to the stresses on brick masonry could be, with profit, revised. It may not frequently occur that the permissible stresses in the masonry will be the governing factor in the dimensioning of the structure, but when such is the case, the discrimination against this material is most unfair.

Below are given results of a few tests on piers, conducted in the testing laboratory of the Faculty of Applied Science at the University of Toronto during the past few years, referred to elsewhere.

Pier No. 1:

Description—The pier in question was tested in December, 1904. It consists of Kingston Road brick, best quality, built in 8 courses and laid in 3:1 cement mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{1}{2}$ inches by $8\frac{1}{2}$ inches—area 72.25 square inches.

Height, 2 feet.

Ultimate load, 184,150 pounds.

Crushing strength per square inch, 2,550 pounds.

Crushing strength per square foot, 183.5 tons.

Pier No. 2:

Description—This pier was tested in January, 1906. It consisted of Carlton 2nd class brick, built in 6 courses, laid in 2 : 1 lime mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{1}{2}$ inches by $8\frac{1}{2}$ inches—area 72.25 square inches.

Height, 16 inches.

Age, 6 years.

Ultimate load, 75,150 pounds.

Crushing strength per square inch, 1,040 pounds.

Crushing strength per square foot, 74.4 tons.

Pier No. 3:

Description—This pier was tested in January, 1906. It consisted of Kingston Road 2nd class brick, built in 5 courses, laid in 3 : 1 cement mortar. Joints $\frac{3}{8}$ inch.

Size, $8\frac{3}{4}$ inches by $8\frac{3}{4}$ inches—area, 76.56 square inches.

Height, 14 inches.

Age, 1 month.

Ultimate load, 117,200 pounds.

Crushing strength per square inch, 1,530 pounds.

Crushing strength per square foot, 109.4 tons.

Pier No. 4:

Description—The pier in question was tested in January, 1906. It consisted of Carlton brick, 2nd class, built in 6 courses and laid in 2 : 1 lime mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{1}{2}$ inches by $8\frac{1}{2}$ inches—Area, 72.25 square inches.

Height, 1 foot, 5 inches.

Age, 6 years (built in 1900).

Ultimate load, 75,000 pounds.

Crushing strength per square inch, 1,040 pounds.

Crushing strength per square foot, 74.9 tons.

Pier No. 5:

Description—The pier in question was tested in December, 1907. It consisted of Yorkville brick, 2nd class, built in 5 courses and laid in 2 : 1 lime mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{3}{4}$ inches by $8\frac{3}{4}$ inches—Area, 76.56 square inches.

Height, 1 foot $2\frac{1}{2}$ inches.

Age, 2 years.

Ultimate load, 106,000 pounds.

Crushing strength per square inch, 1,382 pounds.

Crushing strength per square foot, 99.5 tons.

Pier No. 6:

Description—This pier was tested in January, 1908. It consisted of Kingston Road 2nd class brick, built in 5 courses, laid in 3 : 1 cement mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{3}{4}$ inches by $8\frac{3}{4}$ inches—Area, 76.56 square inches.

Height, 1 foot, $2\frac{1}{2}$ inches.

Age, 2 years.

Ultimate load, 87,000 pounds.

Crushing strength per square inch, 1,140 pounds.

Crushing strength per square foot, 81.43 tons.

Pier No. 7:

Description—The pier in question was tested in January, 1908.

It consisted of 5 layers of Humber brick, 2nd class, laid in 2 : 1 lime mortar. The joints were $\frac{3}{8}$ inch thick.

Size, 9 inches by 9 inches—Area, 81 square inches.

Height, 1 foot, $2\frac{1}{2}$ inches.

Age, 2 years, 1 month.

Ultimate load, 43,000 pounds.

Crushing strength per square inch, 531 pounds.

Crushing strength per square foot, 38.2 tons.

Pier No. 8:

Description—This pier was tested in March, 1908. It consisted of Kingston Road 2nd class brick, built in 12 courses, laid in 2 : 1 lime mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{3}{4}$ inches by $8\frac{3}{4}$ inches—Area, 76.56 square inches

Height, 2 feet, 10 inches.

Age, 12 years.

Ultimate load, 67,200 pounds.

Crushing strength per square inch, 878 pounds.

Crushing strength per square foot, 62.71.

Pier No. 9:

Description—This pier was tested in March, 1908. It consisted of Carlton 1st class brick, built in 6 courses, laid in 3 : 1 cement mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{3}{4}$ inches by $8\frac{3}{4}$ inches—Area, 76.56 square inches.

Height, 1 foot, 4 inches.

Age, 2 years.

Ultimate load, 74,600 pounds.

Crushing strength per square inch, 2,281 pounds.

Crushing strength per square foot, 163.94 tons.

Pier No. 10:

Description—This pier was tested in March, 1908. It consisted of Don buff pressed brick, built in 4 courses, laid in 3 : 1 cement mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{3}{8}$ inches by $8\frac{3}{8}$ inches—Area, 74.4 square inches.

Height, 11 inches.

Age, 2 years.

Ultimate load, 75,000 pounds.

Crushing strength per square inch, 1,008 pounds.

Crushing strength per square foot, 72.00 tons.

Pier No. 11:

Description—This pier was tested in March, 1908. It consisted of Kingston Road 2nd class brick, built in 5 courses, laid in 2 : 1 lime mortar. The joints were $\frac{3}{8}$ inch thick.

Size, $8\frac{3}{4}$ inches by $8\frac{3}{4}$ inches—Area, 76.56 square inches.

Height, 14 inches.

Age, 2 years.

Ultimate load, 59,000 pounds.

Crushing strength per square inch, 772 pounds.

Crushing strength per square foot, 55.14 tons.

Efflorescence on Brick Work*

By A. F. Greaves-Walker†

COMPOSITION OF EFFLORESCENCE.—Wherever brick are used for building purposes, brick walls will be noted which are covered or partially covered with a film of scum. This scum is generally white, but may be yellow or green. It appears at its worst on red brick walls, but may be seen more or less plainly on brick of any color. When the walls are new it appears as white blotches at various places. Later it may come out all over the building, giving the brick work a faded or dirty appearance. In a few years a red brick building so affected will take on a faded pink appearance which will stay with it forever.

The scum is simply a film of soluble salts carried from the interior of the brick to the surface by the water which they absorb, and left there after it evaporates. The scumming is always worst near the eaves and downspouts, and under the window-sills and water table. This is caused by leakage of rainwater between the roof and trough and from the downspouts, and through the catching of the water by the sills and water table which consequently soaks into the brick beneath.

The scum is generally composed of sulphates, although it may be composed of any other soluble salt. Chlorides are found in seacoast clays and alkalies in clays of the Western arid region. In the clays of this country, the scum causing salts, in order of their abundance are: (1) calcium sulphate; (2) magnesium sulphate; (3) potassium sulphate; (4) sodium sulphate; (5) ferrous sulphate; (6) aluminum sulphate.

Often all of these occur in a single clay, especially if it has

* From a paper in the "Journal of Industrial and Engineering Chemistry" of the American Chemical Society.

† Salt Lake City.

been weathered and subjected to the attack of decomposing pyritiferous minerals.

CAUSES.—All of the above salts are very soluble except calcium sulphate, which is soluble 1 : 400. But this is great enough to completely ruin face brick in which it occurs, as the surface is small in comparison with the weight. This particular salt, in fact, is probably responsible for half the ruined walls in this country. The sulphates of soda, potash, and magnesia will often cause scum when present in the most minute quantities. As little as 0.01 per cent. of any one of these salts has been known to ruin face brick.

There are four ways in which salts are incorporated into the brick: (1) Soluble salts in the clays or other materials used; (2) soluble salts in the water used for tempering the clay; (3) soluble salts formed in kilns by oxidation of minerals in clay, or by reaction of sulphurous kiln gases on clay; (4) soluble salts introduced into brick after burning, principally from mortar.

A great majority of clays contain soluble salts, some large quantities, others but a trace. Surface clays are more likely to have a high content than the older deposits. Trouble is encountered in all parts of the world from this source, and probably 75 per cent. of the scumming comes from this cause.

Often materials are mixed with clays that carry soluble salts into them. Examples of this are the brick made around London, England, in which ashes are used to reduce shrinkage, and brick made along the Hudson, in which coal slack is used to aid in burning. In both of these cases the soluble salts in coal add to, if they do not entirely produce, the scum.

In the clays that vitrify, scumming can be overcome by burning them to a vitrified body, in which case the salts form silicates and become harmless.

The water used for mixing and tempering mud brick often contains soluble salts. This, of course, produces the same effect as if the clays contained them. Many good clays are injured in this way.

The formation of soluble sulphates in the kiln is a very common trouble. It is often encountered with clays that contain practically no troublesome ingredients before being fired. In many cases there is really no excuse for trouble at this stage. It is simply a case of ignorance on the part of the brickmaker or poorly designed kilns and stacks. When a kiln is set and the heating-up process is started, the ware contains considerable moisture. If good judgment is used and the fires are kept at such a stage that only so much of the moisture is being driven off as the sluggish draft of a cool stack will carry, trouble is not likely to occur; but if the moisture is driven off more rapidly than the stack can handle it, it is precipitated on the ware again, when it absorbs sulphur from the gases and forms sulphuric acid. This acid attacks the carbonates and other less soluble salts and forms soluble sulphates.

There is no doubt that considerable trouble is caused by the mortar in which the brick are laid. Poorly mixed mortar is dissolved by the rain water and the salts carried into the brick, only to be brought to the surface later. It is therefore always important to take great care with the mortar.

METHODS OF OVERCOMING SCUM.—Many methods are employed to overcome or prevent scum. It is possible to do this in nearly every case, but it is often impracticable on account of the low selling price of the ware. Where facing brick or other wares are made by the wet process or where the ware is vitrified there is practically no excuse for trouble.

The preliminary treatment is the principal method of overcoming or preventing scum. This is done by treating the clay or treating the water used.

TREATING THE CLAY.—Clays that contain soluble salts can be washed before using and the salts leached out. This may be done by treating piles of clay, after mining, with water and then allowing them to dry. This method is only possible

where high-priced ware is made. Clays are often allowed to stand in piles for from six months to a year, in which case the rain and snow do the same thing.

In many clays the above methods will only cause the trouble. This would be the case where a clay did not contain soluble salts originally, but upon exposure to the weather insoluble salts were converted into soluble salts. This would be the case with pyritiferous clays.

Chemical treatment is very often resorted to. This is accomplished in clays made up by the wet process, by adding, to the water used, such chemicals as will precipitate the soluble salts and form harmless by-products, such as barium sulphate. Barium salts are the favorites with which to accomplish this reaction, but others can be used; barium chloride and carbonate are most commonly used.

In case soluble sodium compounds are present, the addition of the above-mentioned barium salts would form either sodium carbonate or chloride, both of which are soluble. However, they are so soluble that they would be readily washed from the surface of the ware by the rain, as soon as they formed.

According to Gerlach, a clay containing 0.1 per cent. calcium sulphate, which is 0.4 gram per pound, would require 0.6 gram of barium carbonate to perform the reaction. However, 6 or 7 grams should be added to every pound of clay for safety. This would mean practically 100 pounds per 1,000 brick. If barium chloride is used, but 26 pounds, are required per 1,000 brick. However, when this is used, close to the theoretical amount must be added, for if added in excess it will form a scum itself.

This method cannot, of course, be used in the dry press process, where no water, or at least very little, is added, as the barium or other salts must be used in solution to do the required work.

TREATING THE WATER.—When it is necessary to use a water that contains injurious soluble salts, it is simply necessary to precipitate them before adding the water to the clay. Many good clays are being ruined by bad water, when it needs but a few hours of a chemist's time to rectify the trouble.

CORRECT DRYING.—If ware containing soluble salts is placed in a drier and allowed to sweat slowly, the chances are all in favor of scummed ware, whereas, if the water is carried away from the surface of the ware as fast as it appears this will not often be the case.

It is a remarkable physical fact, not yet fully explained, that where a clay contains soluble salts, they are not deposited on the surface at all, or at least to a less degree, where the drying is steady and rapid, than where it is slow and discontinuous. It seems that rapid drying causes the water to come through the pore channels of the clay as through a filter and a sort of osmosis is set up, by which the saline matters are retained inside the mass of clay, while the water escapes as vapor from the outside. But where the drying is slow the salts get through this barrier and arrive on the surface plentifully.

It is therefore only necessary that brickmakers, in order to avoid trouble from this source, build good driers and install in them hygrometers by which their operation can be controlled.

Many other methods are used to prevent this trouble; some of them, however, have but temporary effects. One of these is to paint the surface of the scummed ware with oil, which for the time being covers up the scum. This is really practising a fraud, for while the ware does not show scum when put into the building it shows up as soon as the oil evaporates.

Another method is to paint one surface of the unburned brick with a heavy oil or tar. This prevents evaporation from that surface, the salts being carried to the other surfaces. The oil or tar is burned off in the kiln, leaving a clean face. This, too, is only temporary unless the brick is vitrified, as otherwise the salts will be drawn to the clean surface after a few soakings.

Notes on the Clay Resources of Ontario

Unlimited Supplies of Red and White-Burning Clays in the Eastern and Western Portions of the Province Respectively—Comparative Analyses

Specially Contributed by M. B. Baker, Professor of Geology, School of Mining, Kingston, Ont.

In response to a request by the editor for a paper on the above topic, I submit a few observations made while preparing a report for the Bureau of Mines on "Clays and the Clay Products of Ontario."

I know of no raw building material that is now receiving more attention than is clay, since it lends itself to such a variety of uses. We might define "clay" popularly as follows: Clay is an earthy material which, when moistened, becomes plastic, and can then be moulded into any desired shape, which shape is preserved intact upon drying. Furthermore, if heated to redness, the substance fuses, and on cooling assumes a rock-like consistency. From this definition we see that clay has several essential qualities and cannot easily be confused with any other material.

If we wish, however, to define clay more specifically and to deduce its origin, we would say it is a hydrated silicate of aluminium, with the chemical formula $\text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$, and owes its origin chiefly to the decomposition of the mineral feldspar, which is such a common constituent of nearly all our igneous rocks. Clay is therefore strictly a decomposition product of rocks.

Deposits of pure clay, the direct results of rock decomposition, are practically unknown in Ontario, or in Canada for that matter; because very recently, geologically speaking, a series of glaciers, passing in a southwesterly direction over Ontario, removed, not only all the products of rock weathering, but also considerable thicknesses of the fresh rocks themselves. As a result of this action, enormous heaps of glacial products, varying from the largest blocks and masses of rock, to the very finest of rock flour, are found everywhere as our soil covering. Such mixed material is familiarly spoken of as boulder-clay (Fig. 1).

In many places this boulder-clay was deposited in the presence of water, which served to sort the materials to such an extent that we get beds of gravel, or sand, or clay, which are comparatively free from other materials. Such clay beds are suitable for the manufacture of clay products. The best known deposits of this character are the so-called blue-clay or hard-pan, with which most people are more or less familiar. It is usually called "Erie" clay because first studied along the north shore of Lake Erie and found to extend right across the country to Lake Huron.

If a line be drawn roughly from Prescott, on the St. Lawrence river, in a northwesterly direction through the towns of Perth, Ottawa and Arnprior, then, turning westward, through Pembroke, Bracebridge, Walkerton, to Lake Huron, it will divide Ontario into three areas, in which the surface clays will be distinctly different. In the southwestern area will be found the "Erie" clay with its weathered top layers, the "Red Top" clay. In the eastern area we will find the "Leda" clay, while in the whole of northern Ontario the "Saugeen" clay is abundantly distributed. These four clays with the compacted Paleozoic rock-shales yield all the clay products manufactured in Ontario.

The "Erie" clay, we have already seen, is that portion of the boulder-clay which has been laid in water, and was thereby sorted sufficiently free from gravel and sand to be used in the manufacture of clay products. I found this clay not only in the area already spoken of, but in every county south and west of the line above indicated. Erie clay is of a deep blue color when moistened, and an ashy gray color when dry; it is usually very "fat" or strong, and is rich in lime, carrying about 18 per cent. of CaO. This is sufficient to counteract as much as 7 per cent.

of iron oxides, and thereby causes the products to burn white instead of red. All the white brick, tile, pottery, or other white clay products, made in Ontario, are from this Erie clay. Any clay-user can easily detect the presence of this "lime" by simply moistening the clay with acid. If lime be present the clay will effervesce, or bubble up. Such clays will burn white, because ferrous compounds form on burning, and these are white to buff in color. There are enormous quantities of this Erie clay in Ontario. The supply, in fact, is inexhaustible.

What I have named "Red Top" clay is not a separate formation, but simply the weathered upper layers of the Erie clay. It is given a distinct name because it is an extremely important material to clay users in Ontario. Surface waters have a very solvent effect on the carbonate of calcium, the so-called "lime" found in clays. Such waters, therefore, by soaking through the Erie clays dissolve a large part of the "lime" and carry it away in solution. They act similarly on magnesium compounds, but to a much lesser degree. A glance at the analyses given below will show the effect of surface waters on Erie clays. In each case the "Red Top" clay was taken immediately above the "Erie" clay whose analysis is coupled with it.

Comparative Analyses of Erie and Red Top Clays*

Locality	Kind	Si O ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	(Na,K)O	Loss by heat	Loss of CaO
Ridgeway	Erie	39.82	12.69	4.67	15.56	3.72	3.19	18.82	
	Red Top	65.06	14.15	4.67	2.36	2.18	4.14	6.76	13.20
Exeter	Erie	37.72	10.72	3.51	16.90	7.05	3.06	21.76	
	Red Top	63.56	19.91	6.24	1.91	2.42	3.85	5.64	14.99
Stratford	Erie	46.16	13.76	5.58	15.74	3.78	2.70	17.48	
	Red Top	69.12	14.03	4.81	1.94	1.10	3.58	4.80	18.80
Waterloo	Erie	44.30	11.21	4.05	16.10	3.81	3.02	17.74	
	Red Top	68.06	14.18	6.13	1.34	1.98	3.42	4.86	14.76
Preston	Erie	51.30	9.80	3.70	13.63	3.82	3.91	13.88	
	Red Top	67.10	15.30	4.80	1.63	1.59	3.21	5.44	12.00
Beaverton	Erie	37.50	10.81	3.59	22.56	2.61	3.45	19.60	
	Red Top	59.96	19.58	5.86	2.62	2.30	4.05	5.00	19.94
Peterboro	Erie	47.50	13.66	4.44	15.58	0.80	4.42	12.94	
	Red Top	64.44	15.26	5.96	3.68	1.78	5.73	2.92	11.90
Picton	Erie	39.48	9.11	3.71	18.33	4.83	2.66	23.30	
	Red Top	59.48	14.80	5.38	4.60	3.32	4.70	6.82	13.73
Renfrew	Erie	50.06	14.58	4.78	14.00	3.47	4.10	9.76	
	Red Top	54.38	19.18	7.30	4.60	3.20	5.24	5.60	9.40
Prescott	Erie	49.85	13.10	6.18	14.32	3.13	4.14	10.28	
	Red Top	55.34	10.80	7.62	2.18	2.40	5.67	5.50	12.14

Our analyses show that the CaO is reduced from over 15 per cent. in the Erie clay, to under 3 per cent. in the Red Top. It no longer equals, much less exceeds, the percentage of iron oxides, consequently our products now burn to the ferric state, and this gives us the red color instead of the white or buff. I have already stated that the CaO is present in the form of the carbonate CaCO_3 . With the loss of CaO, we therefore have a similar loss of CO_2 , and we see this in the diminution in the amount of loss by ignition in the last column of analyses. The clays chosen for analyses are from sufficiently scattered parts of the province to show that this is a principle and not an accident. Wherever the Erie clay was found in the province, a layer of Red Top clay of some thickness was also found. Naturally, this varies greatly in thickness, which is rarely over four feet, except along a crack, a water-course, roots of trees or shrubs, etc.

Illustrations by courtesy of Bureau of Mines, Toronto

* Analyses by A. G. Burrows at Provincial Assay Office

It is easily seen on any clay-cut (fig. 2), and we can now understand why one and the same clay bank in southwestern Ontario will yield both red and white products. As the layer of weathered clay is rarely over three feet deep, we can also see that the supply of red-burning clay in what is usually called "Old Ontario" is extremely limited.

Turning now to the eastern part of Ontario, we have a small area extending from our Prescott-Ottawa line, to the boundaries of the province. The clay of this area appears to be identical with the Erie clay just described. In reality, however, it is quite different. It has the same slaty blue color, is very deep, has the same dense, strong character, and a typical weathered top layer, but even the fresh, unweathered clay here is very low in lime and magnesia, as the analyses below clearly show. This Leda clay, as it is named, will therefore burn to red colored products. This clay, of course, extends on eastward into the Province of Quebec, and there covers a great area. I have not

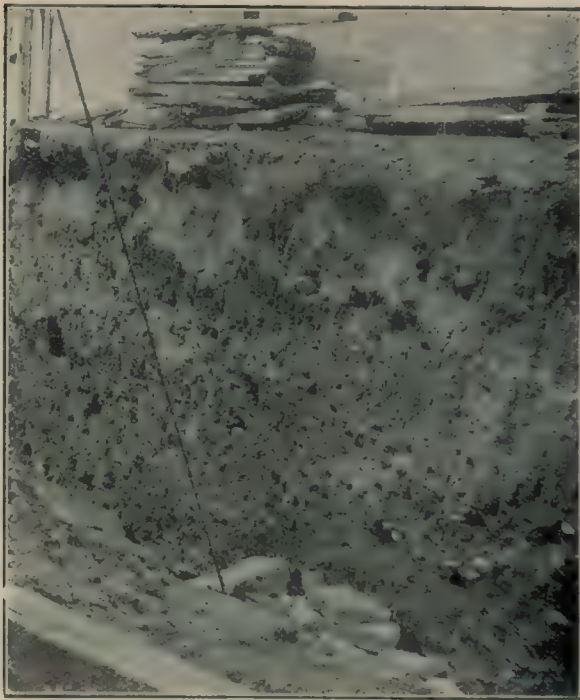


Fig. 1—A Deposit of Boulder Clay

included an illustration of Leda clay, as it would not differ in appearance from the Erie clay beds shown in figure 2.

Analyses of Leda and Saugeen Clays*

Locality	Kind	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	N ₂ K ₂ O	Loss by Ignition
Arnprior	Leda	57.98	19.00	6.18	3.78	3.82	5.68	3.18
5 miles East of Arnprior	Leda	62.06	15.54	5.70	4.91	3.11	4.30	4.01
Ottawa	Leda	56.00	17.07	8.27	4.17	4.55	4.38	4.89
Hull	Leda	52.86	17.42	5.58	3.69	3.37	4.97	5.65
Sault Ste. Marie	Saugeen	64.30	15.45	5.22	3.42	2.02	5.23	3.89
Spanish River	Saugeen	61.40	17.08	6.34	2.66	3.35	4.68	4.52
Sudbury	Saugeen	63.20	15.75	4.67	4.32	2.73	4.71	4.35
North Bay	Saugeen	64.08	17.21	5.40	3.34	2.75	4.91	3.90
New Liskeard	Saugeen	58.30	15.70	5.41	5.10	3.27	4.77	7.30
Bracebridge	Saugeen	63.00	15.15	6.28	3.48	2.67	5.75	3.63
Pembroke	Saugeen	62.30	16.51	5.63	3.16	2.68	4.91	3.60
Casselman	Saugeen	61.20	16.40	6.25	3.10	3.10	4.26	4.94

The remaining portion of the province, or that part lying north of the line from Ottawa to Lake Huron, has, on the surface, an entirely different clay, called the Saugeen. It lies unconformably on the Erie and Leda clays in the northern extension of their respective areas. I have seen this clay all the way

from Casselman to Winnipeg, and from the line described above to within seventy miles of James' Bay. It is, therefore, exposed over a greater area than either of the other clays mentioned. This Saugeen clay is composed of a great number of alternate bands of strong clay, with bands of fine sand or marl, in some cases. The individual bands are usually not over three-quarters of an inch in thickness, but occasionally reach three inches in

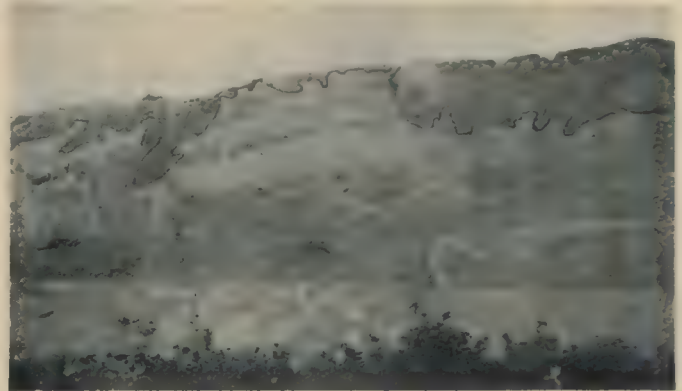


Fig. 2—A Bank of Erie Clay with its Typical Weathered Layer of Red Top Clay

depth. The result is a very striking section. (Fig. 3.) Such bands are repeated so often, however, that banks twenty feet or over in height have been formed.

Marl is simply another name for calcium carbonate, or "lime," as clay users call it; consequently where the light-colored bands are marl the percentage of CaO runs so high that the clay is not well suited to the manufacture of clay products. The color is neither a good red, nor yet a white, but a light pinkish shade. This marl, moreover, burns to ordinary lime, which causes the brick or other product to break up easily by slaking. As a rule, however, the light colored layers are fine sand, and this when tempered, or pugged with the strong clay bands, renders the whole mild, and eminently suitable for clay working, and the products are a good red color. The great "Clay Belt" of Northern Ontario is Saugeen, and it is these layers of sand which mix



Fig. 3—A Railway Cut in Saugeen Clay. Note the Alternate Bond of Clay and Sand (Lighter).

with the clay, to mild it down, and make it so suitable for agricultural purposes.

To sum up our resources of clay in Ontario then, I would say that in Western Ontario we have unlimited supplies of white-burning clay, but very limited supplies of red-burning. In Eastern Ontario we have unlimited supplies of red-burning clay, and practically no white. In Northern Ontario we have unlimited light red-burning clays and little or no white-burning.

*Analyses by A. G. Burrows, B. of M., at Provincial Assay Office 1906



House at Walkerville, Ont. —A Good Illustration of English Bond Brickwork with Heavy Mortar Joints—Architects: Albert Kahn and Ernest Wilby, Associated.

Possibilities of Brick for House Building

Of Interest Primarily to the Manufacturer— Essential to Cater for Varying Conditions— Study Architectural Requirements— Adaptability the Keynote to Success

By F. S. ATKINSON

Bricks have the advantage over almost any other material, and manufacturers should take their opportunity to adapt them to the new conditions of the trade. It is not sufficient to make simply the old bricks and rest content at that. The building trade is changing continually, and new materials, shapes and sizes of bricks are demanded to meet the requirements. One has but to note the improvements made in the last few years in architectural and structural terra cotta to see this. Terra cotta has come into universal use in our cities for outside and inside finish. The modern square blocks of cream-white terra cotta for clothing the outside steel framework of buildings proves more acceptable than stone or marble, and many noted illustrations of this adaptation of the material to a new use could be cited. The terra cotta blocks are lighter than stone or concrete, and when used on very tall buildings they reduce the load on the steel frames materially. Terra cotta flat tiles for domes, arches and stairways are also in considerable use in a number of our best buildings, and they are rapidly tending to supersede the iron and steel domes and stairways.

In regard to ornamental terra cotta one has but to study the newer buildings of large cities to note the remarkable adaptation of this material to a new use. It is lighter in weight than stone, more fireproof, and shows greater durability. It is not easily affected by weather conditions, and consequently requires less cleaning. It will retain its color and form indefinitely, and the front of a building thus ornamented is an imperishable product of the day. There is less danger of terra cotta ornaments getting loose from their moorings at great heights above the street level, and when anchored directly to the steel frames they could not be shaken off by an earthquake. The anchoring of terra cotta blocks for exterior use to the framework is also a work that makes this form of building of paramount value in earthquake countries. The blocks are anchored by embedding the iron rods in the material during the baking, and then twisting them to the iron frames.

Adaptability—Meet the Requirements.

The skill with which structural and ornamental terra cotta manufacturers have studied the architectural needs of the day and then adapted their material to meet the requirements may be taken as a sample of what many brick makers could do in their line. It is true that many brick concerns are to-day specializing on particular forms and shades of bricks in a highly commendable way. In hard burnt enameled bricks for both exterior and interior uses great strides have been made. Enameled bricks are in demand now for exterior ornamental use in connection with terra cotta. In several of the new buildings in New York several million enameled bricks have been used in this way. Their soft, shining surfaces add sufficient contrast to the terra cotta blocks to make the finish highly artistic. The facade of a modern building constructed of ornamental terra cotta and enameled bricks attracts general attention, and is superior in very many respects to more expensive marble and stone. In the first place, the materials retain their color and clean appearance much longer and do not require frequent cleaning.

Enameled bricks for tunnel use, railway stations, lavatories, grill rooms and kitchens, laboratories, slaughter houses, gymnasiums and baths have become within five years the most satisfactory material, and millions of the bricks are thus employed. Many of our first class cities insist upon subway tunnels being

lined with these bricks, and also all public baths and lavatories. The sanitary value of enameled bricks is also a point that is worth considering. In laboratories they are of special value where fumes of acids and chemicals will discolor stone, metal and wood. Manufacturers of enameled bricks have adapted their products to a great variety of uses, and with bricks selling at \$100 per thousand there is a constant demand for them. In the end they prove more satisfactory than inferior materials at half the cost.

The employment of bricks for mantels and fireplaces is another feature of the industry that has gained greatly in the last few years. The revival of the old brick fireplace is now popular among architects and builders. We have had wood mantels and marble and stone mantels until people are tired of their monotonous finish. Wood mantels, unless done in hard woods expensively carved, are very unsatisfactory. They have a cheap appearance and their durability is questionable. The heat of the fireplace or chimney invariably causes them to warp and crack within a short time. Hard woods, hand carved, are almost too expensive a luxury. Marble mantelpieces have the same disadvantage of cost, and also that of unpopularity.

The old fashioned brick fireplaces were pretty in their way and are being imitated in some instances. But the rough bricks used in them are not satisfactory for modern fireplaces. To obtain this the manufacturer of fireplace bricks should employ all the colors, shades and sizes within his means. Architects generally draw the designs they need for mantels and fireplaces, and experience has shown that these designs can be worked out better with bricks than any other material. The different sizes of bricks lend themselves better to such artistic development than any other articles. But it is a mistake to suppose that all has been accomplished in this direction. A short time ago our bricks and terra cotta were limited to a few plain colors, but to-day we have them produced in a great variety of shades. The first essential to the manufacture of fancy pressed bricks is the right kind of clay. A good many manufacturers have found clay beds of such striking color that their bricks have become popular from the outset. Just now there is a pretty thorough searching of the different parts of the country for clay beds which will show other new colors. Nearly every month the report of some new discovery of remarkable clay deposits is received, and new plants are established to work the deposits. A delicately tinted clay product that shows unusual colors of a durable nature when made in bricks is sure to have a commercial success.

Combination of Clay and Mineral.

But a feature of this work which has been neglected is the combination of various clays and mineral elements for the production of bricks of special beauty. This work is entirely in its infancy and requires skilful working. It is only occasionally that a clay bed of great extent can be found which yields a uniform color for fancy pressed brick. As an illustration, a New Jersey concern which popularized a fancy creamy white brick with a delicate shade of light blue running through it had all it could do to fill orders at high prices. The bricks were used for inside finishings of mantelpieces and fireplaces of colonial houses. Architects ordered the bricks so freely that the concern made money rapidly. Then the clay bed gave out and the color of the surrounding deposits was not nearly so effective. Complaints began to be received that the new bricks were not up to specifications. The coloring was not as ordered, and a fancy grade

of bricks began to lose standing. It was impossible to substitute other bricks for the old ones. The company looked in vain for other similar deposits, and then, in desperation, it sought to manufacture similar bricks out of a composition of several clays. This did not answer, and a chemist was called in, who,

after analyzing the composition of the old clay, proceeded to specify the mixing of clays and mineral ores. After considerable rather costly experiment, desirable results were obtained. Once more the company produced the right sort of bricks, and to-day they are used freely for interior fireplace construction.

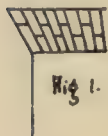
Brickwork—Some of its Uses and Abuses

Semi-circular Arch the most Successful Type—Errors of Construction in Other Forms—Some Examples of Satisfactory Work and Otherwise

Specially contributed by S. H. PENLINGTON, A.R.I.B.A., Toronto

The idea of the writer is to point out briefly some of the means employed in using bricks other than in piers, gable ends and walls.

The commonest use is certainly the arch, of which the semi-circular type is the most successful. Errors of construction, however, appear immediately when other forms are used. Take, for



instance, the gauged arch as in figure 1. Now this looks perfectly simple, but in practice it is usually built flat on the soffit, and with the jointing at right angles to the brick courses (fig. 2). The error of this is at once apparent in the sketch. The arch should be cambered about 1-8 inch per foot of span to correct the sagging appearance commonly noted in the flat arch, and it should be jointed as shown in sketch No. 1.

I have noticed in various buildings arches which are interesting from the point of view of brickwork misapplied. The most glaring example is a window arch, illustrated in fig. 3. It is perfectly patent that the bricks at the crown of the arch depend entirely upon the mortar joint and that they would not carry any weight. Another example of pretty work that is not practical is shown in fig. 4, the inner arch being supported by the brickwork below. This work is also full of triangular spaces which will hold a lot of moisture and which will be sure to make the wall damp inside. I have seen a combined gauged and semi-circular arch in use. This, of course, was carried on the window frame. The jointing needs no comment (fig. 5).

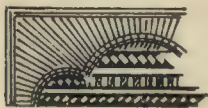


Fig 4.

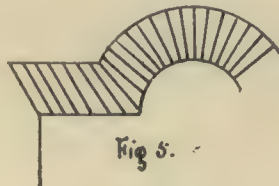


Fig 5.

An example from the Jarvis street Collegiate Institute, Toronto, is interesting as showing the correct application of arches, but bad filling of the spandrels (fig. 6). The main arch should not appear to run down and support itself on the small arches. The spandrels should have been bricked up horizontally, as shown in right side of sketch.

A very good example of the brick arch (fig. 7) employed in Gothic architecture is commonly seen. The pointed arch, being the stronger, takes the premier position of weight-carrying. The semi-circular arch, coming beneath, adds to the beauty of the design and leaves a convenient space for the application of ornament between the two arches.

The treatment of the gable is well seen in the Jarvis street collegiate institute, Toronto (fig. 8). This is typical of the churches in Lombardy and other Romanesque buildings where

brickwork was commonly used. A common brick gable typical of Norfolk cottages is seen in fig. 9. This raking construction of the coping is only applicable to gables where the weight is so small that sliding motion cannot take place. It is not recommended. The treatment shown in sketch No. 14 is to be preferred. Another brick gable treatment is shown in sketch No. 10, with the slates projecting beyond the face of the work. This is commonly done by laying the cornice raking in cement, but then, of course, the work depends entirely upon the cement to keep it in position, and not upon good brick work, as shown.

Brick corbels, panels and aprons are often effective when judiciously applied. There is the usual moulded apron done with rubber bricks and set in putty (fig. 11) or the square apron (fig. 12), which has little to recommend it. A plain panel set about half an inch, as shown in fig. 13, would be better. A brick corbel under the eaves or parapet wall is the common finish of the brick building. It is of great variety and



Fig 6.

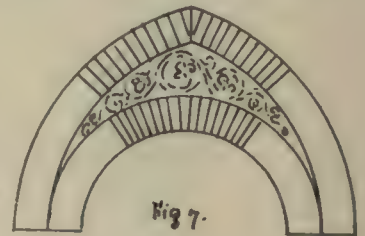


Fig 7.

is so simply done that few errors occur and further comment is unnecessary.

The chimney stack in old buildings is generally the most noticeable feature, particularly in the Elizabethan period. The structures are of good design, always being quite practical in their brickwork. Special bricks are used so as to get proper bond at the angles. An example I have in mind is one of three stalks (fig. 14). In all cases the bricks are flat-bedded and properly bonded, specials being used where necessary. A single stalk chimney, fig. 15, at the Church of Holy Trinity, Toronto, is an attempt to obtain the same effect without the necessary special bricks, the result being bad; although set in cement

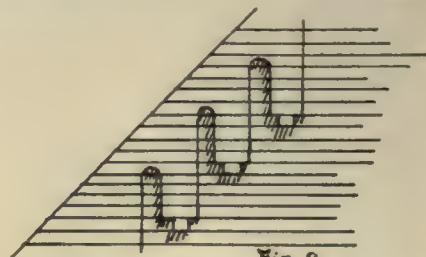
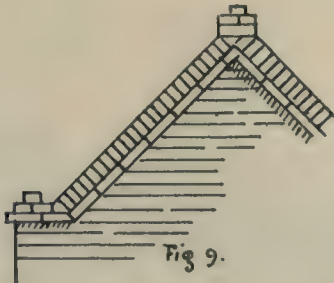


Fig 8.

mortar, two of the angle bricks have fallen out. The bricks are laid almost on end and it is one of the worst bits of construction I know. The church is only some sixty years old. The

Elizabethan chimney is 250 years old and is still in good condition. Adjoining this masterpiece is something equally bad. There is a raking battlement, fig. 16, wherein almost every brick would have to be cut. No bricklayer would ever be guilty of such work on his own account. Raking brickwork is never good, but added to this we get the splayed copings wherein every joint is twisted and small fillers have to be used at the angles, the cement alone holding the work together. The end of each battlement has to be rendered in cement to hide the bad work and keep the weather out. This alone tells the tale. Good work need never be hidden.

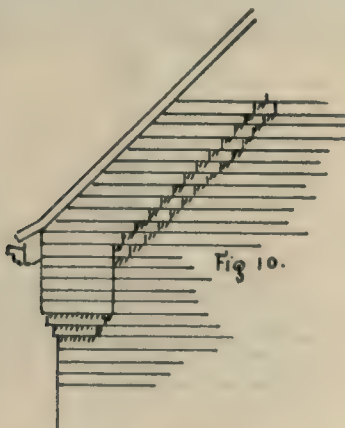
Now, the question arises: what is good brickwork? This is best answered by a brief consideration of the shapes and manufacture of bricks. Common bricks are made rectangular in



shape, of a size 3-inch x $4\frac{1}{2}$ -inch x 9-inch. They are made rough, or have a frog or panel impressed upon their $4\frac{1}{2}$ x 9 face. This is in order that they shall have a firm grip of the mortar and not tend to slide. This fact alone is quite sufficient to show that bricks are intended to be laid flat, and not raking. All bricks that are not flat bedded cannot be well laid.

The next point is that the 3 x 9 and 3 x $4\frac{1}{2}$ face of the brickwork is smooth. This is so that water or snow shall be kept out of the brickwork as much as possible. Therefore this face of the brick should always be exposed to the weather. It also follows that brickwork that is cut and exposed to the weather cannot be good—special bricks should be used.

Bricks are only intended to bear compressive strains, there-



fore they are quite properly used in arches—but here the beds are cut to the required wedge shape or voussoir, or the mortar takes up the irregularity of the jointing in big arches.

Good brickwork will always have straight joints of regular thickness. The vertical joints will come over one another. The work will be properly bonded in itself without the use of hoop iron or other reinforcement. Closers will be used at the angles to break the vertical joint into alternate courses. Any panels, mullions, sills, or enrichment must have specially made bricks. The result will then always be satisfactory, from both a structural and an artistic point of view.

STRAINS IN ROPES DUE TO SLACK.

An American engineer has recently been measuring the strains in hoisting and hauling ropes due to the slack in them, and particularly the bad effect of suddenly applying the load.

He found that when a load was suddenly applied to a rope with $2\frac{1}{2}$ -in. of slack the strain was 40 per cent. greater than

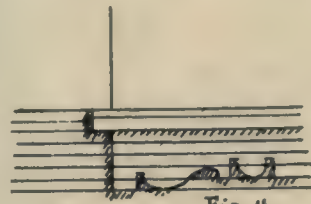


Fig 11.



Fig 12.

when the same load was applied gradually and the work done steadily. With 3-in. of slack the excess of stress was 65 per cent. greater, and with a slack of 6-in. the strain on the rope was equal to more than double the load. With a foot of slack the strain at starting was more than three times that with starting steadily with a taut rope.

Such sudden and excessive stresses are very bad for ropes

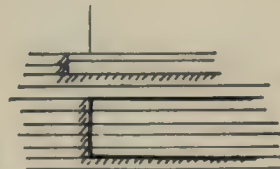


Fig 13.

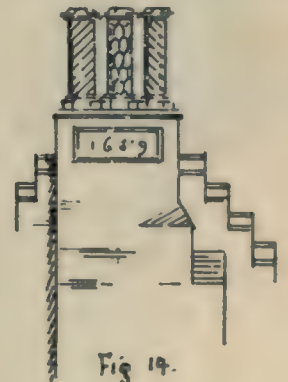


Fig 14.

and rapidly cause deterioration which shortens the life of the rope and tends to sudden and unexpected breakage.

The jerk can usually be avoided by a little care at the commencement of the haul or hoist, and by the use of powerful springs between the wagons and the rope. These latter are seldom (if ever) used in clayworks, and they are not really necessary if the man in charge of the hauling drum is made to

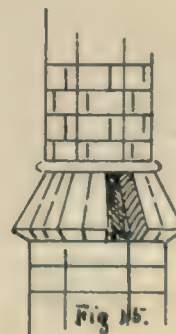


Fig 15.

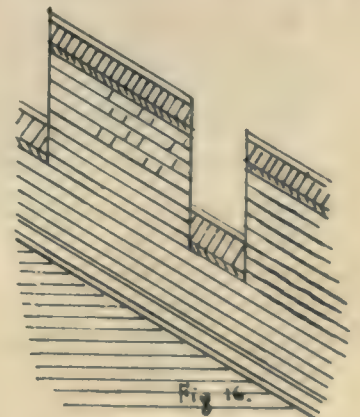


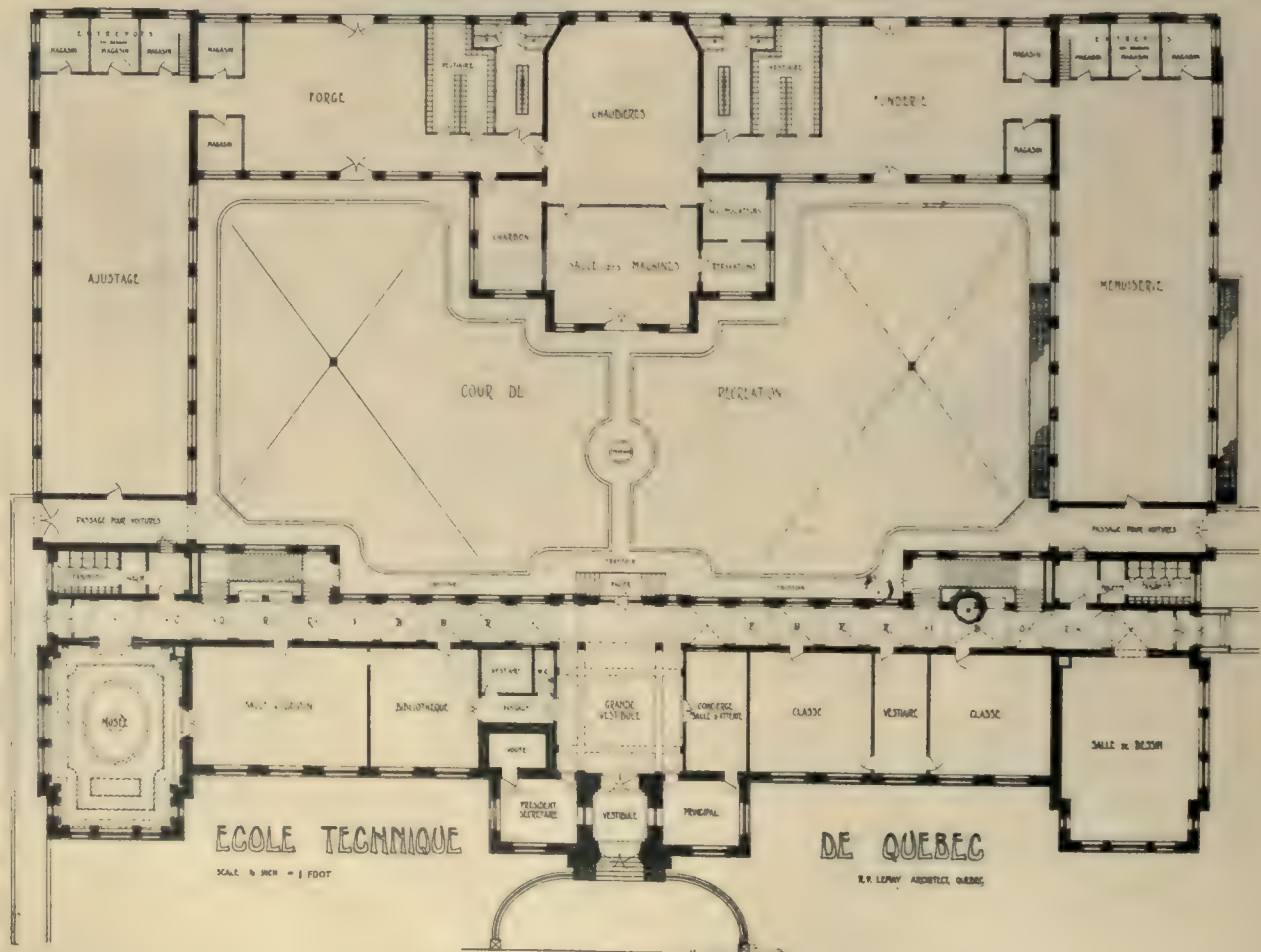
Fig 16.

wind slowly until the rope is taut, and to increase his speed as the rope takes up the load.

The advantage of endless chain haulage is that it enables the ropes to last longer because of the more even distribution of the weight and the steadier drive, it being difficult to put on the load with so violent a jerk as in direct haulage.

The Technical School at Quebec, now
under construction.

Architect : R. P. LEMAY, Quebec.
Contractors: Simoneau & Dion, Sherbrooke.



The New Technical School at Quebec

The Quebec Technical School, now under construction, is a particularly noteworthy example of the successful results obtained by the use of pressed brick in buildings of this class. The structure has a frontage of 252 feet and a depth of 176 feet and is being erected on strictly fireproof lines.

An interior open court separates the administration building and technical school proper from the shops. On the ground floor of the main building are located the respective offices of the principal, president and secretary, a museum, library, two commodious class rooms and a large draughting room.

The first storey contains a large academic hall and several good sized class rooms. The principal's apartments, also the janitor's rooms, are located in the second storey of each pavilion. The rear buildings will contain a large boiler and engine room, foundry, blacksmith shop and machine shop. Here also are situated the shops for shoe makers, joiners, carpenters, etc.

The putting in of the foundations to the level of the ground was carried out last fall in twenty days.

purposes, we use concrete or tile entirely. This season's tile sewer construction has been much less than usual. The construction of two or three large concrete trunk sewers has consumed most of the available funds."

The Bath Room and Clay Products

In considering the field of clay products, with a view to further extension here and there where the best opportunities present themselves, we are impressed with the idea that the bath room presents an excellent lot of opportunities for those making the line of products used or that may be used in this work, says a recent issue of the Clay Worker. This includes not only the bath tub and sanitary ware, but also tiling for walls and for the floors. The ideal bath room is one which may be made up almost exclusively of clay products, with the bare exception of the piping and metal work. It has been thoroughly demonstrated that, from a sanitary standpoint, nothing equals the enameled clay ware, and gradually a discriminating public is taking notice of this fact and is showing a favorable disposition to use it almost exclusively. Now, aside from the technical matters involved,



Constructional view of the New Technical School at Quebec

The basement of the main building is of granite from Portneuf, Que., a coarse granite of an attractive white gray color. The walls of the building are built of Laprairie red pressed brick with Deschambault limestone cornice and trimmings. A clock tower, 130 feet high, surmounts the main central part, this giving much relief and distinctiveness to the whole structure. The back buildings, reserved for shops and machinery, are also of red pressed brick. The whole space between the pilasters is given to the windows. The pilasters have granite base and cap. A feature of this building is that the arches of all windows are made of square brick. The floors in the main building are of two kinds; terra cotta reinforced, of the Faber system, and a portion of Ferra Lithic plates and concrete. The roof is of Multiplex sheets and concrete.

The whole building when completed will cost in the neighborhood of \$400,000. The architect is Mr. R. P. Lemay, of Quebec. Messrs. Simoneau & Dion, Sherbrooke, Que., are the general contractors.

The following extract from a letter received from Mr. H. S. Hancock, city engineer of Fort William, has some significance: "In view of the absence of a good local brick for sewer

one important point the trade should take into consideration is this: we are coming to the day when practically everything in the form of a home built in or near cities is to have a bath room, and the more pretentious home, instead of having just one commodious one, is moving toward the idea of one to almost every sleeping room. Moreover, it will extend further and builders of modest homes in the country will include a bath room as a part of their house. Some of the cities have already taken quite a strong stand in this matter, and are insisting that when new homes are built that they are properly equipped with bath rooms.

By and by we may see the day when there will be included in almost every city ordinance a requirement for bath rooms. With things tending this way one hardly needs a pencil and pad of paper to figure out what it means in the way of increased requirements for bath room material. Moreover, it would be almost impossible to figure it out specifically, but we can easily picture the needs multiplied almost a hundred times, and, therefore, this branch of the trade should present openings for further developments that will not only keep the present industries manufacturing such products hustling, but will make room for a number of new ones without in any way endangering the market.



The New Collegiate Institute at Regina

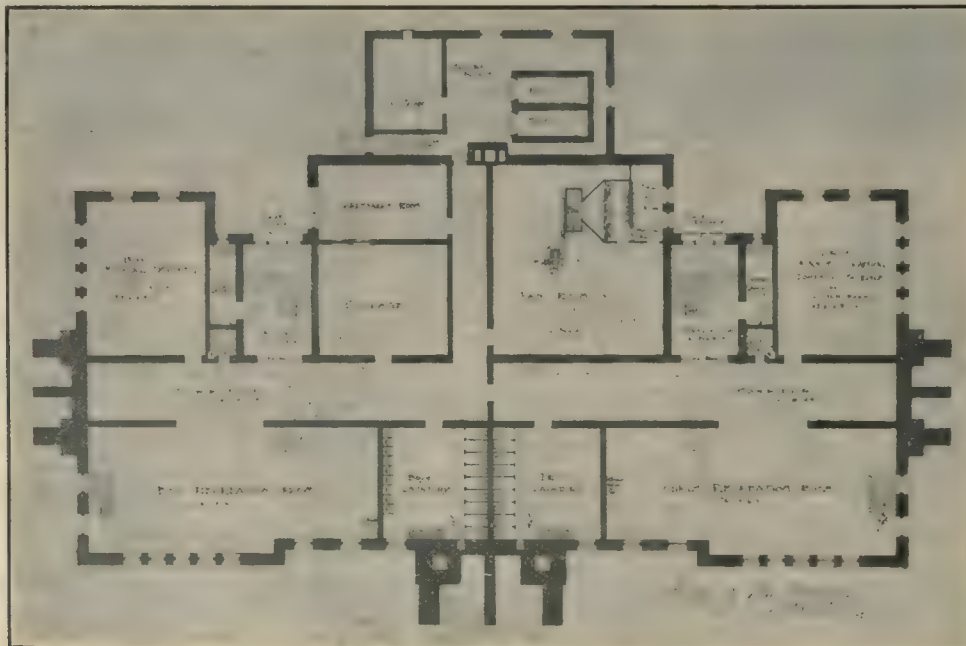
Successful Architectural Treatment of One of Western Canada's Most Noteworthy Brick Structures—Details of the Interior Arrangement

Architects: Storey and Van Egmond, Regina, Sask.

The Regina Collegiate Institute is one of the most noteworthy examples of brick construction in western Canada. The brick used in the building is a St. Louis pressed brick, buff colored, with small iron spots and laid with common

splendid expression of the purpose of the building from the exterior. The interior is so arranged that it will fulfil its usefulness in the most direct manner.

From the comprehensive description of this building which



Basement Plan—Regina Collegiate Institute

mortar with $\frac{3}{8}$ -inch joints raked out a full $\frac{1}{4}$ -in., this giving a very pleasing effect.

The architects for this building, Messrs. Storey & Van Egmond, of Regina and Saskatoon, have had a great deal of practical experience in school work. In this structure they have produced a dignified and symmetrical design that is a

Messrs. Storey & VanEgmond have been kind enough to send us, we extract the following particulars:

ENTRANCES.—Main entrance at front, separate entrances at sides for boys and girls, grade entrance at rear unto landing of stairs and grade entrance to boiler room.

CORRIDORS.—Corridors are well lighted and the usual

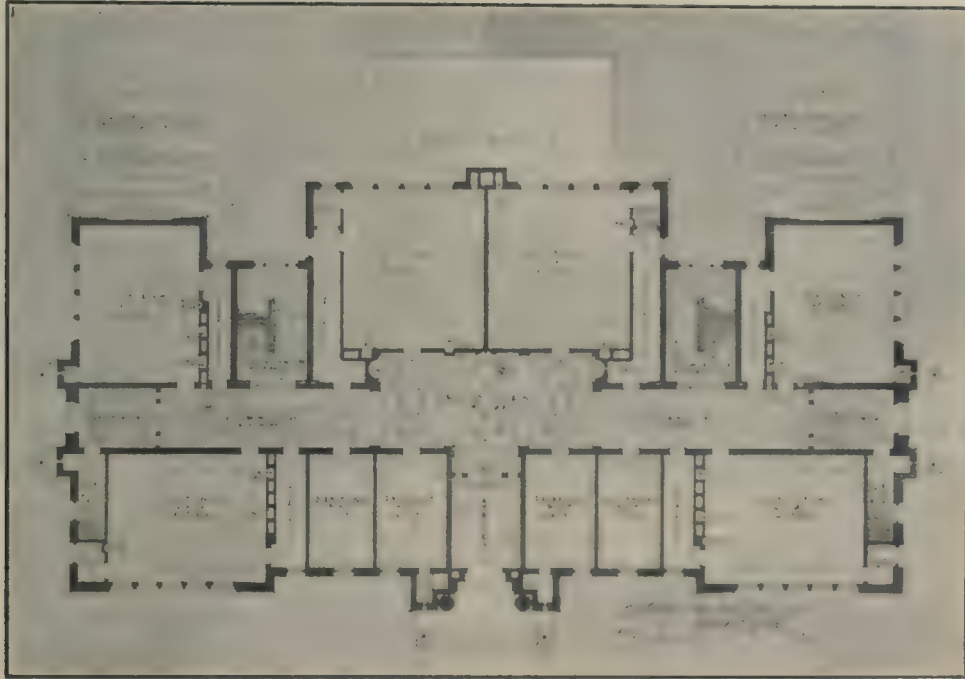
THE CONTRACT RECORD

fire trap stairs in the corridors have been purposely avoided.

STAIRS.—Main staircases centrally and conveniently located and entirely enclosed by fire walls and automatic rolling fire doors. Separate stairs from side entrances are also provided for direct access to recreation rooms.

FIRE EXIT.—Special attention has been given to provide

size are placed centrally and near the main entrance. Separate lavatories for boys and girls in basement and emergency lavatory on first floor. Large and well lighted assembly hall on first floor with stage and dressing rooms. Recreation or lunch rooms, manual training and domestic science rooms, boiler and fan room are located in basement. Coal storage for



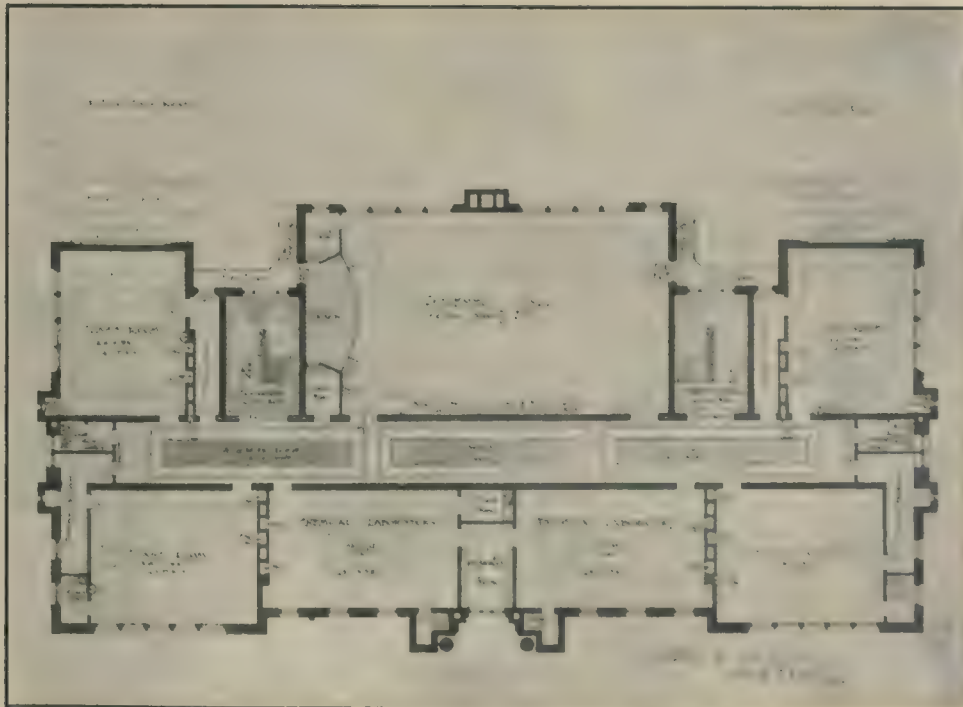
Ground Floor Plan—Regina Collegiate Institute

for the event of fire, and in addition to fire walls and stairs as above, there are provided two large balcony fire escapes at rear of building with access to same from first and second floors.

ACCOMMODATION.—12 class rooms, two of which are

three cars of coal and boiler room have been placed outside of the main building.

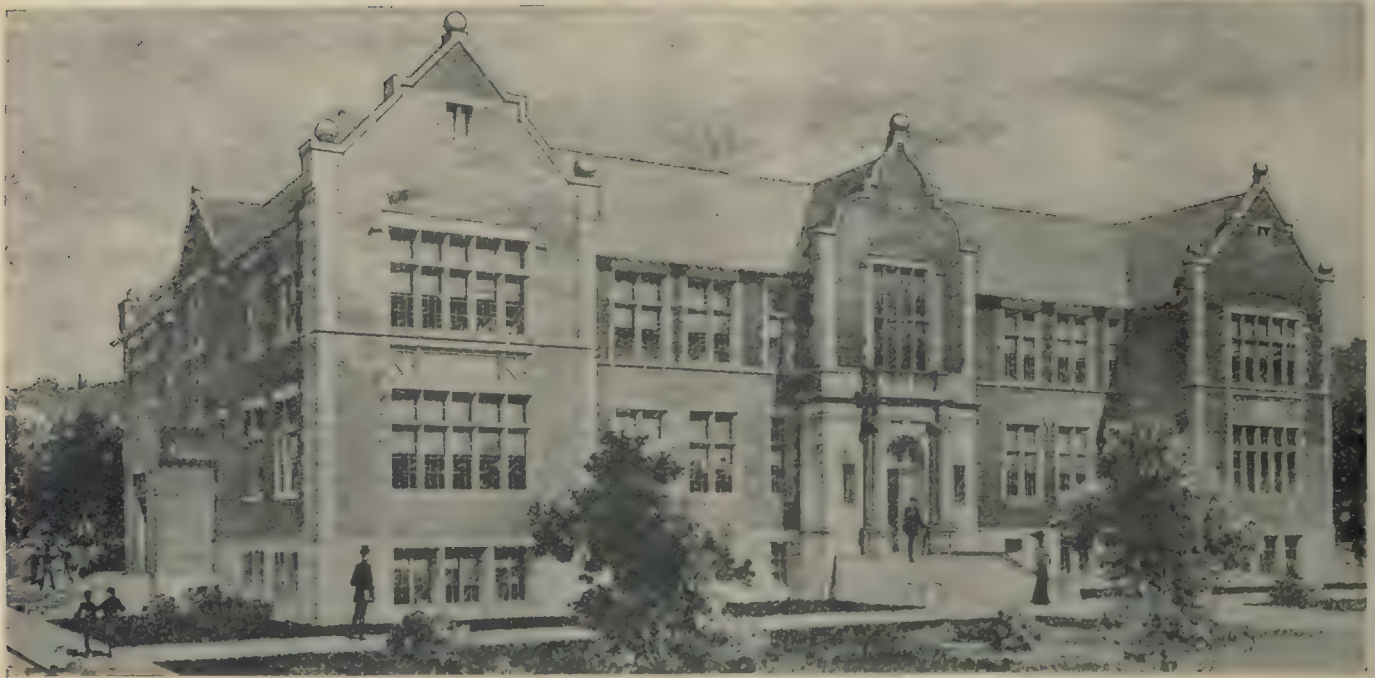
LIGHTING.—Particular attention is called to the lighting of class rooms which are lighted from one side only by a series of windows, divided by marrow mullions.



First Floor Plan—Regina Collegiate Institute

used as chemical and physical laboratories, and the necessary apparatus room, supply room, dark room, etc., in connection. Principal's room, teachers' rooms and library. of commodious

HEATING AND VENTILATION.—The heating and ventilation has been carefully designed so as to ensure a uniform temperature of 68 degrees at all times and at least six changes of



New School Building at Westmount, Que. Cost \$125,000. Architects: Ross and MacFarlane, Montreal

air per hour in class rooms and assembly hall. Low pressure, direct and indirect plenum system of heating and ventilation is used with automatic temperature regulation by thermostats, governing both the direct radiators and fresh air flues. The fresh air enters the building at the intake windows in basement, into the fresh air room, where it is heated by passing over steam coils, provided with an automatic regulating damper and hence through water spray which cleanses the air of all dust and brings it to the proper humidity. The air is then drawn into fan, forced through fresh air ducts and ejected into rooms at a height of eight feet above the floor. The foul air is forced into foul air flues at the floor line, where the foul air lies and ejected into atmosphere above the roof. The boiler installation consists of two return tubular units twinned together in order that only one may be used in the mild weather, which is much more economical than a single boiler. This is the simplest, most positive and most satisfactory system of heating and ventilation that can be installed in a school building.

CONSTRUCTION.—The construction of the building is fire-proof. Reinforced concrete floors are used throughout, with solid brick bearing walls. All partitions are of metal studs and metal lath. The outside walls are lined with hollow tile and plastered direct on these tile. Corridors have Terrazo floors in three colors, wainscoting of enamelled brick in green and brown colors, with all angles rounded. White maple floors in class rooms. Stairs fire-proof with steel strings, cast iron newels and risers, wrought iron railings and slate treads. The outside is executed in buff iron spot pressed brick with raked joints and buff Tyndall stone.

EXTERIOR.—On the exterior, the use of extravagant elaboration has been avoided, and the architects have succeeded in producing a simple, unique and appropriate appearance by fitting architectural treatment. The main entrance is distinctly, but not unduly, accentuated, and the rest of the building has been designed in proper proportion.

The architects lay special emphasis upon the difficulty of securing a good face brick in the West at a reasonable price. The following extract from their recent letter to the "Contract Record" will be of interest in this connection: "We consider that better results can be obtained from brick than from any other materials, for certain classes of work, and when used judiciously under proper treatment. To secure the

proper effect, we have had to specify brick manufactured in the United States for a great many of our buildings, and the cost usually runs from \$40 to \$50 per M. We have done this much against our desire, as we always make it a rule to specify Canadian material where possible. We would ask the eastern manufacturers to investigate the western trade, as we see no reason why they should not compete successfully with American material. There are a number of brick plants in the West, but they have not yet produced a high standard uniform brick, and with the necessary material at hand there is no reason why this should not be done. There are good opportunities throughout the west for the establishment of brick making plants."

Bricks Made From Slag

Brick is made from ore slag in moulds at Brisbane, Australia. The bricks have been found equally useful in the erection of offices and in the construction of water tanks, retaining walls, piers for ore bins, and bases for chimney stacks.

The molds used in making the bricks consist of two L-shaped cast iron plates, and mention may be made of the following features, which have proved important: First, the thickness of the metal, sufficient to chill the slag without becoming overheated; secondly, the reinforcing of the angles to minimize warping; and, thirdly, the adaptation of these reinforcements to form distance pieces by which means space for air circulation is maintained between adjoining moulds. These plates, having been set upon edge on the levelled surface of the slag dump, and arranged to form rows of twenty moulds or thereabouts, are banked up with one and one-half inches of dry sand or ashes.

The slag is poured into the moulds from the ordinary hand-drawn slag pots, which are filled from the double bowl horse pots now in use on this mine. As soon as the bricks have solidified the moulds may be removed and set up afresh elsewhere. After from ten to fourteen hours the bricks are cool enough for handling. Their average weight is eighty pounds, and, when tested with the rough appliances available, they have successfully withstood a crushing stress of thirteen tons per square foot without showing any sign of strain or collapse.

Satisfactory Design of School and Factory Buildings Exemplified at Montreal

The past few seasons have witnessed the erection of many noteworthy structures in Montreal and locality, not a few of which have been described in these columns. Among those which have been completed recently, and concerning which some mention is peculiarly appropriate in this number, are the new school at Westmount and the Ames-Holden office and factory building at Montreal, both of which were designed by Messrs. Ross & MacFarlane, of Montreal.

The new Westmount school was erected at an approximate cost of \$125,000, including furniture, etc., and is considered one of the most satisfactory and best equipped buildings of its kind in the province of Quebec, and we might add, at the same time, one of the most attractive. As will be seen by the illustration, the Westmount school is two storeys high and of effective design, the general style being Elizabethan. The school is 165 feet long by 65 feet wide with a basement 11 feet high and two storeys of 13 feet each. It is built of red pressed brick with light stone trimmings. The varying and at the same time harmonious effect produced with these materials provides an illustration of the results attainable with pressed brick under skilled treatment.

In addition to the main entrance in the centre front of the building there are separate entrances on each side connected by a wide corridor running clear through the building and bisected by the main hallway.

The building contains 16 large class-rooms. On the ground floor, immediately opposite the main entrance, is the principal's office, and at each side of the entrance hall are the teachers' locker rooms, the remainder of the storey being given over to class-rooms. The kindergarten class-room is placed near the side entrance. In the centre of the upper

storey there is a large assembly hall, 62 by 44 feet. The class-rooms on this floor open into a wide corridor connecting the stairs with the assembly hall. Every precaution has been taken to provide rapid means of exit. The building is equipped with an up-to-date system of fan ventilation, is heated with warm air and lighted by electricity.

The construction throughout is strictly fireproof, with floors of steel and concrete, and terra cotta partitions. The corridors and toilet room floors are finished with Terrazzo mosaic. The stair cases are of iron with slate treads.

The new office and factory building at Montreal for Ames-Holden, Limited, illustrates the last word in the economical and skilful treatment of buildings of this class. The Ames-Holden building, while necessarily not elaborate, is at once impressive and dignified. It covers an area of 31,679 square feet and has a floor area of 129,709 square feet. Brick enters largely in the construction, stone and reinforced concrete being successfully combined. The stairs are of iron and all partitions of fireproof material. The stairs, elevators and toilet rooms are isolated in separate towers equipped with metal fire doors. The heating system is by a fan ventilation and heating method, by means of which a circulation of pure air is heated and distributed throughout the entire building. One of the special features of the building is the great area of window space, which gives the maximum lighting possible, one of the greatest desiderata in buildings of this character. The large roof area has been turned into a splendid roof garden for the employees, the stairways leading direct from the several factory floors to the roof.

There is a power plant in the central court separate from the building, this including a gas generating plant with Hornsby-Stockport suction gas engines and electric dynamos for the power and electric lighting requirements of the building.



Office and Factory Building of Ames-Holden, Ltd., Montreal. Architects: Ross and MacFarlane

Main Processes of Sand Lime Brick Making

**Complete Hydration of Lime Obtained only by Steam Hydrating Method
of Manufacture—Raw Material—Chemical Reaction in Hardening**

Specially Contributed by Anton Berg, Toronto

Sand-lime brick as its name denotes, is made from sand and lime. The processes for the manufacture of the brick differ in the manner of hydrating the lime and mixing with the sand, but in all cases the mixture of sand and hydrated lime is pressed into brick, which are then hardened by the action of steam at high pressure. According to the manner of preparing the mixture, there are three main processes:

1. The steam hydrating process.—The lime is treated with superheated steam in iron cylinders, and then mixed with the dry sand.

2. Water hydrating process.—The lime is hydrated by adding water.

3. Silo process.—The lime and moist sand are mixed and stored in a silo for periods of 24 hours or longer until the lime is supposed to be thoroughly hydrated.

By far the best results are obtained by the steam hydrating process, as only by this means is complete hydration of the lime obtained.

RAW MATERIALS.—Sand, which chemically is silica, occurs as fine rounded particles or in the form of sharp and irregular grains. For the purposes of sand lime brick manufacture the latter kind is preferable. The presence of clay is

injurious to the strength of the brick. The degree of coarseness of sand has also quite an important effect on the strength of the brick. The best brick are made by using a mixture of coarse with some finely ground material. The lime should be free from any unburned limestone, as the presence of this substance causes the brick to crack in the hydrating cylinder.

PROCESS OF MANUFACTURE.—The sand, after being brought in from the bank, is fed into a rotary dryer which is supplied with heat from the steam at high pressure. It is then carried by the rotation of the dryer into a conveyor by means of which it is elevated and discharged onto a screen. From there it passes to the measuring device, where the previously hydrated lime is added in the proper proportion.

The lime, which should be used fresh, is hydrated by exposing it to the effect of steam at high pressure for a period of 4 to 10 hours. The hydrated lime as it comes from the cylinder has mostly crumbled into a fine powder, so that there is little trouble, if any, in pulverizing it before it is mixed with the sand.

The mixture used for the manufacture of sand lime brick is very variable, and depends upon the quality of both the sand and lime, but a usual proportion is about 6% by weight



Luxton School, Winnipeg—A Splendid Illustration of the Possibilities of Sand Lime Brick

of hydrated lime to 94% of dried sand. Excess of lime is very injurious to the strength of the brick.

In some cases the use of tube mills or ball mills is advocated for the complete hydration of the lime, but the most efficient, an inexpensive method which is used in American, is the following: The materials pass from the measuring machine into a dry mix mill, and from there to a wet mixer. In this wet mixer the proper amount of moisture is added to the mixture, which is then fed automatically into a heavy steel press, and there molded into bricks. On the thorough incorporation of the mixture and the pressure given in the press depends the success of the finished product. Indeed, Prof. Woolson, of Columbia, has stated that in his opinion, "the amount of pressure a brick receives in manufacture is one of the most important conditions affecting its quality." The press should be massive and built to withstand very excessive and variable strains. A slight difference in the amount of moisture in the mix may cause a much greater variation in the compressibility. In one of the best presses known to the author, the pressure delivered to the material in the molds is about 400 tons a brick, i.e., 25,000 lbs. a sq. in., and the machine in doing this, has three distinct pressures and an up and down motion of the sand in the mold. First, it presses from the top, then from the bottom, then comes the third pressure from the top and bottom together, with the movement of the sand and lime under pressure in the mold, then the lift out. The press contains four molds, so that every time the press lifts, four bricks are delivered on the table in front of the machine.

Besides this press, which is of the vertical type, there are also used rotary presses, that is, those in which the molds are rotated under the plunger.

The green bricks are loaded upon specially constructed steel cars which hold about 1,000 bricks each. The tracks from the press are continuous with those in the cylinders, so that the cars can be run directly into the latter as soon as possible after being filled.

The cylinders which are used for hydrating the lime as well as for hardening the bricks, are each massive steel drums, about 6' 4" in diameter, and 60' long. When filled, the cylinder contains about 20,000 bricks, and is closed hermetically by covers at both ends. Steam is then turned on gradually and the pressure allowed to rise until at the end of two hours, the gauge registers 125°. This pressure is maintained for ten hours, at the end of which period it is again gradually lowered and the cylinder opened. The materials which lay in the sand bank 24 hours ago are ready to be used in the construction of fine buildings as a finished substantial brick.

CHEMICAL REACTION IN HARDENING.—The question that interests the chemist in this process is, "What reaction takes place in the hardening cylinder?"

Silica exists in two modifications, known as active and inactive. The difference between the two consists in the solubility of the active silica in hot sod, carbonate solution. In all sands there is always present a certain amount of this active silica; by the action of the steam at high pressure, it readily reacts with the hydrated lime to form a calcium hydration which is the cause of hardening. Hence, the amount of lime to be added ought not to exceed that which is chemically equivalent to the active silica present in the sand. As in general, feldspar sand contains about 5% of active silica, the usual practice of adding about the same amount of lime is thus explained. In the very hot solution, under-pressure attacks the silica forming a calcium hydro-silicate which crystallizes out between the different particles of sand. Gradually the surface of each little particle of sand becomes converted into the hydro-silicate and thereby any further action is prevented. It is known that boiling alkalies will attack silica, and I have seen it mentioned that steam itself

at high pressure will dissolve silica. As is well known, sand-lime brick may be hardened at even lower steam pressure than 125°, but the time required for hardening becomes proportionately longer

A Treatise on Dry Press Brick Making

Specially Contributed by J. W. BALL, Toronto

THE brickmaking industry is known as one of the oldest in the world. Since the time that the Israelites made bricks in Egypt under bondage, this industry has taken many various and different forms. To enumerate all of them would perhaps be a waste of time and would answer little purpose. One of the most up-to-date methods for the manufacture of bricks is known as the dry press process. This method of brickmaking has become very popular in this country during recent years. It is productive of bricks of the highest type, beautiful in appearance, high in quality, true in shape and color, and with large tensile and compression strength. Bricks made from this process are what might be termed the nobility of the brick world. A description of the process will enable anyone to understand why these bricks are of such high quality and standard.

With this method of brickmaking the material has to be prepared under the very best possible conditions. It is reduced to a fine state, like powder, therefore any foreign substance, such as limestone, must be reduced while passing through this grinding process, and by so doing become part of the brick and act as a flux to other higher materials while burning. With the roller method of grinding clay, many of these limestone pebbles remain in the brick unbroken and in many cases cause an unsightly appearance, cracks, etc.

Materials.

The material best suited for this particular process of brick-making is of the shale variety. The color of this material is sometimes blue, red, gray, and a very dark drab. It is found in large stratified bodies in various parts of the country, varying in its degree of hardness according to the depth below the surface. This material is mined in various ways. Dynamite and other explosives of a similar character are used, and in some cases a steam shovel is employed. Its close and hard texture well qualifies this material for the making of a dry press brick.

Preparing.

The preparation of the material takes many various forms for this particular kind of brickmaking, according to the degree of hardness of the raw material. If you take a body of this kind of shale that is of a soft nature and has been somewhat exposed to the atmospheric conditions for a number of years, it is possible to take the material direct from the mine and manufacture it right into brick with very good results. In many cases with some shales this process has been found to be the very best method, owing to its regularity and even texture in its natural formation. With some shales this method is not at all advisable. It is better to allow it, after being mined, to be exposed to the atmospheric conditions for a few months before manufacturing it into brick.

Another method of treating this hard shale is by grinding immediately the shale leaves the mine and passing the material through what is known as a steaming process, by which the shale immediately it has left the grinding mill, falls by gravity from the screens through a kind of machine that impregnates the whole with a hot moisture from steam. After that, it is taken and placed into storage bins of large capacity to allow it to mature and become suitable for the manufacture of the highest grade of brick. Another method of preparing material for this class of brick may be mentioned. After the shale has passed through the ordinary grinding pan and been screened, the fine dust falls into a mixing mill constructed upon similar lines to the dry pan, where the material receives another milling similar to that which it received in the dry pan. This second milling

toughens it and aids it to withstand the pressure in the press. Material thus prepared will stand more pressure without splitting through the middle while in the press and will be considerably more dense when burnt.

The above are only one or two of the various ways in which it is possible to handle this material so as to bring about the very best results in brickmaking. There are others of a cruder character which are invariably used where a high grade of brick is not an essential feature.

Grinding Machinery.

The machine best suitable for the preparation of this particular brick is known as the dry pan. The construction of the dry pan is so arranged that it not only grinds the material but has a toughening effect. With the dry pan it is possible to add sufficient moisture to the raw material to make positive cohesiveness immediately it becomes subject to pressure. There are other grinding apparatus for the reducing of shale known as pulverizers, rotary crushers, etc., etc., but to the writer's mind and experience the dry pan far exceeds them in the good

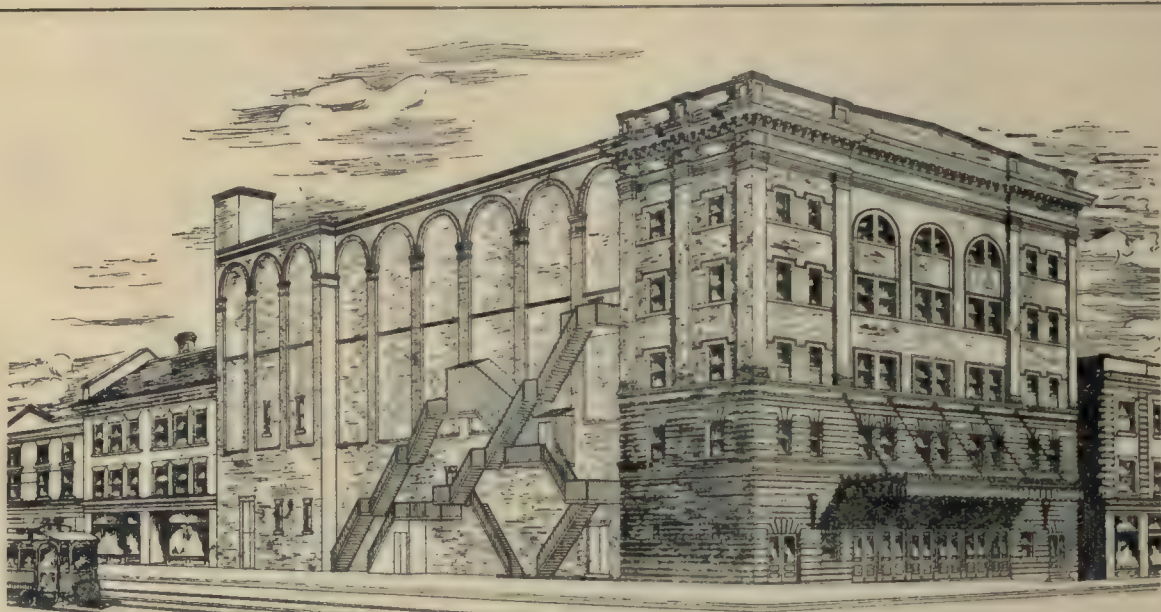
to the press, for the simple reason that the movements of the press are not adapted to give it that even surface and density which a good brick requires. In many cases a granulated centre is the result, giving the brick the appearance of a sandwich.

The press best adapted for this kind of work is one that gives what is known as three distinct pressures, first from the top, second from the bottom, and third from the top and bottom together. The lift-out movement of the press should be such that the brick on leaving the mould, remains perfectly still, so that the bottom edges are not destroyed until the charger comes forward and removes it to the front apron ready for transit into the kiln.

Such machines as are described above are well known and are in extensive use.

Setting.

After the brick has been carefully made, an important feature is that it should be placed very carefully in the kiln and set in such a manner that it is evenly spaced on the side, with two faces and ends together so as to give the very best pos-



The new Shea's Theatre, Toronto, erected this season of pressed brick. Contains 24 fire exits and model interior arrangement. Considered the best equipped building of its kind in Canada. Total approximate cost, \$200,000. Architect, Charles J. Read.

quality and preparation of shale for this particular kind of brickmaking. The dry pan is not only well adapted for this purpose but it is substantially built; and with care such as is used with all machinery, will last for an indefinite number of years under the very heaviest kind of work. These pans are manufactured in our own country and should appeal very strongly to Canadian brickmakers.

Pressing.

After the material has passed through any of the above treatments it finally passes into the press before entering the kiln.

The press plays a very important part in the quality of this brick after due care has been given to the preparation of the material. In this process the press has to take the place of that chemical action, which, in other methods, is brought about by the mixture of water and raw material. Therefore it is very necessary, considering the small amount of moisture that is used in this process of making brick, that the press should be of the strongest manufacture and the best adapted, according to its movements, to bring about the solidity of the brick. In many instances, even when due care has been paid to the preparation of the material, it is finally spoiled when it comes

sible chance of bringing out a perfect face and end, free from blemish and marks of any kind. If the bricks are not properly set, it is very noticeable when they issue from the kiln; 5 over 2 is a good way, giving good faces and ends, plenty of draft, and causing the draft in the kiln to spread well.

Burning.

The last but by no means the least consideration is the method of burning this particular brick. After the brick has been properly made and set, it requires the services of a practical burner to bring it forth to the best advantage. The first point in burning is the water-smoking period when the small amount of added moisture is extracted. If, during this period of burning, the kiln is rushed to any extent and the temperature rises more than 212 degrees Fahrenheit, the chances are that the good work of the preparation of the material and pressing will be destroyed, as the sudden rise of temperature in this period will cause the bricks to expand, thus destroying the bond, and any amount of burning after will not bring the same solidity into the brick that would have been obtained if it had been treated properly during this period.

The oxidization period is another important factor in the

burning of this brick. During this period the moisture contained in this material is taken away and the brick is prepared for that higher element of vitrification. All combustible matter is extracted during this stage; therefore it is necessary that this work be thoroughly completed before vitrification takes place. Bricks not properly treated during this period show a black or blue core when broken through and at other times a swelled appearance. This is caused by the outer pores of the brick becoming vitrified and closing up so that the combustible matter cannot escape. As a consequence, the brick are of very little value, and in many cases altogether spoiled.

Vitrification.

During this period of burning the brick is changed from a perishable to a non-perishable material. It receives during this process its stability for future years of use as a building material. It also receives its color at this time. Therefore the burner in charge should endeavor to turn out a product that will not only stand the ravages of time but have a pleasing effect upon the eye.

Drawing.

This last process, when the finished article is being drawn from the kiln and when its quality is being determined, is at all times a matter of great importance worthy of serious contemplation upon the part of the manufacturer. To produce brick in first-class condition means constant attention throughout all stages. Care should be taken in shipping to sort the bricks according to quality and color. They should be shipped in the cars with straw in the very best condition.

When the manufacturer who has been careful in all these matters looks at the finished building he will be proud to think that such bricks have been made under his care, and that they will last long after he has gone, standing as a credit not only to himself but to the industry he represented.

In conclusion, the writer wishes continued success to the industry of which he is a humble representative.

The Hollow Clay Block

Contributed by W. McCREEDIE, Lyons, Ont.

A wall with hermetical air space, impervious to moisture, easy to construct, cheap, strong and of good appearance is an ideal wall. Such a wall is now obtainable by the use of hollow clay blocks. In these days of much experimentation with cement for solid and hollow walls, it is well to study this modification of the old clay brick.

The hollow clay block or brick is now made in a variety of shapes and sizes and is used extensively throughout the western, middle and southern states of America; also in many parts of Eastern Canada. When its advantages are considered, it is strange that farmers have been the first to appreciate these blocks and that they have been considered so little by other builders. Fifteen years, however, is possibly too short a time to allow for the general adoption of any material unless the manufacturer adopts vigorous advertising methods.

In the western states a single air space block, about 8 x 8 x 14 inches, with about 1½-inch wall, is much used. In Ontario, however, for barn foundations and other outbuildings, cold storage and cheese factories, and buildings of similar requirements, there is a general use of and sensible preference for the three-celled block. The most common size is 6 x 9 x 12 inches for such purposes, giving a 9-inch wall.

There is no reason why these blocks or similar ones of slightly different proportions should not be used for factory or warehouse construction, or for house foundations and partition walls. Where a wider wall is required, the smaller size of double or single celled hollow blocks can be used.

These are commonly used in the dimensions, 4 x 6 x 12, laid beside and parallel to the 6 x 9 x 12, then by reversing the courses, making a perfectly bonded wall of 14 inches in thickness and with five dead air spaces. By carrying out this plan, any thickness of wall may be obtained. There is another size

of block being used, viz., 3 x 4 x 12, which gives a handsome exterior face to a house or factory. It is important to note the superiority of hollow clay blocks over cement (hollow) blocks and solid cement walls. The hollow cement block, despite the hollow space, is not a bar to moisture—as any one can discover by a little testing. These blocks have little to commend them beyond their claims to provide insulation. The hollow clay block wall is less liable to danger from cracking, is of better appearance, costs no more on the average and gives perfect insulation, the walls being of a kneaded and burnt homogeneous material.

Kiln Costs

I have claimed that I can construct a round down-draft kiln of 100 M. capacity as cheaply as an up-draft kiln, writes Anton Vogt, in "Brick." I have, through the clay journals, invited interested parties to furnish a bill of cost for an up-draft kiln of same capacity. So far none have responded.

In order to prove what I claim I hereby publish a bill showing the cost of material and labor for a 31½-foot kiln, holding 100 M. building brick. This includes a stack 40 feet high and of proper draft area.

70 M. common brick at cost of production, about \$4.00 per M.	\$280.00
3 M. fire brick at \$20	60.00
2 tons fire clay	15.00
Lime, sand and cement for outside wall.....	40.00
Labor to lay 73 M. brick at \$5.00 per M.....	365.00
Excavating for foundations and flues	25.00
800 feet ¼ x 1½ inch iron strips.....	35.00
One steel band, ¼ x 8 inches	25.00
2 steel bands ¼ x 4 inches	25.00
500 feet 1-inch wire cable (second)	50.00
Lugs, bolts, turn buckles and two rails 7 feet long for door frame, and two rods	30.00
Total	\$950.00

I figure that ground-clay for clay mortar, and also the scaffolding, is furnished by the prospective builder of these kilns. In some localities such a kiln can be built even more cheaply than the cost quoted above, and in other places it may cost a little more. I guarantee to burn 95 to 98 per cent. hard brick and at least 98 to 99 per cent. salable brick, under these conditions:

I would oversee the construction, setting, and burning of the first kiln at a reasonable compensation for my time and expenses.

These kilns have no grate whatever and mine-run coal is used from start to finish. I do not claim to use all slack; I guarantee to burn with from 700 to 1,000 pounds of mine-run coal per thousand; and in from six to eight days for stiff-mud and in from eight to ten days for dry-press brick.

A beginner can build one or two of these kilns with unburned brick, except for the outside wall, 8 inches thick, where burned brick must be used, and the crown can be covered with burned bats and grouted. A temporary shed can be put up while building the kiln and by slow heating the first burn one will have a substantial kiln that will last for years, and a cheap one. There are some points of merit in construction and also setting, which I cannot publish, because these points are my assets, enabling me to build these kilns so cheaply.

By proper care in setting, a high percentage of front brick can be burned in these kilns as well as in the highest priced ones. When it comes to down-draft kilns I do not intend to take my hat off to any one, and I will do all I can to work for better brick by furnishing kilns that the poor man can afford to build and which deliver the good, hard brick.

These kilns are durable, easy to clean out, burn even from side to side and from top to bottom, easy to operate and under control of the burner at all times.

Don Valley Brick Works



The Don Valley Brick Works, Toronto

One of the oldest, largest and most modern brick-making plants in Canada is that of the Don Valley Brick Works, now owned by Mr. Robert Davies. Immediately on acquiring this plant, about ten years since, Mr. Davies, with characteristic energy and foresight, made extensive improvements and additions. These have been continued from year to year in order that the plant might be kept thoroughly up-to-date. The improvements of the past season, for instance, included an entirely new stock brick plant, an addition to the fireproofing plant, and four new down-draft kilns.

The views accompanying this article give a very good idea of the magnitude of the plant and of the diversity of its

operations. Nearly everything in brick or block made of clay is manufactured, such as white stock bricks, red and buff pressed bricks, wire cut bricks, terra cotta fireproofing, porous blocks, foundation blocks, vitrified bricks, hollow tile and blocks for flues and drainage purposes, Roman bricks, arch bricks and enamelled bricks in all colors.

The clay deposits of the Don Valley Brick Works are very extensive, and, as will be noticed by the illustrations, there are exposed a variety of clays and shale which are manufactured into some form of clay product. The shipping facilities of the Company are also of the best, having connection with three transcontinental lines.

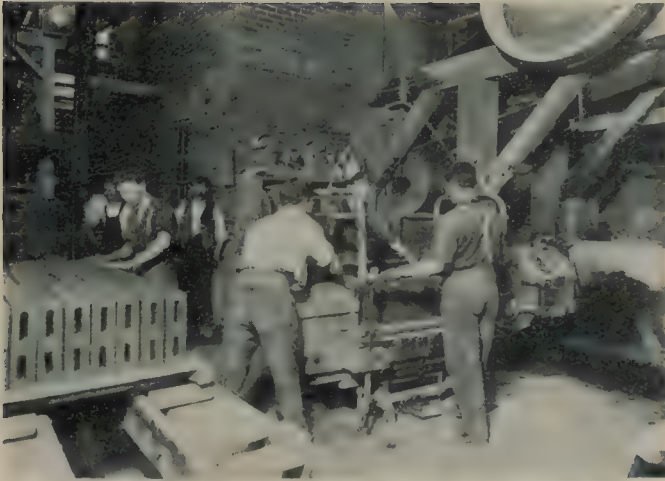
The product is marketed in all parts of Canada. The



Row of Kilns at the Don Valley Plant



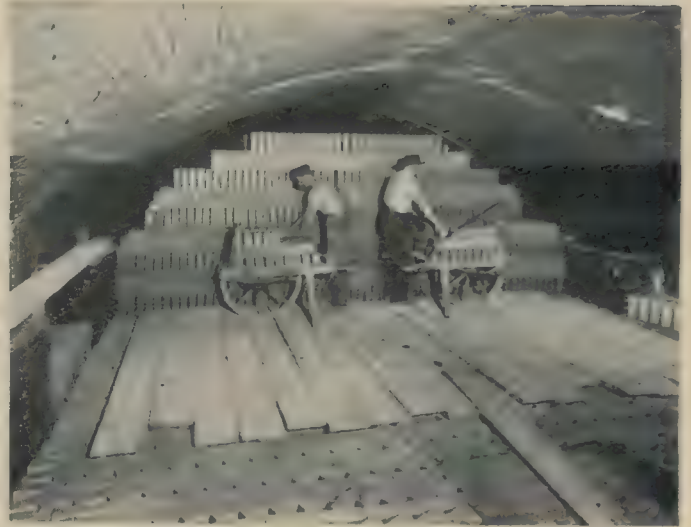
Showing Presses in Operation



A Corner of the Porous Terra Cotta Department

magnificent contract recently secured by the Company for the new hospital in Toronto is a testimonial to the quality of their brick.

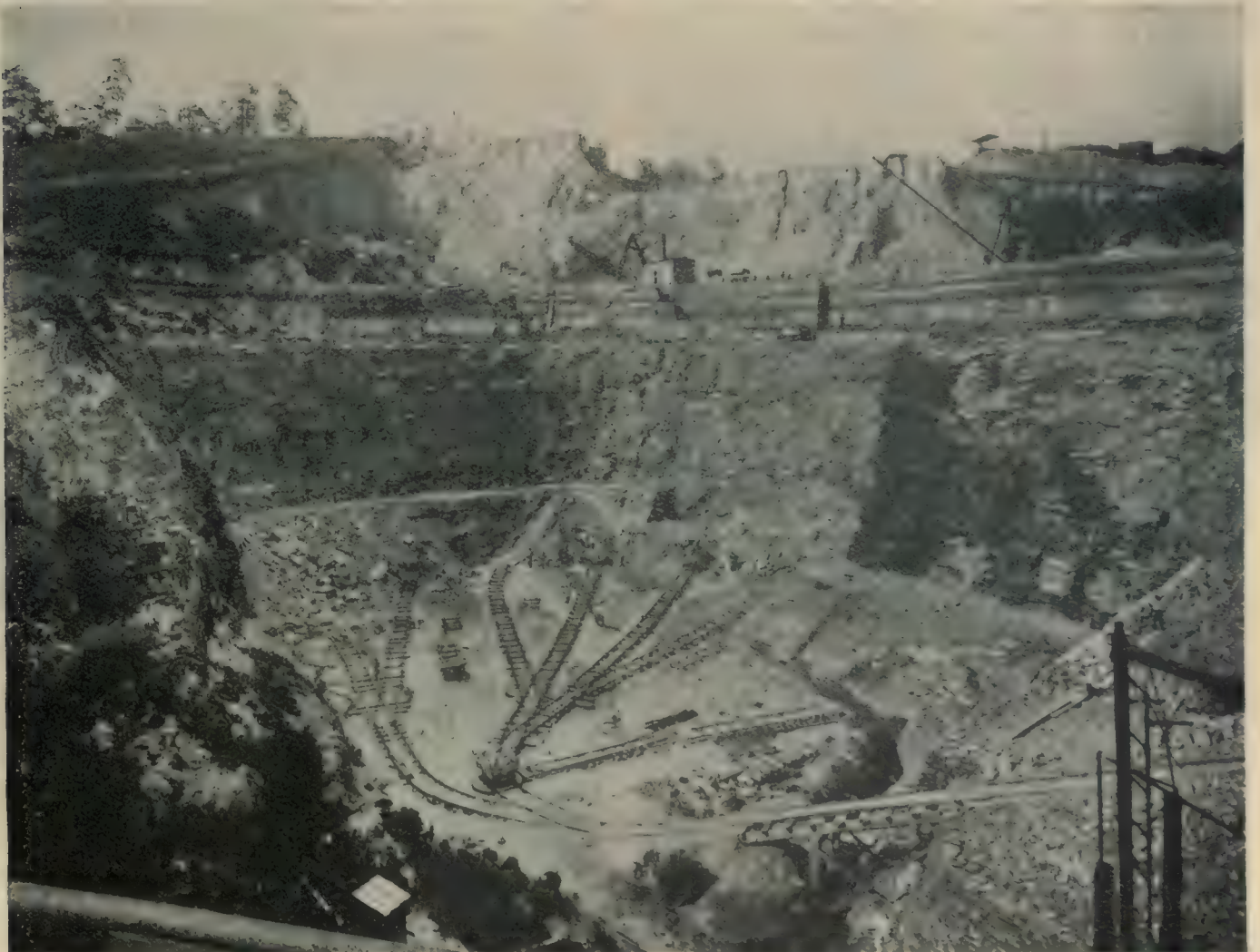
Good management and thorough organization are among the reasons for the great success which has attended this enterprise. Each department at the works is conducted independent of the others, and there is one general superintendent over all. The General Manager is Mr. John M. Bowman, who



Interior of One of the Kilns

has been connected with the establishment for nearly 20 years. He is very widely known, and to him is due in no small degree the progress which has been made.

It is scarcely necessary to mention in connection with this article that the products of the Don Valley Brick Works are known for their quality wherever they have been introduced. An exhibit of pressed bricks of this plant took the highest



View of Shale Pit and Tracks on the Don Valley property

award of the World's Columbian Exposition at Chicago. Enamelled bricks have been ordered from here for important United States buildings. The terra cotta fireproofing has stood some very interesting tests. In connection with the latter product the following report made by Professor Gillespie of the University of Toronto is of special interest:—

Toronto, Ont., Mar. 23, 1910.

Mr. John M. Bowman,
Manager, Don Valley Brick Works,
36 Toronto St., Toronto.

Dear Sir,—On February 25th and 26th at the plant of the Don Valley Brick Works, I witnessed a test of a flat floor panel ten inches thick constructed of Don Valley terra cotta tile, a sketch of which showing dimensions, I enclose herewith. The panel measured 7' 9" x 8' and was built entirely on the end construction plan between two 18" steel I-beams weighing fifty-five pounds per foot. The loading consisted of sacks of cement and clay piled in tiers of twenty-eight bags each, in such a way as to approximate, as nearly as possible, a uniform-

ly distributed load. Deflections were measured at the centre of the panel and are given in the attached table.

Load, pds. per

sq. ft.	Deflection	Remarks.
78	1/40 of an inch	
117	1/32 " "	
234	1/20 " "	
273	3/32 " "	First crack observed in jointing near key.
351	5/32 " "	Crack in jointing 1/30 of an inch in width.
429	7/32 " "	
546	11/32 " "	

The load was discontinued when 14 tiers of sacks had been placed on the panel, the roof of the building not permitting of additional loading without great inconvenience. The panel in consequence was not tested to destruction.

Yours very truly,
(Sgd.) Peter Gillespie,
Lecturer in Applied Mechanics.

Port Credit's Connection with the Industry

The Home of the Port Credit Brick Company, a Progressive Concern with One of the Best Equipped Plants in Canada

A ten mile run from Toronto on the electric car, along the lake shore from Sunnyside, brings one to Port Credit, where is located the yard of the Port Credit Brick Company, used principally in the manufacture of red pressed and wire cut brick, and one of the largest and best in Canada.

The location is exceedingly good, being convenient of access from both Toronto and Hamilton, and, as may be gathered from one of the accompanying illustrations, the shipping facilities both by rail and water, are excellent. The brick are

continuous kiln. The brick are wheeled from the machine directly to a Hoffman continuous kiln, consisting of eighteen chambers arranged continuously in an oval. The waste heat from one chamber passing through the adjoining chambers first dries off the brick, then, as the fire is led nearer, it heats them up; finally, the fire is led right into the new chamber, and so the process continues round the oval of eighteen chambers, so that when the fire is once kindled, it is never let out, but some chambers are being charged while



Port Credit Brick Works—General View of Plant from Rear, showing Kilns and Power Houses

made from a mixed shale, the upper part being reddish; below this the shale is yellowish brown, and lower it is blue. The shale is blasted from the top to the bottom and is hauled by car to two pan mills; the ground shale is elevated to screens, and the oversize returned to be re-ground.

The plant consists of five dry pans; two manufactured by the Waterous Engine Co. of Brantford; two by the American Clay Machinery Co., and one of the company's own design. There are three Berg dry presses, each with a running speed of 1,800 brick an hour; also one American Clay Company's No. 65 wire cut machine with a capacity of 10,000 brick an hour. Power is obtained from a 1,000 h.p. electric plant.

There are seven up-draft and six down-draft kilns and

others are burning, and still others are being discharged. Each chamber is capable of holding about twenty thousand brick; thus the whole kiln will burn three hundred and eighty thousand in one round; and this can be done in sixteen days, once the fire is up. The firing is done from above through small hand-holes about five inches square. A good sized handful of cracked coal is dropped down each hand-hole every twenty minutes. A large flue serving for all the chambers passes along the centre of the kiln, with a small flue connecting it with each chamber, and in the outer end of each of these is a hand damper by which the fire can be regulated from one chamber to another.

An expert analysis of the shale shows a high percentage

of iron well fitted to produce the red color of the brick, together with a low percentage of lime, which, therefore, does not counteract the iron. The percentage of sulphur trioxide is very low, consequently the brick are practically free from the so-called "soda," usually found on red pressed brick.

The company specialize in the manufacture of sewer brick, a large quantity of which they have supplied for the trunk sewer construction at Toronto. This sewer brick is much harder, and consequently the absorption lower, than the aver-



Port Credit Brick Works—Method of handling Shale to both Dry Press and Wire cut Plants

ago. Other lines are hard building brick and the usual run of dry pressed brick, Nos. 1, 2 and 3.

The average daily capacity of the plant is 150,000. The approximate total output last year was 50,000,000. It is certainly no exaggeration to say that the plant is one of the finest and most thoroughly equipped in Canada.

Beamsville Brick and Terra Cotta Works

These works, operated by George Crain, formerly a well-known builder and contractor of Brockville and Ottawa, are situated in the heart of the fruit district of the Niagara Peninsula, a short distance west of the village of Beamsville, Ont., near Grimsby Beach. The clay beds consist of sixty-two acres, upon which the works are erected. The red Medina shale, which outcrops here, has the following composition: Silica, 55.90 per cent.; alumina, 18.46 per cent.; ferric oxide, 6.60 per cent.; lime, 3.82 per cent.; magnesia, 2.65 per cent.; soda, .53 per cent.; potash, 3.55 per cent.; sulphur trioxide, .31 per cent.; loss by ignition, 8.74 per cent.

Beneath the red shale is a stratum that burns to a buff color. Both of these clays are of a very fine quality, dense, and hard as a rock, requiring, if not for some time exposed to the weather,



Port Credit Brick Works — Showing Rail and Water Transportation Facilities

the use of dynamite or powder in order to loosen them. When, however, the shale is opened up and exposed to the weather, it

becomes more or less disintegrated, so that it can be broken up with a pick-plough and allowed to slack further before being taken to the clay shed.

After being stored in the clay shed, the material is fed into two pans or grinding mills, one of Canadian make and the other made by the Whittaker Company, Accrington, England. From these mills the clay is elevated, and screened to hoppers, the oversize returning to be reground. From the hoppers, the ground shale feeds two Simpson dry presses, from which the bricks are loaded on barrows and rolled direct into the down-draft kilns, where they are set and dried slowly under a coke fire. When thoroughly dried, the bricks are brought up to a white heat with soft coal, until they are semi-vitrified. The works turn out a very high grade of pressed brick, in red, brown, and buff colors, including a dark red flashed brick, having black or brown edges, and all forms of brick for ornamental work. The semi-dry plant has a capacity of 30,000 per day. The kilns are six in number, all down-draft, two being round and the others rectangular.

In the manufacture of plastic-made, wire-cut and paving brick, hollow brick, fireproofing and drain tile, the ground shale runs into a pug-mill, which feeds a large auger machine of German design, the capacity of which is 30,000 per day. In making side-cut bricks, thirteen are cut off at a time. They are then piled on steel cars, 550 to each car, and run into a 5-tunnel dryer, built of brick, with a capacity of 40,000. Through these tunnels a draught of hot air is forced by a fan, the air obtaining its heat by passing through arches heated with coal. Only about twenty-four hours is required to thoroughly dry the bricks, when the tunnel cars are run out on a transfer car to the kilns. The bricks are then set in the latter, and vitrified or semi-vitrified as required. The hollow brick, terra cotta, fireproofing and farm drain tile are put through the same process as are the wire-cut



View of the Beamsville Brick and Terra Cotta Works, owned by Mr. Geo. Crain

brick, the quantity made being in proportion to that of the wire-cut brick, 30,000 per day.

The brick made from the shale referred to are known by leading architects and engineers all over the Dominion to be of a high grade, dense and hard, withstanding a crushing strain of from 7,994 pounds to 8,012 pounds per square inch, while the absorption test shows only from 10.6 to 10.8 per cent. This was the result of the test undergone by Beamsville brick when several millions of them were used by Messrs. Dawson & Riley, contractors, in the Canadian Niagara Power Company's tunnel at Niagara Falls, Ont. (Mr. C. B. Smith, chief engineer). The same grade was also supplied Messrs. Haney & Miller, contractors for the tunnel under the Bay at Toronto, under the direction of the City Engineer. Beamsville flashed pressed brick were used in the new station on the G. T. P. and T. & N. O. at Cochrane (Mr. John M. Lyle, Toronto, architect).



General View of the Milton Pressed Brick Company's plant. Note the Siding which holds twenty-five cars

Progress the Watchword at Milton, Ont.

An Industry which has just "Come of Age"—A Brief Description of the Plant of the Milton Pressed Brick Company

The Milton Pressed Brick Company's plant, of which Mr. J. S. McCannell is vice-president and managing director, is situated just outside the town of Milton, Ont., and has been in operation for about twenty-one years. Red and buff pressed bricks are manufactured, as well as several varieties of fire flash effects in both red and buff colors. A specialty is made of fireplaces, these having a ready sale through different parts of Canada.

The Medina shale which is worked from the bank with a fifty-foot face, runs in layers of red and buff alternately. The shale is blasted out with dynamite and hauled in cars to dry pans. The material is then ground in these pans, being tempered to a slight dampness just sufficient to let it through the screens, which makes it as fine as flour. A large hopper just above the press carries the supply of ground material. Five Boyd dry presses are in operation. These ma-

for loading. A siding holding twenty-five cars runs along the front of the plant, where the bricks are wheeled in from the level of the cars.

This plant has been running summer and winter for many years, and a staff of nearly one hundred and twenty-five men is kept the year round. Twenty men are kept continually loading cars, which are shipped out over the C. P. R. whose main line runs through the plant. The company also ship over



Portion of Press Rooms where five 4-mould Boyd Presses are working

chines have a capacity of 18,000 to 20,000 bricks each, per ten-hour day.

The bricks are run directly to the kilns where they are water-smoked with wood for about ten days, after which they are burned with coal for about a week. The kilns, of which there are eleven in number, are all, excepting two, of the down-draft, rectangular type, and hold two hundred thousand bricks each. The plant is very conveniently situated



A Busy Spot at the Milton Plant

the G. T. R., the cars being switched down to the "Y" which is but a slight distance from the plant.

An Up-to-Date Plant Near Georgetown, Ont.

There are three main points that one must take into consideration in formulating an idea of the successful operation and in making a forecast concerning the possibilities of the future development of a pressed brick industry, granted, of course, that there is a fair market for the company's products.

In the first place, there must be an abundance of good shale available for working; secondly, there must be adequate transportation facilities at hand, and thirdly, the management must be aggressive, progressive, and experienced.

Judging by these standards there is every reason why the Terra Cotta Pressed Brick Company, Limited, of Toronto, should feel optimistic. They have an excellent property of 160 acres on the outskirts of Georgetown, Ontario, 35 miles from Toronto, where, so far as this and a score of other generations are concerned, there is an unlimited quantity of



Toronto Pressed Brick and Terra Cotta Works at Milton, Ont.

material in sight. There are splendid shipping facilities, the works being located on the Allandale branch line of the G.T.R. Excellent water power is available on the Credit River. The up-to-date electrical equipment at this plant was installed by the Westinghouse Company. At the present time a number of important extensions are being made at the works. When these are completed the capacity of the plant will be greatly increased. The company are employing the American system of down-draft kilns. The presses were supplied by the Berg Machinery Company.

There is a good call for the firm's products, the company having a big shipping territory throughout the provinces of Ontario and Quebec. The plant has only been running three years, but the material therefrom has already made a reputation in building circles.

The Toronto office of the company is located at 37 Yonge street and is in charge of Mr. D. A. Burns, general manager.

Toronto Pressed Brick and Terra Cotta Works

A pressed brick plant, which is probably the pioneer establishment of its kind in Canada, is located at Milton, Ont., on the main line of the C.P.R., 33 miles west of Toronto, and owned by the Toronto Pressed Brick & Terra Cotta Works. The com-

pany's property at Milton is an extensive one, covering an area of 103 acres. There is an excellent deposit of Medina red shale, one of the finest in the province, or for that matter, in the country. The clay bank now being worked by the company is shown in one of the accompanying illustrations.

The plant is equipped with the most modern machinery, including five dry-press brick machines of the latest design. It is capable of turning out twelve million bricks a year—a capacity which is now being taxed to the utmost.

In addition to a high grade red pressed brick, the company manufacture architectural terra cotta roofing and flooring tiles, cresting, finials and chimney tops. Recent noteworthy contracts for the company's brick have been with the Cockshutt Plow Company, Brantford; Mammoth Knitting Company, Dunnville, Ont.; and the Massey-Harris Company, Robert Simpson Company, and the Toronto Carpet Manufacturing Company, of Toronto.

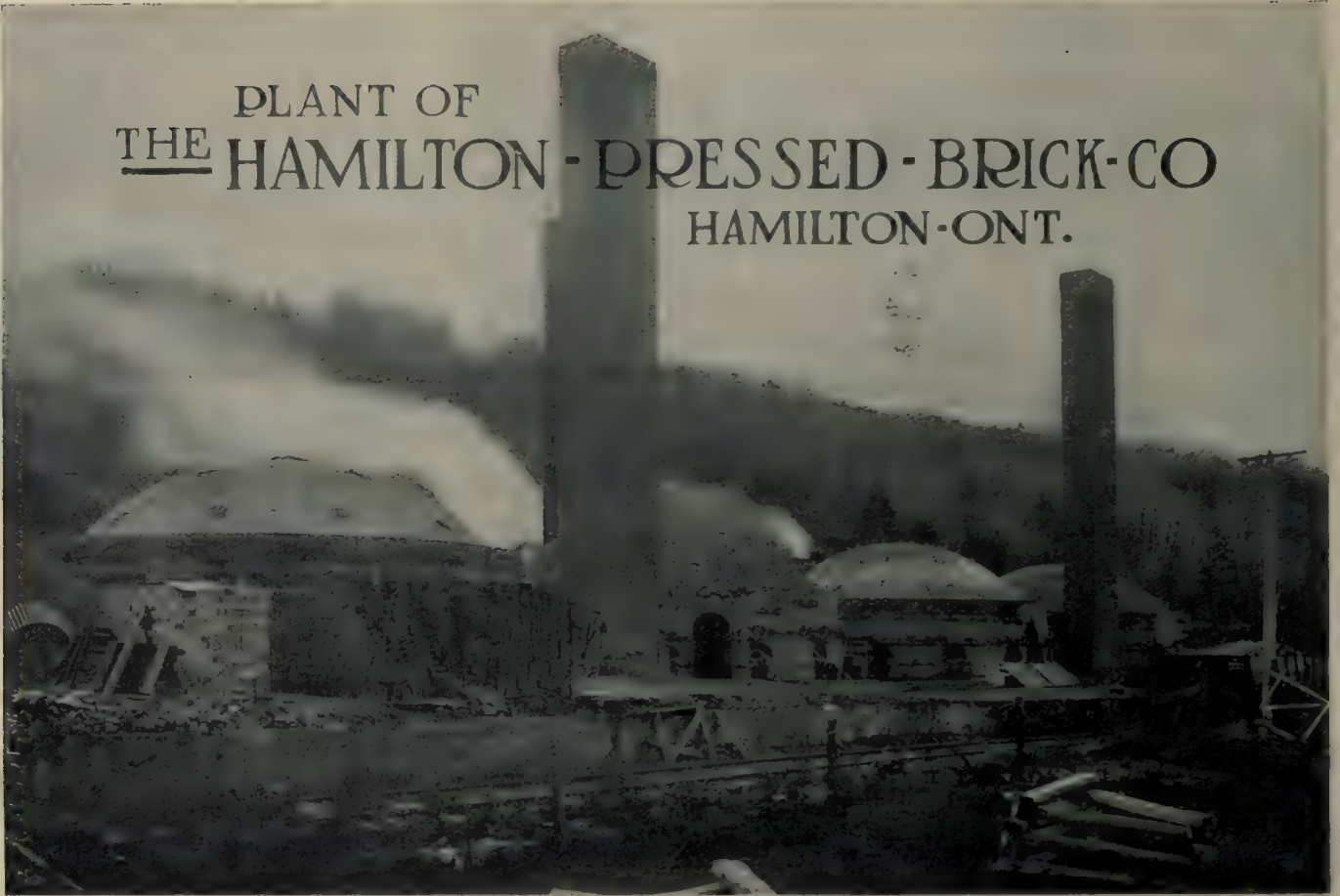
The head office of the company is located at Milton, Ont. Mr. C. J. Lewis is the proprietor of the concern and his son, Mr. C. B. Lewis, manager of the plant. The Toronto agent is Mr. John D. MacDonell, 19 Yonge Street Arcade, and the Montreal agent, Mr. E. F. Dartnell, 157 St. James street.

The Dominion Sewer Pipe Co., Swansea, Toronto, is erecting a brickmaking plant at Waterdown, Ont.



Clay Bank on the Property of the Toronto Pressed Brick and Terra Cotta Works

PLANT OF THE HAMILTON - PRESSED - BRICK - CO HAMILTON - ONT.



Hamilton Pressed Brick Company, Limited

The plant of the Hamilton Pressed Brick Company, Limited, which is located on the outskirts of Hamilton, Ont., is entitled to particular mention on account of the wide market for its products that has been created in something less than three years.

The company was organized early in 1908 by Messrs. Henry New and Robert W. New. The latter, who manages the

plant, has an intimate knowledge of practical brick making, and under his capable management the works have been operated with the greatest success. The company is working a superior and practically inexhaustible deposit of red shale clay just inside the eastern limits of the city. One of the most notable features of the plant is its excellent transportation service, the works being located on the main line of the Toronto, Hamilton & Buffalo Railroad, which connects with the C.P.R., M.C.R. and G.T.R. From the plant to the company's office in the Spectator Building, which is situated in the heart of the city, it is only a fifteen-minute run on the Hamilton, Beamsville & Grimsby electric car.

In the manufacture of Hamilton pressed brick, the shale is crushed in a dry pan and screened down to a Berg press, after which the bricks are set in the kilns and burned for about two weeks. There are four down draft brick kilns, each with an approximate capacity of 140,000 brick. The bricks are unloaded from the kilns right onto the railroad cars, as may be seen from the larger illustration. This is facilitated by the construction of the kilns, which have an entrance next to the press and an exit door adjoining the tracks.

The accompanying photo conveys some idea of the resources of the company's property. The depth of the shale bank varies from 30 to 80 feet, and the property has a frontage on the railroad of the best part of a mile.

The bricks of the Hamilton Pressed Brick Co., Ltd., have been specified for a number of important buildings, among which may be mentioned the collegiate institute, Brantford, Ont.; collegiate institute, Grimsby, Ont.; new public school, Goderich, Ont.; hydro-electric power stations at Dundas and Woodstock, Ont.; apartment house, London, Ont.; large addition to factory of Cockshutt Plow Co., Brantford, Ont., and the Oliver Chilled Plow Company's factory at Hamilton.

The firm's shipping territory extends over a wide area from Sault Ste. Marie, Ont., to Halifax, N.S.



A Section of the Inexhaustible Shale Property of the Hamilton Pressed Brick Company, Limited

With a practically unlimited supply of high grade red shale, unexcelled transportation facilities and an experienced and progressive management, the Hamilton Pressed Brick Company are sure to make rapid advances during the next few years. The annual capacity of the plant, at present, is between 4,000,000 and 5,000,000 bricks. In the near future this capacity will be greatly augmented. Even now the company is contemplating extensions that will double the output.

Few clay working concerns have had such a uniformly successful run of business as the Hamilton Pressed Brick Company, Limited. This is due largely to the fact that the president and vice-president have had a long and valuable practical experience in the clay working trade. It will be within the recollection of many of our readers that for a quarter of a century Mr. Henry New was head of the Hamilton and Toronto Sewer Pipe Company.

A Flourishing Brantford Industry

The fame of the city of Brantford, one of the foremost industrial centres in the Dominion, as a natural outcome, has become world-wide. One of its successful concerns is that of the Schultz Brothers Company, Limited. This industry has been established over forty years and is well known in contracting circles. One

of the most recent additions to this company's extensive industry is their silica pressed or sand lime brick plant.

It was in the spring of 1907 that this plant was installed, a splendid stretch of sand banks having been secured. This put the Schultz Company in a position to supply from their own products, the materials necessary for a structure from start to finish.

The accompanying illustration of the plant shows a portion of the sand bank, the process buildings, and the piled up product. The equipment of the plant is complete and up-to-date, and the different machines entering into the process are conceded to be the best of their several kinds in existence. The minimum capacity is 20,000 bricks a day. One feature of the process which puts silica brick on a plane reached by themselves is the short time required from when the sand leaves the bank and the lime the bins, until the bricks are piled up or transported. Twenty-four hours covers the entire process, the bricks being made and ready for use in one day.

We wish to draw attention, in passing, to one particular virtue of these brick. At the Schultz plant a well had to be excavated to take care of the condensation from the cylinders. This well is lined with sand lime bricks laid up loose. One of these bricks was removed after having been subjected to steady contact with the hot water while the plant was in operation, and after the bricks had passed through two winters of freezing. Upon inspection the brick was found to be none the worse for the ordeal,



View of the extensive plant owned by The Schultz Brothers Company, Limited, Brantford, Ont., showing Silica pressed brick plant (left background), planing mills and lumber yard

in fact, it was as hard as flint. This is a good example of the density, strength and low absorption of silica pressed bricks.

The Schultz Brothers Company are to be congratulated upon the rapid strides they have made during the four years in which they have been in the brick business. Their make of bricks has become popular all through the western half of the province, shipments having been made from Toronto in the east, to Lake Huron in the west, as far north as Port Elgin and down through the Niagara Peninsula. A number of the largest factory buildings, schools, churches and residences in the Dominion have been erected with Schultz silica bricks. Each successive season has resulted in a pleasing increase in the total number of bricks sold. It has been found necessary to keep the plant running on into freezing weather in order to supply the demand. The sales for 1910 will run considerably over the four million mark. This condition of affairs is due in no small measure to the fact that only A1 bricks are turned out, quality being the first thing studied. The shipping facilities, too, are such that prompt delivery can always be assured, a private siding connecting the plant with the G.T.R. Deliveries can also be made over the T.H. & B., M.C.R. and C.P.R. Approximately 700 car loads of the firm's output are handled in a year.

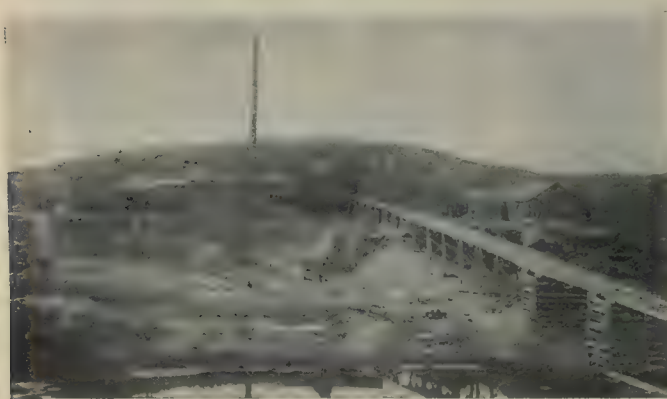
In the ordinary course of events, should the production of this plant run in proportion to previous years, extensive additions will have to be made in the near future

New Ontario Concern's Good Product

Topographically speaking, nobody ever accused Sudbury of being level, but its squareness must be admitted. From a post in the centre of the town, lines radiate one mile each way to the cardinal points. These lines form the diameters of the square which encloses the townsite. Just over the southern limit, on the Soo Line, are situated the works of the Sudbury Brick Company.

Their clay is an extensive bank of clean, rich Saugeen, the top eight to ten feet being weathered. This top weathered strata starts at the grass roots and makes an excellent red brick. The clay analysis is as follows: Silica, 63.20 per cent; alumina, 15.75 per cent.; ferric oxide, 4.67 per cent.; lime, 4.32 per cent.; magnesia, 2.73 per cent.; soda, 1.71 per cent.; potash, 2.80 per cent.; sulphur trioxide, .04 per cent.; loss by heat, 4.35 per cent.

The clay is mined in benches, which gives an even mixture of



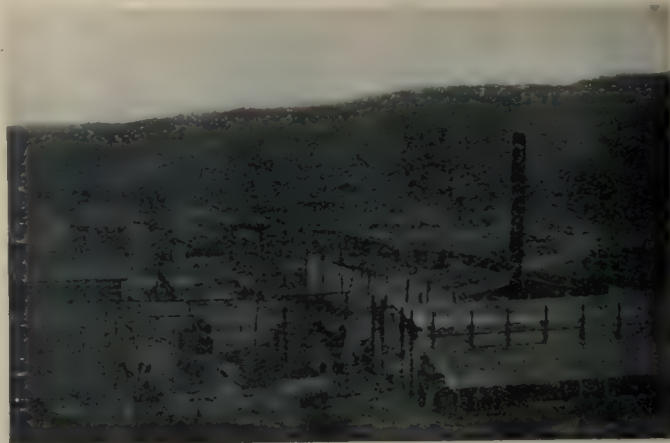
Sudbury Brick Company's plant, looking west

the full face, and is drawn by cars to the machine up an inclined trestle 500 feet long. This trestle is high enough to permit the car to dump its load directly into the machine, which moulds twenty-five thousand bricks a day. The green brick are then racked on Sheldon cars and transferred into a 5-tunnel dryer. The fan was bought two sizes larger than was usual for this size of dryer. The wisdom of this selection was soon evidenced by the splendid results obtained.

The brick machine and hoist are run by a 75 h.p. Leonard engine, and the fan by a 15 h.p. portable engine, both being fed

by a 100 h.p. boiler. This arrangement permits the shutting down of the main engine at night. During the day the exhaust steam from both engines is condensed in the heater, the hot water being returned automatically to the boiler. At night the exhaust steam from the fan engine is augmented by just enough live steam to form a complete condensation in the coils. From the dryer the brick are moved on the same cars to the kilns.

The company heretofore have always burned in scored kilns, but owing to the nature of the clay, 20 per cent. has been lost in burning. They are now adopting a system of down draught kilns, one of which is already erected. Others will be proceeded



Sudbury Brick Company's Plant, looking east

with as soon as the spring opens. The kiln ground is served with a spur and shipments are made either by car or wagon.

The company is composed of the following gentlemen: A. B. Gordon, Toronto, president; A. P. Turner, Copper Cliff, Ont., vice-president; L. O'Connor, Sudbury, secretary; N. T. Hillary, Toronto, treasurer; W. A. Evans, Sudbury, manager.

The works are under the direct superintendence of Mr. Jno. Hymas, whose early ceramic education was obtained on the banks of the Don.

National Fire Proofing Company of Canada

Experts have tested clays in the vicinity of Toronto for the past three years but have found nothing suitable for the manufacture of hollow tile fireproofing. Local clays all carry too high a percentage of lime to make fireproofing conform to modern specifications.

The National Fire Proofing Company of Canada have purchased about 150 acres of land situated between the Water-down Station on the G.T.R. and Hamilton, on which has been found a large deposit of very pure and plastic red-burning clay, which after exhaustive tests they found would make a high grade tile for general fireproofing and structural uses. It is essential in the manufacture of terra cotta fire proofing that the material be thoroughly burned, and without vitrification, as either imperfectly burned or vitrified tile is not suitable for fireproofing purposes.

The plant will be composed of several factory units. Factory number one will be equipped with dryer and kilns of the most approved type, and will have a capacity of fifty thousand tons of hollow tile per annum. This will be in operation in March, 1911. The other factories will be equipped and put in operation as the company's business expands. Factory number one will cover eight acres, and will be constructed with steel frame and hollow tile walls and roof.

The National Fire Proofing Company of Pittsburg have taken a substantial interest in the Canadian company, which will be fully equipped to carry on the manufacture of terra cotta hollow tile and also for general contracting for fire proofing construction.

A Well Known Machinery Plant at Parkhill, Ont.

The brick and tile machinery plant of H. C. Baird, Son & Company, at Parkhill, Ont., was established nearly half a century ago by the late Hugh C. Baird, who carried on a successful business in the manufacture of agricultural implements until 1895, when he bought the Canadian rights of the well-known patent Kells combined brick and tile machinery. Since then the firm has made a specialty of brick and tile machinery, besides carrying an extensive line of brick yard supplies. The concern was reorganized as a joint stock company under the style of H. C. Baird, Son & Company, Limited, in 1906. Their policy has always been one of progress and improvement, until now they claim to have the largest line of soft mud and semi-dry clay machinery, together with one of the best equipped plants in the Dominion.

In the Province of Ontario alone there have been sold over 350 Kells machines, nearly all of which are in successful operation at the present time. The company claim that 85 per cent. of the agricultural drain tile made in the province are manufactured on their machines. Of the soft mud machinery manufactured by this firm may be mentioned the iron and steel Quaker brick machine, operated either by steam or horse power. This machine has a capacity of from 10,000 to 30,000 brick a day. The Monarch and the Martin machines, the latter of which is now known as the Parkhill Martin A brick machine, have both made excellent reputations. Each has a daily capacity of from 30,000 to 50,000 brick.

The company manufacture a full line of iron and steel pug mills, clay mixers in all sizes, winding drums, automatic dump cars, wheel barrows, trucks, brick moulds, sanding machines, furnace doors, cast iron plates, grates, kiln bands and kiln irons of all kinds, shafting, pulleys, hangers and leather, rubber and canvas belting. They also handle new and rebuilt boilers and engines, suitable for brick and tile yard purposes.

The company are on an excellent financial basis, which enables them to buy in the best markets. This fact, combined with their economical production at Parkhill is accountable for their close quotations in all lines. The firm's products are known from coast to coast, the entire territory having been apportioned to the firm's travellers. The company's new business calendar and catalogue for 1911 may be obtained on application.

The Work of the Canadian Clay Products Manufacturers' Association

The Canadian Clay Products Manufacturers' Association was inaugurated some seven or eight years ago and held its first two meetings at London, Ont. The succeeding conventions were held at Waterloo, Toronto, Hamilton, Ottawa, Brantford and Chatham. The work of the Association is practical and helpful. Probably in no other industry is the co-operation of its members so essential as in the various branches of clay working. It is not too much to say that there are no two banks of clay from which identically the same results are produced in moulding, drying or burning, and the interchange of experience and technical knowledge is most beneficial. The main object of the Association, as defined by one of the most prominent members, is "to find out how to make the best article for the least money." The clay workers are fully alive to the value of adequate technical training and for some time a special committee of the Association has been endeavoring to interest the Government in the establishment of a ceramic school. That their efforts have not been entirely in vain may be gathered from the fact that the Government appointed a commission composed of Professor Ellis, Toronto University, Mr. S. J. Fox, M.P.P., and Mr. W.

McCredie, President of the Association, to visit the ceramic school established by the Ohio State University. A number of useful pointers were obtained across the border and a special report was duly placed before the Board of Governors of Toronto University and the Minister of Education. So far, no definite action has been taken by the authorities. This is due not to lack of effort on the part of the Association but rather to the failure of the authorities to appreciate adequately the extent and importance of the industry. When it is considered that many of the States of the Union have established clay working schools and that large appropriations are being made annually for their maintenance, it is a matter for astonishment that such a school was not established in Canada years ago. While the apparent results of the efforts made in this connection by the Canadian Association are small, much useful work has been accomplished. A permanent impression has been made, and it remains only for the Association to keep pegging away until they gain their end. With this object in view alone the existence of the Association is amply



MR. W. MCCREDIE, Lyons, Ont., President of the Association

justified. But no justification is necessary, for it is regarded almost as a *sine qua non* by the trade in the interests of which it operates.

Montreal Terra Cotta Lumber Company

The Montreal Terra Cotta Lumber Company have recently purchased a 45-acre site at Lakeside, near Montreal, and will remove their plant at present situated in Maisonnive. The plant will then consist of five kilns and will be driven by electricity, power being derived from Stawanigan Falls.

A large number of buildings around Montreal and vicinity are built of terra cotta supplied by this firm. Among those are: Royal Victoria Museum, Ottawa; Earl Grey School, Montreal; Sarah Maxwell School, Montreal; Technical Manual Training School, Montreal; Quebec "Telegraph" Building, Quebec; two of the McGill University Buildings; Government Technical School, Quebec; Museum, Laval University, Quebec, the Trust and Laval Building, Montreal, and many others. The firm's output last year was over 20,000,000.

Many things can be said in favor of terra cotta: it is not only absolutely fireproof but is also more nearly sound-proof than any other solid construction can be; it carries the lowest insurance rates; is a better fire and water resisting material than dense or semi-porous tiles, and is therefore the most desirable for floor arches, partitions and numerous other purposes.

Brick Resources of the Federal Capital

Interesting Facts Concerning the Supply and Demand at Ottawa —The Principal Concerns, their Equipment and Output—Trade Notes

Correspondence of the Contract Record

Ottawa is particularly a city of brick. A few of the residences, as well as the government buildings, are of stone, but the mass of structures, both residential and commercial, are of red or white brick. In spite of the preponderance of this kind of building there is very little other than the common veneer clay brick or silicate used in dwelling construction. There is no plant in the city, or very near it, where pressed brick is manufactured, and what is used has to be shipped a considerable distance.

At a meeting of the clay manufacturers a few years ago in this city, it was claimed that Ottawa producers made too good brick or not good enough. The explanation was that while no pressed clay brick was made the common brick was unusually good.

The production capacity of the brick plants within or at the borders of the city totals about 18 to 20 million a year. The largest producers are the Silicate Brick Company, of Ottawa, the Ottawa Brick Manufacturing Company, and the Peerless Brick Company—which has just come under the management of the Merckley Brothers, of Casselman. Another company, operating at Russell, has been organized to produce shale brick for the Ottawa market.

Brick ranges in price all the way from the best clay common brick at \$21 a thousand to \$8 a thousand delivered within the city limits. Manufacturers pay their men with teams \$1 per thousand for delivering the brick in all parts of the city.

The demand for brick this spring and summer was the largest, it is believed, in the history of the city. The local producers were unable to cope with the requirements, and a certain amount of building was held up for some time on account of the scarcity. It also resulted in other towns of the Ottawa Valley pouring car loads into the local building districts.

The demand for next spring has every evidence of being greater than that of this year. The Blackburn building, tenders for the construction of which have been called for, will eat up about 1½ or 2 million. The expectations are that the Government departmental building on MacKenzie avenue will be started early in the spring. One or two industries, and perhaps more, are also preparing to erect plants in the spring. These things, added to the general building, ought to produce a big demand. To meet this there is very little brick, comparatively, in the local yards. The Ottawa Brick Manufacturing Company has sold out its supply entirely and the Peerless has very little, if any, on hand. These firms do not manufacture in the winter. The Silicate plant has a larger supply yet in its yards and can manufacture all winter. It is, therefore, anticipated that the supply in the early spring will be none too plentiful. However, once the plants get going, particularly the Peerless, they will be able to produce much more than last year, so that the shortage should not last long.

One of the big users of brick this summer was the Chateau Laurier (The Grand Trunk hotel). It took about 2,500,000, all of which came from Casselman. This was utilized for backing up the stone which forms the outside of the building. Hard red common clay brick was used.

The Ottawa public school board produced an extensive demand on account of its two big schools, built in Ottawa South and Breeze Hill. These two buildings took about 800,000. The Westboro' public school, just outside the city, took about 200,000, and the Eastview school about 200,000. All of this brick, with the

exception of that used in the Eastview school, was supplied by a local firm.

The Hope building, now in course of construction, will take about half a million brick. About 175,000 for the interior walls is of terra cotta (red), purchased from Weiser & Sons, Arnprior. The remainder was silicate. The Rideau Club House, nearing completion, took about 300,000 silicate brick. The fronts on all the sides facing the streets are of cream terra cotta, of English production.

The corporation used about 200,000 brick in sewer construction. The Matthew Building is to be faced with enamel brick from the Don Valley Brick Works. This will extend over two sides. The Canadian Life Building, completed in the spring, used about 100,000, and the Rosenthal Building about the same amount. Both these buildings will have facades of terra cotta imported from Great Britain. The big Westminster apartment house was faced with pressed brick from the Milton Brick Works. The National Paper Box factory, just completed, has half a million brick in its walls, and the Slinn-Shouldis bakery will use nearly as many. The latter has been started quite recently.

The Ottawa Brick Manufacturing Company, Limited, produced about 6½ millions of clay brick this summer. It has one plant in Ottawa East and one at Hog's Back, just outside the city. Next year the company expects to produce over seven million, when the Hog's Back plant is running more smoothly. This plant has three machines, operated by steam, and the Ottawa East has two machines, operated by electricity.

A Description of Canada's First Silicate Brick Plant.



J. A. BULLMAN, Manager
Silicate Brick Works

A very popular brick in Ottawa is the silicate. The local firm, the Silicate Brick Company of Ottawa, Limited, will produce this year about eight millions. This was the first silicate brick plant to be built in Canada and began operations about eight years ago. Silicate, or sand-lime brick, are produced by the chemical action of high grade lime and pure sand, under a high steam pressure. Pure sand, when brought into contact with hydrated lime (calcium hydrate) and water under the influence of a high temperature, produces a silicate of calcium. This compound, like all other silicates, becomes a very hard substance, particularly with age, and is claimed to be less affected by frost and water than other brick. It possesses great crushing resistance. In a recent government test, in connection with the construction of the new Ottawa Y. M. C. A., silicate brick crumbled at 83,920 pounds pressure, and clay brick used in the construction at 67,200 pounds. The silicate brick resembles Indiana limestone and can be made any color by the addition of pigments. It is different from natural stone, however, in that chemical action is uniform throughout.

The Ottawa plant is situated on the bank of the Rideau canal within the city limits. It secures its lime from the Wright Company, Hull, in stone shape. Clean bank sand is used. It is contracted for and brought from a bank at Black Rapids, on the



Plant of the Silicate Brick Company of Ottawa, on the Rideau Canal. The two smoke stacks are from boilers which produce steam for drying and hardening. The plant itself is operated by electricity.

Rideau river. It is transported in barges seven miles to the works. About 20,000 cubic yards of sand is used in the manufacture of eight million brick. The lime is hydrated one day and used in the production of brick the next.

The sand and lime are mixed in a mechanical mixer. The proportion varies with different qualities of lime or sand, but is usually about four parts sand to one part lime. The mixture is transferred to the presses, where every two brick are subjected to a pressure of 125 tons. Each press has a capacity of 36 brick a minute. This plant has two presses and the normal output is 34,000 per day. The management allow a bonus of five cents per thousand for each man in the works for any amount over the 34,000 produced in a day. The brick, after coming from the presses, are piled on cars (about 900 on each car) and passed through cylinders filled with steam. This part of the manufacturing is done at night. The brick are submitted over night to a high steam pressure, and when taken out in the morning are dry and ready for use. Although very warm they may be piled in the snow without deteriorating results. Electric power is used throughout, even in unloading the sand from the barges. About 35 horsepower is used. Twenty-eight men are employed in the works, not including teamsters.

There are no hard and soft classes of silicate brick. There is, however, a second class sold, which is of bricks that are less regular, used for interior work. The natural color is grayish white and this color is therefore cheaper than the colors produced by adding pigments. The prevailing demand is for white or dark red.

The marked growth of the silicate brick business in Ottawa has shown that in the three requisites, style, durability and price, the product is right. During the first year that the present manager, Mr. J. A. Bullman, had charge of the plant, that was in 1905, there were 750,000 brick sold. This year more than 5,000,000 have been disposed of. The capacity of the plant was doubled this year and the management will be able to cater to the outside trade in the future.

In most of the largest of the more recently erected buildings in Ottawa, this brick was used, such as in Bennett's Theatre, Canada Life Building, Canadian Building, Hope and Rosenthal Buildings now in course of construction, Rideau Club, Family Theatre, Matthew Building, and the new fire hall. The brick ranges in price from \$8 to \$11 per thousand, delivered throughout the city.

The Peerless Brick and Tile Company did not produce as much brick this year as usual. It began the season manufacturing wire-cut brick, which did not prove satisfactory, and the company reverted to its former methods. However, the entire plant and equipment has been sold out to a local syndicate and it is expected that the output will be doubled next year.

Fire Brick for Building Purposes

Fire bricks are coming more and more into use for building purposes throughout this country, architects and contractors specifying them for construction work, particularly in large buildings such as hotels, theatres, churches, public halls, etc.

Of the different fire bricks on the market at the present time, those of the "Glenboig" and "Gartcosh" brand, manufactured by the Glenboig Union Fire Clay Company, Limited, of Glasgow, Scotland, are well known to leading architects and contractors. Many buildings in different parts of Canada attest to their superiority. Notable among these are the Chateau Frontenac, Quebec, which was constructed entirely of Glenboig fire brick.

In 1836 "Glenboig" brand fire brick was first placed on the market. Since then the demand has steadily increased, until now in all large centres of the world the brands are to be found in some of the largest construction.

A high degree of infusibility is possessed by the "Glenboig" and "Gartcosh" brick. Another good quality which they have is that of suffering practically no expansion by heat or contraction by cooling, in consequence of which they neither crack nor fall out of the position in which they have been built. The practical test in the furnace is the only reliable one, and it is on that test, with years of experience that the fame of Glenboig rests, and which accounts for the great extensions of the Glenboig Company's business, now the largest of its kind in Europe.

Alex. Gibb, 13 St. John St., Montreal, is the selling agent for "Glenboig" and "Gartcosh" brand fire brick. They are also stocked by all leading dealers throughout the country.

The Jamieson Lime Company, of Renfrew, Ont., have lately purchased the two brick industries in Renfrew formerly owned by the Renfrew Brick & Tile Company and F. Hillyard. The Company is now operating the three plants, giving employment to over 80 men. The Renfrew lime manufactured by this firm for so many years is well known to contractors and has a wide sale from Fort William east. The proprietor, Mr. J. A. Jamieson, intends making an additional feature of brick and tile.

Mr. R. Forke, reeve of Pipestone, Man., has been elected president of the Manitoba Union of Municipalities. The next annual meeting will be held at Brandon.

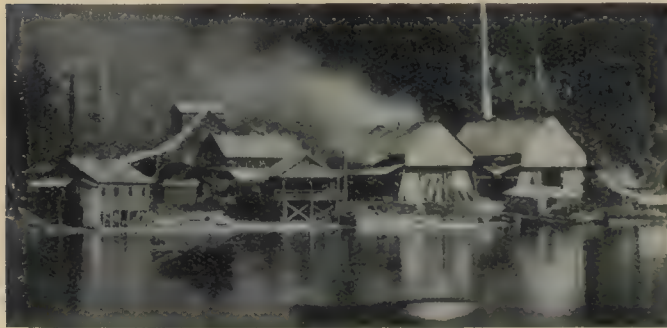
Rapid Development in British Columbia

Manufacturers Making a Determined Effort to Supply the Needs of the Home Market — The Clayburn and other Leading Plants

Correspondence of the Contract Record

The tremendous progress made by British Columbia during the past few years has far surpassed the expectations of most firms engaged in manufacturing for the supply of the home market, the result being that the output in all lines has been entirely inadequate. When possible the deficiency was supplied by placing orders with Eastern manufacturers, but in the case of various lines the product could not bear the transportation charges, and recourse was had to United States manufacturers, Washington, Oregon and California dealers reaping a rich harvest of orders.

Take the case of brick, for instance. Twenty years ago there were comparatively few brick buildings in British Columbia, hence little attention was paid to spying out possible deposits of brick-making clay. As time passed and a small demand developed, it was supplied mainly by the hand-made article, but later on a number of small capacity steam plants were started up here and there, the trade being entirely local, the quality poor, the price excessive, and the supply always an unknown quantity. When Vancouver and other towns took on healthy growth, and



Pitt Lake Brick and Cement Company's Plant

brick business blocks began to replace the frame structures, facing and common brick had to be procured from Seattle, while the fire brick required by the growing industries had to be secured from the old country. Then a number of large contracting firms established plants for the manufacture of common brick, several companies got busy and ordered expensive brick-making machinery, and the number of Chinese engaged in hand-moulding operations was doubled and trebled, yet still the importations grew in volume, owing to the increasing scope of the building operations and the substantial class of buildings being erected.

To-day—twenty years later—the situation is very similar, so far as the market supply is concerned, but it would be unfair to place the blame upon the shoulders of the manufacturers. They are making determined efforts to supply the deficiency and keep the people's money at home, but in several instances have been hampered in their schemes for enlargement by lack of capital. Large brick plants are very costly, and unfortunately two or three hastily-planned enterprises of the kind proved unprofitable for the shareholders, the result being that capital for a time was difficult to secure. However, the industry may now be said to be on a first-class footing, and very soon the combined output will render importations entirely unnecessary. The Clayburn Manufacturing Company, making high grade pressed brick in four colors, fire brick unexcelled by the best Scotch, as well as paving and common, has already attained an output of 55,000 per day—soon to be increased to 75,000; the Anvil Island Brick Company is about ready to commence operations with a daily

output of 30,000 pressed red; and the Pacific Pressed Brick Company, Beach avenue, Vancouver, are having a Steger System plant installed, the daily capacity of which will be about 40,000. This will be in operation in the course of a few weeks.

Some of the principal plants manufacturing common brick are: Port Haney Brick Company, Port Haney, on the Fraser river; John Coughlin & Sons, near New Westminster; Victoria Brick Company, Vancouver Island; Port Moody Brick Manufacturing Company; Silica Sand Lime Brick Company, Vancouver Island; Sidney Island Brick Company, Pitt River Brick Company, and the Columbia Clay Company. In addition, there are several good-sized plants at points in the Mountains.

Pitt Lake Brick and Cement Company.

The plant of the above company is located 28 miles northwest of the city of New Westminster, and is owned by Mr. E. J. Fader, a prominent business man of that city. Pressed brick is produced, the output being about 20,000 a day. Mr. Fader has been in England for some months, and has just succeeded in bonding his brick property for a large sum. This will doubtless lead to an enlargement of the plant and the investment of considerable new capital.

Fraser River Brick and Tile Company.

This plant is situated in Ladner municipality, on the south side of the Fraser river, and is owned by Hemphill Bros., the well-known Vancouver contractors. The daily capacity is 40,000 common brick, but the actual output does not average more than one-half that quantity. A six-tunnel steam dryer is used. The firm require the six or seven million brick turned out for their Vancouver building operations, and in addition they have to import some three or four millions of pressed brick annually from Seattle. Messrs. Hemphill contemplate putting in a soft mud plant during the winter, increasing the capacity by 30,000 per day. The plant is operated with steam power.

"One of the Finest Plants in the Dominion."

This was the verdict of a well-known Vancouver brick expert, following a visit of inspection to the new pressed brick works of the Anvil Island Brick Company, Limited, which is situated on Anvil Island, Howe Sound, about 22 miles northwest of Vancouver. The plant, which is just approaching completion, will be turning out by the first of the year, red pressed brick of unrivalled quality and color, judging from samples shown. The capacity of the works will be 30,000 daily, there being six repress machines, with grinding pans, etc., from England, and three improved down-draft kilns of large size.

Construction work on the plant was commenced about twelve months ago, since which time a large staff has been constantly employed. In addition to the plant proper, a large boarding house, a residence for the manager, and several cottages for married employees, have been erected. Between 80,000 and 100,000 yards of excavating had to be done.

English capital is interested in the enterprise, which is regarded as being one of the most promising brick propositions in the Dominion of Canada. The president of the company is Mr. Frederick Lance, a gentleman of large experience in the brick business; while the manager, Mr. M. B. Taylor, who acted as engineer and superintendent of works during construction, has embodied in the new plant all the improvements suggested by a lifetime of practical association with brick industries in the old country.

British Columbia's Largest Pressed Brick Plant

Some eight or ten years ago fire clay deposits of large extent were discovered in the New Westminster district at a point about two miles west of the town of Abbotsford, on the C. P. R., and about 40 miles east of Vancouver. With the enterprise and energy for which British Columbia people are noted, the "find" was not long allowed to remain undeveloped, the growing demand for brick supplying the needed spur to action. The Vancouver Fire Clay Company was organized with a considerable capital, the shareholders including prominent local men and some

Under such circumstances it is little cause for wonder that when these conditions appeared to have become chronic, some of the stockholders evinced a disposition to withdraw. Eventually they did so and a little over a year ago the plant was taken over by the Clayburn Brick Company, comprising members of the original company who continued to have faith in the enterprise, and several newcomers, among whom were Mr. Roger Miller, of Toronto, and Mr. C. C. L. Wilson, of Ingersoll, Ont., each of these gentlemen becoming directors of the new company. The new owners were determined to profit by the mistakes of



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Clayburn Brick Company's Extensive Plant: (1) Entrance to One of the Company's Mines; (2) View of Works from North; (3) Office and Transportation Facilities; (4) View of Kilns; (5) View of Plant from South Side.

Eastern capitalists who happened to be looking for an opportunity for investment in that line. Eight hundred acres of land were acquired and in due time a large plant was erected about a mile north of the railway track, the various buildings, kilns, drying sheds and dwellings for employees forming a little village to which was given the appropriate name, "Clayburn." The initial investment was a large one, and the troubles which mark the early history of most brick plants soon cropped up. Bricks of excellent quality were turned out, but breakdowns were frequent; the daily output fell far short of the capacity of the plant, and dividends appeared to have no connection with the industry.

their predecessors, and their first efforts were devoted to securing a competent expert to assume the management of the plant. They were fortunate in obtaining Mr. J. B. Millar, for eighteen years superintendent of the Don Valley plant, and known everywhere as a successful manager and first-class brick and tile expert. Mr. Millar reached Clayburn in June of last year. After inspecting the plant and clay deposits, and carefully investigating the possibilities, he manifested his faith in the future of the enterprise by purchasing a large block of the stock of the company.

Then followed an era of progress, the improvements being effected gradually so as not to interfere with the operation of

the plant. In the course of a few months the daily output was raised from 12,000 to 25,000 bricks, simply by readjusting the machinery and adopting better methods in connection with the handling of the raw material. Last winter two new kilns were erected, and there are now three large dry-pans in use, one of which—built by the Berg Manufacturing Company, of Toronto—was installed this season. Other additions to the plant comprised a granulator of large size for the manufacture of common brick, which was supplied by A. E. Doig & Company, of Toronto, as well as new conveyors and rolls for pulverizing, built by the Vancouver Engineering Works, which firm also furnished a number of dump cars of five-yards capacity each, for handling the clay material. As a result of these and other changes completed in June last, the output was further increased to 50,000 bricks in ten hours. Even this does not content the energetic manager, who hopes to reach the 75,000 mark in the near future. At present the machinery is driven by a new Wheeland engine, steam being furnished by a 150 h.p. boiler. Mr. Millar had planned early in the season to instal electricity, and had purchased motors to generate 500 h.p., but at the last minute the Vancouver Power Company decided that it could not spare that amount of energy until the completion of the new development plant at Lake Coquitlam, which will be some time next season.

Present and Future Facilities.

There are three large rectangular kilns, each of 200,000 capacity, and six circular down-draft kilns of 50,000 to 80,000 capacity. The common brick are burned, for the present, in ordinary scove kilns, which are built as required. During the winter the company will add to their facilities by erecting a large continuous kiln for burning fire brick and common brick. The company also contemplate establishing, in the near future, a sewer pipe plant for making pipe from four to twenty-four inches in diameter. This project is due to numerous requests from contractors and others, who realize that the superior grades of clay available should produce excellent pipe.

A Well-Equipped Private Railway.

To ensure the economical handling of the raw material required to keep the big plant in operation, a narrow-gauge steam

mined similarly to coal, being taken out in small mine cars to an overhead platform and dumped into the larger cars on the track beneath. The shale and fire-clay used in the making of fire brick and paving brick, is found about a mile further on; it is also secured by mining methods, being dumped into large bunkers erected alongside the track, from which it is taken as required. At the plant, the locomotive hauls the loaded cars



MR. J. B. MILLAR,
Manager Clayburn Brick Company's Plant

up a trestle leading to capacious bunkers, into which the material passes to be fed into the several grinding machines as needed, by shovellers stationed below. A combined narrow-gauge and standard spur line extends from the plant to the C. P. R. and B. C. E. R. tram tracks, about a mile distant, over which loaded cars for shipment and return empties are moved expeditiously by the company's locomotives.

Nature Has Solved the Fuel Question.

As all brick manufacturers fully appreciate, the fuel question stands for one of the big items of expenditure in the operation of plants. Here in the West, where hardwoods are lacking, enormous quantities of the lighter woods are required for the firing of the kilns. For this reason the directors were enthusiastic when a seam of coal of excellent steaming quality was uncovered some time ago by the miners engaged in blasting the fire clay formation. No attempt has been made to open up the seam, but a sufficient quantity is being taken out daily with the clay to supply the power plants at both mines. As fire clay always occurs in juxtaposition with coal, and as there is a mountain of the material to work upon, there is reason to believe that, when the seam is properly developed, later on another large source of revenue will accrue to the company.

The officers of the company are: S. J. Castleman, president; W. H. Armstrong, vice-president; J. J. Plommer, secretary-treasurer; J. B. Millar, manager. Evans, Coleman & Evans, Limited, Vancouver, are the general sales agents. The head office of the company is located in the Imperial Building, Seymour street, Vancouver.



MR. J. S. CASTLEMAN,
President Clayburn Brick Company

railway line, three miles in length, had to be constructed to tap the various deposits. The rolling stock comprises two locomotives, and a number of self-dumping cars. The common clay is secured at a point only about a quarter of a mile distant from the works, a steam shovel dumping the material into the cars on the track alongside. Clay used in making the various grades of facing brick is found about two miles away. It is

At Brockville, Ont., last week the death occurred of Robt. G. Harvey, at one time a well known railway contractor and promoter. The deceased was in his 70th year.

The Moose Jaw Pressed Brick Company, Limited, Moose Jaw, Sask., have installed a sand lime brick plant, with a capacity of 22,000 per day, and will commence operations next February. Mr. F. H. Strong, the president of the company is very optimistic over the prospects. When in Toronto recently he told the "Contract Record" that he had sold all the next year's output of his plant.

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Modern Sewer Pipe Plant at New Glasgow, N. S., operated by the Standard Drain Pipe Company

Standard Drain Pipe Company

The Standard Drain Pipe Company, of St. Johns, P.Q., Limited, was established under Dominion charter in 1884. The company own and operate two sewer pipe factories, one at St. Johns, Que., and one at New Glasgow, N.S., and a fire clay factory at St. Johns, where they manufacture stove linings and all kinds of fire clay goods. At New Glasgow, N.S., the company own an up-to-date plant and an excellent property with 40 acres of clay, and shale 60 feet deep over the whole area. The St. Johns' factory, which was rebuilt in 1907, is located on an excellent property of 50 acres, underlaid with 30 feet of clay over the whole area. The company is operating 18 kilns of 33 feet and 37 feet inside diameter. The capacity of the plants, which is taxed to the utmost, is over 2,000 carloads per annum.

The goods manufactured by the company include salt glazed vitrified sewer pipe and connections, culvert pipe, wall copying, chimney tops, vases, chimney linings, and all kinds of fire clay and vitrified goods. The head office of the company is at St. Johns, P.Q. The officers are as follows: president and general manager, W. C. Trotter (Assoc. Mem. Can. C. E.); vice-president, G. H. Balfour (general manager, Union Bank of Canada); secretary-treasurer, H. G. Perchard.

The First in the Field

The Hamilton & Toronto Sewer Pipe Company, Limited, of Hamilton and Toronto, is said to be the oldest sewer pipe company in America, it having been established in 1860. The factory is located on Wentworth street, North Hamilton, Ont., and the head office is also in that city. There are branch office at Toronto, Ont. Mr. J. H. New is the president of the company and Mr. R. H. New, vice-president. Being centrally located the company are in a position to give prompt shipment to their large list of customers throughout Ontario. They also have an extensive busi-

ness in the other provinces of the Dominion. The corporation of the City of Winnipeg recently ordered upwards of one hundred cars from the firm. They manufacture the famous "Hamilton Salt Glazed Vitrified Sewer and Culvert Pipe" in various thickness and sizes; also all lines of sewer pipe fittings, chimney tops, flue linings, wall coping and other articles well known to buyers of clay products. During 1909 their output was about one thousand carloads. During 1910 they have had a considerable increase over last year's business, and 1911 is expected to be an all round record-breaker.

The Largest Paving Brick Industry in the World

A concern which lays claim to be the largest producer of paving brick in the world is the Metropolitan Paving Brick Company, of Canton, Ohio. The output, according to Government statistics, is 125,000,000 paving brick and block annually—more than one-eighth of the entire production in America. Six enormous plants are operated by the company.

One of the features of Metropolitan Paving Brick is its uniformity. Carload after carload is sent out year after year without there being the slightest change of character in the material. And the company can maintain their production at the same rate for generations, the supply of shale being practically inexhaustible.

Selected Metropolitan block in different shades of colors is now being used extensively for building purposes. During the last few years architects have begun to realize the possibilities of this block and it is now becoming an important feature of the company's business.

The officers of the company are: C. W. Keplinger, president; W. E. Keplinger, vice-president; J. J. Sullivan, vice-president; H. S. Renkert, treasurer and general manager; H. G. Barbour, secretary; A. P. Maurer, manager of sales.



37-foot Kilns at the St. Johns Factory



St. Johns, Que., Factory of Standard Drain Pipe Company

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aylmer, Que.

The town council will be requested to extend the waterworks to the summer resorts, Echo Bay and The Cedars.

Burnaby, B.C.

Re the proposed Burnaby water system and costs, Mr. McPherson, municipal engineer, reports proposed area to be 2,841 with 42 miles of reads; cost, \$150,000, of which the details are as follows: Wood pipe, trenching, laying and backfilling, \$105,000; connections, \$5,000; complete Kewanee plant, tank and two pumps, \$5,000; engineers' fees, \$7,000; pump house and miscellaneous work, \$10,000. Messrs. Wearts, Sanderson and George were appointed as a committee to act in connection with the committee appointed by the Burnaby council regarding the matter.

Chilliwack, B.C.

The Young street expropriation by-law was defeated.

Hamilton, Ont.

It will be necessary for the reconstruction of the Hess street sewer, owing to the accumulation of iron rust. Estimated cost, about \$2,000.

Hull, Que.

Mr. A. Earley has been instructed to prepare estimates of the cost of a sewerage system for Wrightville and Walkerville, in Hull.

Lachute, Que.

The ratepayers decided to purchase the waterworks system of the Laurentian Water & Power Company and also sanctioned the loan of \$20,000 for the improvement of the system. R. T. Leclerc, Montreal, effected the sale.

London, Ont.

It is probable that the cement work on Dundas and Richmond street pavements will be done by the city. The Barber Asphalt Company have the contract for resurfacing these pavements, but no contract has been awarded for doing the cement foundation work.

Moncton, N.B.

The council is considering the construction of a reservoir to cost \$200,000 to \$250,000.

North Vancouver, B.C.

Tenders were called until December 15th for clearing and grubbing on portion of the Marine Driveway at Deep Cove. Plans, etc., with J. R. Cosgrave, district engineer.

Tenders addressed to the City Clerk will be received until January 3rd for the installation of sewerage system here. Pipes will be laid in about nine streets. Geo. Hanes, city engineer. Vitrified pipe will be used, it is stated, by press reports.

Oak Bay, B.C.

Tenders addressed to R. Fowler, Bastion street, Victoria, municipal engineer, will be received until December 27th for supplying

British cast iron water pipe and special castings.

Point Grey, B.C.

Tenders addressed to H. Floyd, C.M.C., Kerrisdale, will be received until December 29th for supply of special castings. Specifications, etc., at office of the engineers, Cleveland & Cameron, 506 Winch Building, Vancouver. Time extended to Jan. 11th.

Also until Jan. 11th tenders for valves and hydrants will be received.

Toronto, Ont.

The City Engineer was asked to report on the probable cost of widening Bloor street west from Dundas street to High Park.

Victoria, B.C.

The ratepayers will be asked to vote shortly on a by-law providing for the development of Sooke Lake as a source of water supply for Victoria.

Tenders are called until January 1st, 1911, for the reorganization, improvement and extension of private water supply system on country property, including trenching, damming, concrete tanks and machinery for purposes of home and farm supply and water power. Address 722 Colonist Office.

Vancouver, B.C.

The C. P. R. will install waterworks in the section known as the railway reserve. Approximate cost, \$4,890. Agreement is pending.

Bids will be asked on pipe in the proposed improvement of waterworks, as all other work will be carried out by day labor. Wm. McQueen, City Clerk. W. A. Clement, City Engineer.

It was decided to call for tenders for laying the lateral sewers south of Broadway to connect with the Yukon street trunk sewer and its branches. The engineer promised to present estimates for lateral connections for the Glen Drive sewer.

Winnipeg, Man.

Tenders for the immediate construction of sewers on Carter avenue from Wolf to Cameron and on Wolf avenue from Carter to Nairn, and for the construction of water mains on Salter street, on Ellice avenue from Ingersoll to -arfield street, and on Helen from Rathgar to Merriem, will be called at once.

AWARDED.

Kipp, Alta.

The Munderloh Company, Montreal, have secured an order for 16,000 feet of Mannesmann seamless steel piping for purposes of water distribution at the Chanook collieries here. About 40 miles of this piping have been delivered to Western Canada.

Prince Rupert, B.C.

The Westholme Lumber Company has been awarded the contract for the grading of Second avenue, their tender of \$100,000 having been accepted. This is the heaviest piece of rock work undertaken as yet in the new northern city. The company will com-

mence work at once and expect to complete the job within ninety days.

Winnipeg, Man.

Contracts for sewers and water mains amounting to over \$107,000 were as follows: Main trunk sewer on Clifton street, from Portage to Sargent avenues, Thomas Kelly & Sons, \$92,991. Thomas Jackson & Sons, sub-main sewer on Sargent avenue, from Clifton to Strathcona streets, \$6,437. All the other contracts—five in number—were awarded to the engineer of construction, his tenders being the lowest in each case.

The following engines for the National Transcontinental Railway for power house equipment in Winnipeg shops will be built and installed by the Goldie & McCulloch Company, Limited, Galt, Ont.:—Three 21 inch and 34 inch by 30 inch, 750 i.h.p. cross compound, heavy duty non-condensing Corliss engines, each direct connected to one 500 k.w. three-phase 60-cycle generator, speed 150 r.p.m.; one 18 inch by 30 inch 375 i.h.p. heavy duty, simple non-condensing Corliss engine, direct connected to one 250 k.w. three-phase, 60-cycle generator, speed 150 r.p.m.; one 14 inch by 30 inch, 225 i.h.p. heavy duty simple non-condensing Corliss engine, direct connected to one 150 k.w. direct current generator, speed 150 r.p.m.; two 11 inch by 12 inch (exciter) side crank, non-condensing Ideal engines, direct connected to 75 k.w. d.c. generators, speed 275 r.p.m., 115 h.p. each.

Railroads, Bridges and Wharves

Belleville, Ont.

The Roads and Bridges Committee of County Council presented a report which showed \$403,000 was required to rebuild the present wooden bridges in order to make them up-to-date structures.

Guelph, Ont.

In regard to the settlement of the controversy between G.T.R. and city, the city gets \$9,000 for Jubilee Park and a number of concessions from the company, the most important of which is that the company builds a foot subway at Neeve street, to cost about \$2,500. They did not say when building operations on the station might be expected to begin, but stated that they would have the plans changed according to the settlement, so that it might be approved of by the Railway Commission at its next sitting in Toronto.

London, Ont.

A plebiscite will be taken on the advisability of building a bridge over the Thames to connect South and West London.

Margaree Harbor, N.S.

Tenders are called until January 4th by the Public Works Department, Ottawa, for construction of an extension to breakwater here.

North Vancouver, B.C.

Soundings and surveys of the Second Narrows have just been finished by the Burrard Inlet Tunnel & Bridge Company

and the results are reported as very satisfactory.

Owen Sound, Ont.

The ratepayers will vote on by-law to provide \$20,000 for a new permanent bridge at 10th street and a wooden bridge at 9th street.

Prince Rupert, B.C.

It has been decided by the Provincial Government to invite tenders for construction of the overhead approaches to the Government wharf at Prince Rupert.

Quebec, Que.

Tenders addressed to W. D. Baillairge will be received until January 11th for construction of a steel swing bridge over St. Charles river. Bids must be for bridge complete, including substructure, superstructure and approaches.

Regina, Sask.

The G.T.P. will make this city an important divisional point for three of its branch lines.

Vancouver, B.C.

Plans have been submitted to the bridges committee for the proposed viaduct connecting Harris street with Georgia street with a "Y" extension from Dunsuir street connecting with the viaduct proper, and the proposed bridge crossing False Creek at the foot of Burrard street. The cost of the former structure is estimated at \$551,250 by City Engineer Clement, while that of Burrard street will cost approximately \$600,000 for a steel structure. An estimate of the cost of a reinforced concrete bridge, prepared by Mr. George H. Webster, from Burrard street to a point west of the Lulu Island tram bridge at Kitsilano, is \$1,000,000. The matter was referred to the finance committee. Should it be decided to go ahead with the work of erecting either of these bridges it will be necessary to make application to the Dominion Government for the right to open Creelman avenue through to the waterfront, thus giving access to Kitsilano and West Fairview.

AWARDED.

Calgary, Alta.

It is stated that the Parsons Construction Company has been awarded the contract by the C. P. R. for an overhead bridge, \$35,000.

Lethbridge, Alta.

The Board of Railway Commissioners has authorized the building of two new bridges west of Lethbridge by the C. P. R., one at mileage 2.6 and the other at mileage 10.6. Both bridges will be built of steel and reinforced concrete and will be of the most modern construction in every respect.

Vancouver, B.C.

Press reports state that Eslick & Hartnett, of Spokane, Wash., have secured contract from the Canadian Northern Railroad Company for the construction of 52 miles of rock construction, at a cost of about \$250,000.

Victoria, B.C.

The contract for the construction of the new government bridge over the Thompson river at Walaachin was awarded to the Algoma Street Bridge Company, of Winnipeg, whose tender for foundation, substructure, superstructure, manufacture and installation complete was \$33,272. The company's representative in this province, Mr. M. B. Stone. The bridge is to be four hundred feet long with one central pier.

Public Buildings, Churches, Schools, etc.

Brantford, Ont.

The ratepayers will vote on January 3rd on a by-law regarding a site for the new Government buildings.

Brockville, Ont.

Local members of the Order of Orange-men have decided to erect a temple in memory of the founder of the order in Canada. Estimated expenditure, \$40,000.

Brandon, Man.

On December 20th the ratepayers will vote on a by-law to issue \$50,000 5 per cent. 30-year school debentures. Harry Brown, City Clerk.

Blanchard, Man.

On December 20th a by-law will be voted on to issue \$7,000 20 annual instalment, 5 per cent. debentures, for the purpose of building a municipal hall. G. McIntyre, secretary-treasurer, rural municipality of Blanchard, Man.

Cranbrook, B.C.

The by-law to build city hall was carried. Estimated expenditure, \$15,000.

Calgary, Alta.

Plans for a public abattoir have been prepared. Estimate cost, \$25,000.

Chilliwack, B.C.

The citizens have taken steps towards the erection of a Y.M.C.A. building here. Details of plan have not yet been decided upon. M. H. Nelems, Westminster Trust Building, is interested.

Edmonton, Alta.

The architect for Heminick street school building was instructed to prepare drawings showing on the plan 12 rooms with provision for addition of wings.

Fort William, Ont.

The board of health forwarded to the council a resolution advocating the erection of an incinerator plant at the earliest possible date.

Guelph, Ont.

At the conference of the special committee appointed to consider the question of the rebuilding of the county buildings, it was decided to do nothing for at least another year. Noted in issue of Nov. 23rd.

Hull, Que.

Mayor Fontaine and a committee are arranging for the erection of a hospital.

Hillsboro, N.B.

Tenders addressed to Jordan Steeves, chairman of committee, will be received until January 6th for construction of the First Hillsboro Baptist church. Plans, etc., at office of above; also at H. H. Mott's, architect, Germain street, St. John.

Hamilton, Ont.

The County Council has decided to purchase the Newitt farm, near Dundas, as a site for a House of Refuge, and to refuse to take the NeNiven farm in Ancaster.

A by-law will be voted on to issue \$7,500 4 per cent., 10 years, debentures for the erection of a Detention Home for Children. S. H. Kent, City Clerk.

Hull, Que.

It is reported that the Government has secured options on a number of properties in Hull. It is said in some quarters that the land will be used as a site for a new Printing Bureau, but in others it is believed more probable that it will be used for a new public works yard.

Ilderton, Ont.

The congregation of the Methodist Church here have decided to rebuild their church recently destroyed by fire.

London, Ont.

A by-law to set aside \$75,000 to erect a new city hall will be voted on by the ratepayers in January next.

The faculty of the Western Medical School will consider the matter of a new building for the Medical School at their annual meeting in April next.

Montreal, Que.

The Wither Club, Limited, with a capital stock of \$149,000, has been incorporated, and will erect a large club house on the old Eady property, stretching from Drummond to Stanley streets. The building will be commenced in the spring and opened in 1912. Those interested in the incorporation are Mr. Henry Joseph, Sir H. Montague Allan, Sir Edward Clouston, Sir Thomas Shaughnessy, Messrs. E. T. Galt, C. M. Hays, F. E. Meredith, H. V. Meredith, Hugh Paton, James Ross, C. F. Smith, F. W. Thompson, H. S. Holt and G. R. Hooper.

A new church for the Italian Roman Catholics of Montreal will be erected, and plans and specifications will shortly be submitted to the Archbishop for approval. It will be known as Notre Dame Delia Difesa.

Mr. Theo. Daoust, architect, 90 St. James street, is preparing plans and specifications for the proposed alterations to the old building of the post office, facing on St. James street. The estimated cost of the work is \$140,000, and the building will be fireproofed and up-to-date when completed.

New Westminster, B.C.

The Royal Agricultural and Industrial Society are calling for tenders for the completion of the horse show building at Queen's Park.

Ottawa, Ont.

Tenders will be called next month for the brick work of Bothany Presbyterian Church. The building is to be brick inside and outside. J. A. Ewart, architect.

The Rideau Curling Club, of which J. A. McShado is president, will put a new roof on its rink.

Tenders are called until December 19th by the Public Works Department for supply of fittings, racks, etc., for Ottawa Military Store Building. R. C. Resrochers, secretary.

Peterborough, Ont.

The members of Charlotte Street Methodist Church will canvass for funds to add to the \$25,000 already raised for the building fund.

Quatsino, B.C.

This municipality is erecting a town hall, the residents supplying the labor.

Stratford, Ont.

The by-law, providing \$15,000 for the erection of a market building has been dropped.

Scott, Sask.

On December 10th the following by-laws will be voted on:—\$9,000, 20 years, 5½ per cent., fire hall and town hall debentures, and \$6,000, 20 years, 5½ per cent., hospital. C. F. Street, secretary-treasurer.

Thornbury, Ont.

Tenders will be received by Ed. Dorke, town clerk, to Dec. 11th, for the several trades required in the erection and com-

pletion of an agricultural exhibition in the town of Thornbury. For further particulars see advertisement in the "Tenders and For Sale" Department of this issue.

Toronto, Ont.

Tenders addressed to the chairman of the building committee will be received until December 26th for the erection of a nurses' home for the General Hospital. Darling & Pearson, architects, 2 Leader Lane.

It is announced after a conference between representatives of the Ontario Government and the University of Toronto that \$400,000 will be expended upon the erection of the Royal Ontario Museum.

Victoria, B.C.

Tenders were called until December 6th for construction of additional wing to the Victoria West School. W. Ridgway Wilson, architect.

Vancouver, B.C.

Tenders for erection of the Isolation Hospital, plans for which have been prepared, have to be ready by December 19. Building Inspector Jarrett.

Plans for a new club house for the Vancouver Rowing Club have been prepared and discussed. Estimated expenditure, \$15,000. J. Fyfe Smith, 440 Seymour street.

Plans have been prepared by Building Inspector Jarrett for the morgue and call for a building two storeys, of reinforced concrete. Estimated cost, \$25,000.

The Vancouver Commercial Club, it is announced, will erect shortly a 10-storey steel and fireproof building, part of which will be used for club purposes. Option has been taken on Pender street. President, Dominic Burns.

Tenders for the construction of Isolation Hospital addressed to Wm. McQueen, city clerk, will be received until Dec. 19th.

Winnipeg, Man.

Tenders addressed to the chairman, Board of Control, will be received until December 15th for supply of furnishings required for the new Tuberculosis Hospital now in course of erection. M. Peterson, secretary.

AWARDED.

Edmonton, Alta.

E. L. Gutierrez, Edmonton, has secured the contract for erection of school, S. D. 2292, Edmonton Highlands.

Moncton, N.B.

Messrs. P. J. LeBlanc and O. J. Dunham have secured the contract for the new wing to be added to the post office building. The terms of the contract call for completion of the work on April 15th, 1911.

Strathroy, Ont.

The proposal to erect a county hospital here was laid over for the new council in January.

Toronto, Ont.

It is announced that a plan will be submitted to the members of the Toronto Amateur Athletic Club providing for the erection of a suitable down-town club house. Dr. W. G. Wood is interested.

Residences

Belleville, Ont.

A fine residence, owned and occupied by Mr. L. G. Lewis, of Sidney Township, was destroyed by fire on the 8th inst. Loss, about \$4,000.

Montreal, Que.

Mr. G. E. Gudewill, of the Canada Iron Corporation, will erect a handsome house on the lot adjoining his present residence on Bishop street. The plans are now being prepared. The exterior will be built of Indiana sandstone.

Ottawa, Ont.

Among the recent permits for buildings were: John Campbell, dwelling, Sunnyside avenue, J. E. Wilson, architect, \$2,500; G. S. Green, dwelling, Nelson street, \$3,800; Mrs. John Cowan, dwelling, Adelaide street, \$3,500; W. H. Craig, dwelling, Oakland street, \$3,000; Center street, \$2,500; Melgund street, \$3,000.

St. John, N.B.

Plans are now being prepared for conversion of the new Victoria Hotel building in Prince William street into an apartment house. An option has now been secured from the McCoskery estate, on the lot adjoining to the south. L. P. D. Tilley is interested.

Toronto, Ont.

Recent building permits include:—J. Grandin, three attached two and one-half storey brick dwellings on Fermanagh avenue, \$7,500; J. T. Baldwin, three pairs semi-detached two-storey roughcast dwellings, brick fronts, Sarah and Pretoria, \$12,000; Frank Cuneo, one pair semi-detached two-storey brick stores and dwellings, Dundas street, \$5,000; Mr. McCabe, one pair semi-detached two and one-half storey brick dwellings, Christie street, \$4,500; Dundas Building Company, three pairs semi-detached two-storey brick dwellings, southwest corner Franklin and Ruskin, \$12,000; Mrs. J. Wheller, one pair semi-detached two and one-half storey brick dwellings, Sinclair avenue, \$5,000; F. G. McBrien, two-storey brick dwelling, 126 Castle Frank road, \$5,500; L. C. Sheppard, three pairs semi-detached two and one-half storey brick dwellings, Kenilworth, \$15,000; Jackson & Brooks, twelve detached two-storey brick dwellings, Barber avenue, \$33,600; J. H. Jackson, four detached two-storey brick dwellings, Fairview avenue, \$11,200; J. McConnell, two-storey and attic brick dwelling, 89 Binscarth road, \$6,000; A. O. Scott, three attached two-storey brick dwellings, Royce, \$6,000; F. Courtemanche, three two-storey brick dwellings, Woodville, \$6,000; J. H. Stanford, four pairs semi-detached two-storey roughcast dwellings, brick fronts, Verral, \$12,000; R. M. Case, one pair semi-detached two-storey and attic brick dwellings, Brighton, \$5,000; Thos. J. Ford, three attached two-storey brick dwellings, near Dufferin, Armstrong, \$6,000.

Vancouver, B.C.

G. R. Stinson, Burrard street, will erect a residence on Howe street.

Business Buildings and Industrial Plants

Coaticook, Que.

It is reported that Penman's, Limited, will extend their plant here in the spring.

Chilliwack, B.C.

The lot next the Westminster Trust building on Westminster has been purchased, with a view, it is said, of erecting on it a new concrete block in the spring. W. R. Nelems effected the sale.

Edmonton, Alta.

A new six-storey office building is to be erected on Jasper avenue next year by the Northern Investment Agency, 21 Jasper west. They also announce that next year they contemplate erecting a six-storey

building, which shall be used as offices for the company, and others.

Fort Frances, Ont.

The ratepayers will vote on January 2nd on a by-law to grant fixed assessment to the Shelvin-Clarke Company. Noted in last issue.

Guelph, Ont.

The G. T. R. state that they will proceed immediately to erect the new station.

Hamilton, Ont.

The Diamond Flint Glass Company has purchased a 10-acre block of land where three new buildings will be erected. The Egg-O-Baking Powder Company, of Regina, Sask., and the Robinson Box Company, of Lowell, Mass., will also locate here. W. Mullise, commissioner of industries.

Lachine, Que.

The Dominion Cridge Company has taken option on properties adjacent to their works. Nothing definite has been stated regarding enlargement.

London, Ont.

It is understood that the hydro-electric repair shops will be erected here, also a large garage for storing the automobiles used in the service.

Maisonneuve, Que.

Tenders are being called for completing the work on the new factory of the United Shoe Machinery Company. The roofing of the building is still open for bids. H. C. Stone, architect.

Magrath, Alta.

The Taylor Karren Company's store at Magrath was destroyed by fire on the 5th inst. Loss, about \$30,000.

Montreal, Que.

The new merger known as Canadian Explosives, Limited, with a capital stock of \$15,000,000, will make its headquarters at Montreal. It is understood they will erect quarters here.

The new station at Place Viger for the C.P.R. Company will be enlarged to permit of two storeys, not called for in the original plans, being added. There will be a turreted roof and the architecture will be the same style as the present Place Viger station. John Stewart & Company, Westmount, are the general contractors, and Mr. W. S. Painter, of the C.P.R., architect.

Property at 235 to 237 St. James street has been purchased by Mr. Frank Truhsch. It is understood that in the spring a modern restaurant will be erected.

North Vancouver, B.C.

It is the intention of the Bank of British North America to erect a fine large bank building at the corner of 3rd street and Lonsdale, next spring.

Nanaimo, B.C.

Messrs. Fletcher Bros., Ltd., of this city and Vancouver, have purchased the Odd-fellows' Block, which will be thoroughly remodelled.

Outremont, Que.

Inspector of Buildings Reid has plans and specifications ready for a four storied stone and brick building on the upper section of Durocher for the erection of a factory for the making of brooms.

Owen Sound, Ont.

The ratepayers will vote on January 2nd on a by-law to loan \$20,000 to the Canadian Heating & Ventilating Co., who purpose to extend.

Tenders and For Sale Department

City of Winnipeg Power Development

Electric Generator Wanted

Proposals will be received at the office of the undersigned up to DECEMBER 23RD, 1910, for supply of direct current Electric Generator, new or second-hand, 50 K.W. Capacity, along with Steam Engine for direct connection or for belt driving.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, Dec. 7th, 1910. 50-51

Tenders Wanted

Sealed tenders addressed to the undersigned, will be received up to SATURDAY, THE 21ST DAY OF JANUARY, 1911, for the several trades required in the erection and completion of an Agricultural Exhibition Building at the Town of Thornbury, Ont.

Plans and specifications can be seen at the Office of John Wilson, Architect, Collingwood, or at the Office of the Town Clerk, Thornbury.

The lowest or any tender not necessarily accepted.

EDWARD RORKE,
Town Clerk.

Thornbury, Dec. 9th, 1910. 50-51

We want to establish Tesco Marble Factories in the following Cities:

New York
Philadelphia
Indianapolis
Atlanta
Kansas City
New Orleans
Chicago
Minneapolis
Denver
Seattle
Los Angeles
Cuba—Havana
Canada—Montreal
Winnipeg and Vancouver

Since Tesco Marble is a real marble in its analysis and surface appearance the demand has come from all sections of the United States and overwhelmed our present factory facilities in Milwaukee, consequently it becomes absolutely essential to meet the demands.

We are ready to open negotiations with responsible parties for the manufacturing rights in the above named Cities.

Our marble is thoroughly covered by patent rights exclusively our own, thus assuring you of absolute safety on your investment.

Tesco Marble is the marble of the age.

Best financial references required.

Full information regarding investment, profits, etc., will be mailed.

TESCO PRODUCTS CO.,
N. W. Norris, Pres.

Main Offices 1-3 Builders & Traders Exchange,
MILWAUKEE.

Grand Falls Company, Limited, Grand Falls, N.B., capital \$1,200,000; incorporated to acquire the water power, etc., and to construct, operate, etc., mills for the manufacture of mechanical and ground wood pulp, etc., incorporators: Sir William Cornelius Van Horne, and Herbert Samuel Holt, both of Montreal; Redfield Proctor, Proctor, Vermont, U.S.A.; George Frederick Underwood, vice-president, International Paper Company, New York; James Robinson, mill owner, Millerton, N.B., and A. J. Gregory, Fredericton, N.B.

Business Buildings and Industrial Plants

Ottawa, Ont.

Building permit was issued for Blackburn building, \$95,000. W. E. Noffke, architect; Howe, Horwood & Sutherland, contractors.

Orillia, Ont.

Plans for the four buildings for the Canada Keg & Barrel Company here are completed and tenders will be asked for shortly.

Port Dalhousie, Ont.

The G.T.R. elevator here was destroyed by fire on the 7th inst.

Portage la Prairie, Man.

The Merchants Hotel was badly damaged by fire on the 6th inst. Estimated loss, \$50,000.

Port Arthur, Ont.

Negotiations are being carried on regarding the establishment of a car repair plant here. R. L. Jones and J. L. Neilson, both of Winnipeg, are interested. F. G. Neill, publicity commissioner.

Peterborough, Ont.

A by-law will be submitted to the ratepayers at the next municipal election regarding the agreement with the Bonner-Worth Company (Isaac Bonner), who purpose the erection of a plant here. Industrial Commissioner, Mr. Duggan.

Quebec, Que.

Mr. John Bowker will commence the erection of a 3-storey block at the corner of Broughton street and Wilcox for the Woods Motor & Taxicab Company. Mr. Elwood Watkins, architect.

Richmond, Que.

It is understood here that a new G.T.R. station will be built next spring.

Regina, Sask.

The old Rembler Paul farm has been purchased. It is understood the G. T. P. shops will be erected on it.

This city will become a most important divisional point for three of the branch lines of the G.T.P. A new station will be erected at 1½th avenue, costing with hotel \$400,000. B. B. Kelliher, chief engineer,

Winnipeg, Man.

The Western Manufacturing Company plan to double their present floor space this winter. Estimated expenditure, \$20,000. T. A. Wilson, manager.

Selkirk, Man.

The Fryer block on Eveline street was destroyed by fire on the 7th inst. Estimated loss, \$3,500.

St. John's, Que.

The second Cluett-Peabody by-law granting an additional piece of ground to that company has been passed unanimously by the ratepayers. Engineers were at once engaged to report on the nature of the soil. The foundations have been started. Noted previously.

South Vancouver, B.C.

Mr. G. A. Horel has prepared plans for the 3-storey block to be erected for Webb & Young on Main street.

Sherbrooke, Que.

The E. & T. Fairbanks Company is about to call for bids for erecting additional buildings.

St. Boniface, Man.

The entire plant of the Rat Portage Lumber Company was destroyed by fire on the 7th inst. The loss is estimated at \$200,000. Mr. D. C. Cameron, president and general manager, announced that the plant would be rebuilt at once, machinery having been ordered. He further stated that the mill at Rainy River, recently destroyed by fire, would be rebuilt.

Toronto, Ont.

The Imperial Flour Milling Company, recently granted a Dominion charter (capitalization \$2,000,000), will erect as soon as possible a large mill and elevator. The site proposed is the present Alexander Brown Milling Company's. Aemilius Jarvis is interested.

Victoria, B.C.

It is announced that an addition of brick and concrete will be made to the Steam Laundry, View street, at once.

Plans for the building to replace the Five Sisters' Block, corner of Fort and Government streets, have been completed and are now awaiting the approval of the owners in England. Plans call for steel and reinforced concrete construction of six or eight storeys, to cost about \$400,000. Thomas Hooper, architect.

The Alberta Pacific Elevator Company, Limited, have purchased 600 feet on the north bank of the Fraser River, near Hammond as a building site, it is understood, for an elevator. Sale effected by D. E. Brown-Maculay Company, Limited. Plans also point to the erection of another in the east end on the south shore of Burrard Inlet. Representative, Mr. L. P. Strong.

Property on Seymour street has been purchased, with a view, it is stated, of erecting thereon a large and tall building. Wm. Holden effected the sale.

It is stated that the Paterson Timber Company, acting for clients, have applied for a lease of Trinity street end and also permission to erect an overhead bridge across the C.P.R. tracks, thus allowing access to the waterfront. A large cereal mill costing about \$250,000 is contemplated.

Tenders are being called by the B.C. E. R. Company for erection of passenger station, until December 21st.

The Western Union Tel. Company has sanctioned the expenditure of \$6,000 in equipment for their offices here. J. G. Davies, local manager.

Welland, Ont.

It is stated that in the beginning of the new year work will be started on the new 3-storey block for Reeve John Goodwin.

By-laws to grant fixed assessment to the Hamilton Tube Company, Hamilton, and also to Mr. John E. Cutler, both of which purpose erecting new plants, will be voted upon at municipal elections.

Winnipeg, Man.

It is announced that the Canada Cement Company, Limited, of Montreal, has secured property in this city and will next

year erect a large plant. Plans, etc., are not completed. It is stated that R. F. Jones will be manager.

The Temple building has been purchased with a view to extend the building next year. Sale effected by M. C. Berkeley & Company.

AWARDED.

Montreal, Que.

The contract for the glazing work in connection with the plant being erected at St. Timothee, P.Q., for the Canadian Light & Power Company has been awarded to W. E. Potter & Company, 26 Benoit street, Montreal. General contractors, Geo. W. T. Nicholson, E. T. Bank building, Montreal. T. Pringle & Sons, Coristine building, Montreal, contractors.

The contract for the glazing work in connection with the new building being erected on Bleury street for Messrs. Caron Bros., has been awarded to J. P. O'Shea & Company, Et. Agathe street. Atlas Construction Company, general contractors, and MacVicar & Heriot, architects.

New Westminster, B.C.

The contract for the construction of the new Kelly-Douglas warehouse here has been let to J. C. Allen. Construction will start at once.

The contract has been let to H. M. Marshall for the erection of an apartment and business block on Eighth street for A. A. Hardman.

Ottawa, Ont.

M. M. O'Connell has been awarded the plumbing and heating contract for the building of George Matthews Company, Limited, on Rideau street. W. E. Noffke, architect.

J. R. Cameron has been awarded the heating contract for Barrett Brothers' building in Ottawa east. W. E. Noffke, architect.

Port Arthur, Ont.

The Imperial Construction Company has received contract for the preparation of a site for the iron clad industry of Canada, a branch of the American Iron Clad Company, to be located here. Capitalization, \$350,000.

The contract for clearing in connection with the erection of the Enamel Works Co. has been awarded to the Imperial Construction Company. Work will start at once. Robert Greig, president; Publicity Commissioner, Neill.

Toronto, Ont.

A. B. Ormsby, Limited, received the following contracts: Kalamoined clad doors for the T. Eaton Company's new garage; roofing and galvanized iron work on the warehouse, Richmond street west, for the Consolidated Optical Company; a number of steel rolling doors for the Canadian Westinghouse Company, Limited, Hamilton, Ont.

Victoria, B.C.

Thomas Catterall has the contract for alterations to the interior of the Canadian Bank of Commerce, corner of Fort street and Government. Probable cost, \$12,000.

Power Plants, Electricity and Telephones

Berlin, Ont.

An application will be made to Parliament for an act to incorporate a railway company under the name of the Imperial Traction Company with power to lay out and operate from Hamilton to Guelph, Berlin, Stratford, St. Marys, London, Ingersoll, Woodstock, Brantford, Hamilton, with extensions.

Calgary, Alta.

This municipality has under consideration large extensions to the electric light and power departments, for which estimates will be prepared and a by-law submitted as early as possible in the new year.

The following tendered for supply of car bodies for the street railway: J. G. Brill Co., Philadelphia, \$2,976.25; McQuire Co., Chicago, \$2,830; Preston Car & Coach Co., \$2,210.25; Ottawa Car Co., \$1,940 (award given in last issue).

The conditions governing the securing of the power site near the junction of the Elbow river and Canyon creek are as follows: That \$50,000 be spent in developing the power during the first year, 1911; that \$100,000 be spent during the second year, 1912, for this purpose; that a minimum of 2,000 h.p. be developed by January 1, 1914; that a maximum of 5,000 h.p. should be developed after January 1, 1914, if the Minister of the Interior considers it necessary, or in the interests of the public; that the city pay a consulting engineer and inspector for the work, assume all risks and indemnify the crown for all against all actions and submit the schedule of rates to be charged to the board of railway commissioners for approval.

Deseronto, Ont.

A by-law will be voted on at the municipal elections to authorize and confirm certain agreements between the Trenton Electric & Water Company, Limited, and this town.

Port William, Ont.

Later advices state that the ratepayers will be asked to vote on a by-law to raise the sum of \$67,000 for the purpose of further extending and improving the street railway. The ratepayers will also vote on the raising of \$25,000 for the extension and improvement of the telephone system.

Edmonton, Alta.

Tenders addressed to John Stocks, Deputy Minister Public Works, will be received until Dec. 15th for supply of 25,000 tamarac telephone poles at Lamont, Spruce Grove, Stony Plain, etc.

Guelph, Ont.

A by-law to provide for the extension, etc., of the Guelph Radial Railway by issue of debentures for \$30,000.

Galt, Ont.

A by-law will be voted on at the municipal elections to provide for the issue of \$4,000 debentures required to provide for the local distribution of electric power, and for extension of the electric light system of the town of Hespeler.

Kingston, Ont.

The Light, Heat & Power Committee's recommendation for the raising by debentures of \$13,000 by vote of the people for street lighting passed council.

Listowel, Ont.

On Jan. 2nd a by-law will be voted on to issue \$5,000, 4½ per cent. electric light debentures. William Bright, clerk.

Mitchell, Ont.

The power plant here will need but few changes to make it ready to handle hydro-electric power. Mr. Ord, local electrician in charge.

Medicine Hat, Alta.

Work on the proposed power plant is now under construction by day labor; cost about \$50,000. A. Grimmer, city engineer.

Melfort, Sask.

On Dec. 27th a by-law will be voted on to issue \$4,000, 5 per cent. debentures for

the purchase of certain lands and \$3,000, 5 per cent., 20 year, telephone debentures. Reginald Beatty.

Nanaimo, B.C.

A by-law is being prepared authorizing the Nanaimo General Electric Railway Co. to build an electric railway over certain streets in Nanaimo, B.C.

Ottawa, Ont.

The Electric Department called for tenders on the 13th inst. for 60 ornamental posts; also 300 MacBeth Evans alba globes for 100 watt tungsten lamps.

It was decided to let the municipal electric department carry out the project for "the great white way" on Sparks street, and to do away with the poles and arc lamps at the street corners on that thoroughfare.

The Carleton County Councillors want the Ontario Hydro-Electric Commission to provide the county with electric facilities from water power in this district as it has done in Western Ontario from Niagara power.

Peterborough, Ont.

It is rumored that negotiations are in progress by which the Canadian Electric Power Company will purchase Burleigh Falls and Buckhorn water powers.

The ratepayers will vote at the municipal elections on a by-law to give permission to Mr. C. E. Dittman the right to lay mains on the streets to convey natural gas to the citizens should it be found in sufficient quantity in the vicinity to justify the outlay.

Township of Preston, Ont.

On Jan. 2nd a by-law will be voted on to issue of \$36,000, 6 per cent. debentures for the purpose of aiding the People's Railway. Thos. Laughlin, clerk.

Victoria, B.C.

A by-law providing for a loan of \$25,000 for more electric light equipment will be submitted to the ratepayers at the municipal election.

Winnipeg, Man.

Tenders will be received by M. Peterson, secretary, Board of Control, to December 23rd, for the supply of direct current electric generator, new or second-hand, 50 k.w. capacity, with steam engine for direct connection or for belt driving. For further particulars see advertisement in the "Tenders and For Sale Department" of this issue.

The St. James Ratepayers' Association considered a proposition made by the John King Real Estate Company, which has been put to the municipality of Assiniboia to run a railway at reasonable intervals on the streets which run north of the Portage road. They are willing to build the railway immediately the municipality will ratify their agreement as a by-law and have it passed.

AWARDED.

Ottawa, Ont.

The Public Works Department of the Dominion Government has given a contract to the municipal electric commission to light the Woods building and the Canadian building at \$2 per light per year. It was claimed that the government was being overcharged by the owners of these buildings, of which it is the tenant and therefore decided that the building be rented without light and contract direct with the commission.

Saskatoon, Sask.

See "Public Buildings," awarded. Montreal, Que.

Plaster-Rock Mining in Canada

Inquiries have been made regarding plaster-rock mining in Canada, for which the following information has been secured:

In Nova Scotia the total quantity of crude gypsum mined in 1908 was 254,540 tons, as compared with 351,611 tons in 1907. Of the total in 1908 about 87 per cent. was mined from quarries in Hants County, at Windsor, Walton, Cheverie, Noel, etc., the balance being quarried at St. Anns, Victoria County, and at Cheticamp, Iverness County. At Cheticamp the Great Northern Mining Company, under the management of M. W. Grandin, commenced operations in 1908. A mill was built, but the company did not begin to grind gypsum until the later part of September or to manufacture plaster of Paris until the middle of October. All goods manufactured were for the ports on the St. Lawrence, and shipments ceased on the close of navigation. The Victoria Gypsum Mining and Manufacturing Company carried on operations as usual at St. Anns, but with a somewhat reduced output. The Nova Scotia Cement and Plaster Company was organized to work deposits at Port Hastings, in Iverness, but nothing was done further than to strip the surface covering from the deposit. In Hants County the principal operators were the Wentworth Gypsum Company, the Windsor Gypsum Company, and Albert Parsons. Shipments were made also by the Newport Plaster Mining and Manufacturing Company, the Windsor Plaster Company, which operates a small mill, the Noel Plaster Company (W. B. O'Brien), and Lorenzo Ettinger.

In the Province of New Brunswick the principal shipper is the Albert Manufacturing Company, of Hillsborough. In addition to shipping a large tonnage of crude gypsum this company operated a large mill for the manufacture of plaster of Paris. The Hillsborough Plaster Company also operates a quarry at Hillsborough, and from the Tobique River deposits in Victoria County, a small quantity of gypsum is annually quarried by John E. Stewart, of Andover, N. B. The total quantity of crude gypsum mined in New Brunswick in 1908 was 90,015 tons.

In Ontario 10,889 tons of crude were reported as having been mined in 1908. The Alabastine Company, of Paris, sells gypsum, crushed and ground, and manufactures plaster of Paris and special wall finishes under the name alabastine. The Imperial Plaster Company, of Toronto, quarried gypsum for its own use at Cayuga, while the Crown Gypsum Company built a crushing and calcining mill at York Mines, Onedia Township, and commenced to open up the properties formerly known as the Martindale, Taylor, and Donaldson mines.

The only operator in Manitoba is the Manitoba Gypsum Company, of Winnipeg. This company has a mill and calcining works at Winnipeg, while the quarry is situated at the north end of Lake Manitoba. The company has a narrow-gauge railway of its own from the mine to Lake Manitoba, and a small fleet of steamers and barges which bring the raw material from the head of the lake to Totogan, from which point it is brought to Winnipeg on the Canadian Northern Railway.

Ferro-Dovetail Plates

The new ferro-dovetail plates, manufactured by the Pedlar People, of Oshawa, fill a long felt want, as a means of saving cost and dispensing with the use of wooden centering for concrete floor slabs on a steel superstructure. To use them, it is merely necessary to lay out the steel arrangement to a maximum of 5' 6 or 6' spans. Ferro-dovetail plates are supplied in sheets to fit these spans, allowing a 3" end lap. At this end lap, the corrugations are spread so that the sheets will interlock. The builder lays ferro-dovetail plates for the

steel superstructure just as he would lay planks, lapping and interlocking the plates at the edges. Then with a plank runway for his wheel-barrow, he may start to apply his concrete to the desired depth of the slab. As soon as the concrete is set, the under side of the plates is plastered with ordinary plaster.

As a roofing material in places where a roof is subject to deterioration from devastating gases, ferro-dovetail plates meet the requirements most satisfactorily. Moreover, they are particularly valuable where a roof is to be put up in a hurry, as they can be used for years as a corrugated metal roof and then concreted.

Stiff Conditions on Prince Rupert Contract

Tenders are being invited for the construction of a buoy depot at Prince Rupert, B.C., for the Marine and Fisheries Department. A notable feature of the contract is the insistence of the department on a schedule of current wages and working day hours.

The specifications include the erection of a reinforced concrete wharf with timber approach trestle, together with the necessary dredging, earthwork, stonework, stone filling, pitching, concrete, timber and track work. The wharf to be erected is 405 feet long and 40 feet wide, with an additional width of 15 feet over 105 feet of its length. The wharf is to consist of concrete piles, and these after having been driven in are to be carried up as columns erected in place and braced with horizontal and diagonal members. The tops of the columns are to be finished off at an elevation of 216.93 feet.

The fair wage schedule, signed by J. D. McNiven, fair wage officer, makes the following stipulations as to wages for a nine-hour day; concrete workers, \$3.00; carpenters, \$5.00; blacksmiths, \$4.50; painters, \$5.00; plumbers, \$5.50; bricklayers, \$6.00; engineers, \$4.50; firemen, \$3.00; machinists, \$4.50; laborers, \$3.00.

It is also stipulated that the contractor shall enter on the site and commence the works within 30 days after the signing of the agreement and that the works shall be completed on or before Dec. 1, 1911.

According to a dispatch from Ogema, Sask., Neil Keith, a sub-contractor for the Lethbridge-Weyburn branch of the Canadian Pacific, is missing. The country has been searched for miles by the mounted police, but no trace of him can be found, and the conclusion has been arrived at that he perished in the recent storm. Mr. Keith has been a resident of Winnipeg for nearly 30 years.

Toronto's Building Record

The following comparative statement has been issued by City Architect McCallum, Toronto:

	1909.	1910.
Approximate value of buildings Jan. 1 to Nov. 30	\$16,545,882	\$19,774,518
Approximate value of buildings for the month of Nov.	1,940,650	2,040,030
Number of building permits issued Jan. 1 to Nov. 30	4,721	5,906
Number of buildings for which permits were issued for month of Nov.	650	722
Number of new buildings erected from Jan. 1 to Nov 30.	6,698	8,092

The Toronto Board of Control have voted an additional appropriation of \$3,800 to the city engineer for the continuance of the chloride treatment of the city water. Since May 23 the department has spent about \$5,000 in this work, with very beneficial results.

Contract Record

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The Decimal Scale for Construction Work

It is generally conceded that the adoption of a single unit of measurement for engineering, architectural and construction work would not only facilitate the work of engineers, architects and contractors, but would also eliminate the chance of making errors in the transference from the engineers to the architect's scale, and vice versa, says Engineering-Contracting.

It is interesting to note the opinions of prominent men connected with engineering, designing and building operations. Mr. F. W. Reynolds, mill engineer and architect, Boston, Mass., says: "We believe that from the engineer's standpoint the decimal scale could be very well adopted for construction work. By this we mean that all measurements could be taken and expressed according to the decimal scale with quite as little trouble and confusion as follows the use of the scale of feet and inches. Drawings would be just as easily made and read if the decimal system was followed as under the present system. We fear, however, that unless the adoption of this system could be made compulsory, it would be the source of many errors from the confusion which would arise after drawings were sent out into the hands of persons more familiar with the scale of feet and inches than with the decimal system."

"The difficulty comes essentially from educating the contractor's foreman and men rather than the inspectors and engineering corps, as the latter are, of course, accustomed to the use of the engineer's decimal scale in all their surveying operations. I believe that in the majority of cases, more particularly large and important works, the use of the decimal scale would be possible,

but greater difficulty would be encountered in its introduction in the smaller works. The fact must also not be overlooked that in such works as involve building—in iron work, castings, structural material, etc—the manufacturers and machine shops still adhere to the English "feet and inch" scale. Under such circumstances either separate plans for details would have to be used, or the two different scales would appear upon the same drawing, or dimensions would be stated for both purposes in one scale only. This again would be disadvantageous from the point of view of the mechanic, who has become thoroughly accustomed to the foot and inch scale, and in the majority of cases knows little of the engineer's decimal scale. You will see, therefore, that while from the engineer's point of view the change would, broadly speaking, be advantageous, from the practical point of view. I fear there would be serious difficulty in its general introduction, except perhaps in general classes of work."

The opinion of Mr. L. C. Wason, president of the

PROGRESS OF CANADIAN TRADE.

Compilation of the returns of Canadian trade for the first six months of the current fiscal year, proves that the expectations of a record-breaking commerce were well-founded. Indeed, in some particulars, the event has exceeded the most sanguine expectation. Imports, exports and total trade all show large increases over the corresponding period of 1909, while in comparison with the same period of 1907, which heretofore held all trade records, imports show an increase of nearly 15 per cent. and total trade an increase of over 8 per cent. Exports are still slightly less than for the first six months of 1907.

Comparing the latest twelve months' period with the corresponding period of 1907, imports show an increase of 14 per cent, exports an increase of 12 per cent., and total trade an increase of 13 per cent. In all respects the twelve months ended September, 1910, was the greatest twelve months' period in the history of Canadian trade.

Aberthaw Construction Company, Boston, Mass., is interesting as being that of a man intimately connected with actual conditions in the field. His opinion follows:

"In designing and figuring we work in the decimal system, later converting the measurements into feet, inches, and fractions to correspond with the dimensions given by engineers. If engineers and architects could be induced to use decimals it would be a great boon to the profession in general, and of assistance in the execution of work. I think co-operation could be obtained from the manufacturers of rules, who would make it more difficult to get rules divided in fractions of an inch, and turn out more of these in decimals, and also who would send out advertising literature showing the advantages of the decimal system. By the co-operation of the manufacturers and the engineers and architects, I believe a result could be accomplished which would be very desirable. I am looking forward with interest to the time when the metric system will become necessary through enactment of law."

Methods and Cost of Paving at Guelph

Details of Various Construction in Tar Macadam, Asphalt Block, Westrumite and Brick—Plant Required—Street Railway Track—General Observations

Specially Contributed by L. MALCOLM, Acting City Engineer, Guelph, Ont.

The following description of work done in the city of Guelph, Ont., may be of interest to those engineers who have had limited experience in this connection and possibly the notes on street railway track work will be of aid. The account of our experiences in laying the tar macadam pavements may be helpful in view of the experimental work now being carried on with these materials in this country. So much by way of apology.

The paving of Guelph dates from 1907. It was in this year that the city became convinced, with reason, that the state of the streets was not good advertising, to say nothing of the inconvenience caused by muddy and rough roads. After much discussion and many visits of inspection, it was decided to pave the main street—Wyndham—(see accompanying sketch) with asphalt block on concrete. As no storm drainage had been put in, the first necessity was to make provision for the storm water. The contract for this was let in the fall of 1907. So that it was not until the spring of 1908 that any paving was done.

In 1908 the paving proper was commenced. The contract involved the laying of approximately 16,250 square yards of pavement, 3,400 feet of curbing, 2,000 lineal feet of car track, and such smaller work that is incidental.

In the same year the contract for approximately 5,600 square yards of asphalt block pavement on Carden street was let, but the work was not done until 1909. The specifications and contract were the same as for Wyndham street.

In 1909, two brick pavements were laid on Quebec street—east and west—involving about 6,000 yards.

On Woolwich street, about 14,000 yards of Westrumite was laid in accordance with their "A" specification. On this street 3,600 feet of car track was paved with vitrified brick.

The contract for 2,200 yards of Westrumite "A" was let for Paisley street, but on account of delays was held over until April of this year, 1910.

In 1910, Westrumite "A" was laid on Paisley street, and Westrumite "B" on Upper Norfolk street, 5,700 yards approximately.

Tar Macadam.—In 1908 the council decided that asphalt block was too expensive for residential streets, so an experiment was made on Douglas street with tar macadam. This seemed to give good results when completed, so that it was decided to do Cork street in the same way. This latter street was commenced in 1908 and finished in 1909.

In the spring of 1910, when the paving question again came up, it was decided to try tar-macadam and the city engineer, Mr. James Hutecheon, recommended same to council. It was computed that tar macadam would be as cheap as asphalt, even if the roadway had only five years of life to ten of asphalt, as it (the tar macadam) would cost less than half as much. This, of course, is speaking of surfacing only. In any case it was decided to use a concrete base. All the tar macadam in Guelph has been done by day labor. The accompanying sketch shows the areas paved (Fig. 1).

Curbs.—All the curbing is made of concrete and the most of it is laid combined with the gutter. In 1908,

on Wyndham street, a 24 inch gutter was laid. This wide gutter is cheaper than pavement, and on a wide street it was thought that a 24 inch gutter would not look out of place.

In 1909 and 1910, the gutters on streets have been reduced to 12 inch, and with a little more slope to gutter

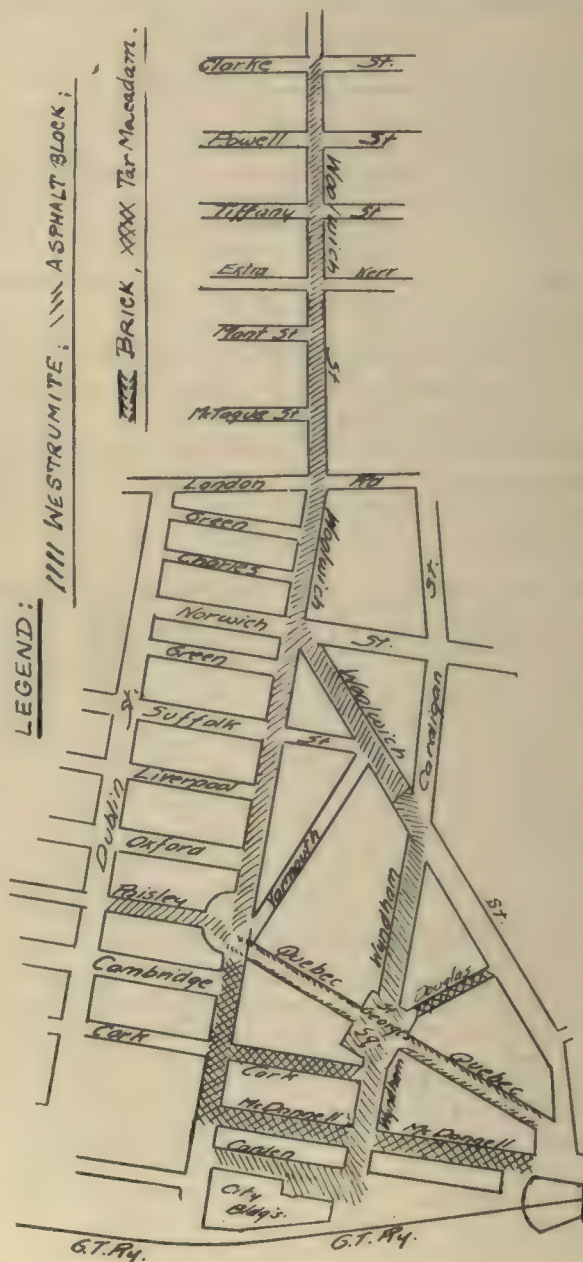


Fig. 1

so as to give a slightly more pronounced waterway. The streets are narrower and consequently the traffic comes nearer the curbing. A 24 inch gutter would likely come near the wheelway and the traffic along edge would break up the gutter and pavement rapidly. Also, 24 inch gutter would look out of proportion on the narrow streets, so the narrower gutter was adopted. On all

bituminous pavements a gutter is employed, as is proper.

On the brick paving no gutter was used, a straight curb being employed. This was to keep the expansion joint as far out of sight as possible, i.e., next the curb.

The sewerage of Guelph is on the "separate" system, i.e., the storm water is carried in pipes separate from the house sewage. They discharge into the nearest

watercourse. Storm drains are placed under all pavements.

The surface water is collected by catch basins (Fig. 4), and from these flows by 9 inch pipe to the storm sewer.

The street railway tracks are drained to the storm drain from track basins. Formerly these were made like the Detroit basins, of cast iron—long, shallow and narrow, and laid lengthwise across the track. The cover had circular holes to allow water to enter. These were not satisfactory as the holes rapidly clogged up with straw and dirt.

In 1909 we adopted a concrete track basin. walls 6 inches thick and dimensions 18 inches by 12 inches, set in the centre of the track with a cast iron cover, with bars leaving openings about 3 inches by 1 1-2 inch. These have given better satisfaction.

The basin is directly connected to the storm drain by 6 inch v.s.

Curb and Gutter 1908.

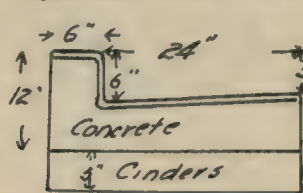


Fig. 2

Curb and Gutter 1909-1910

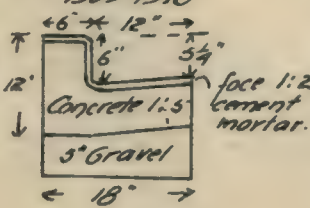


Fig. 3

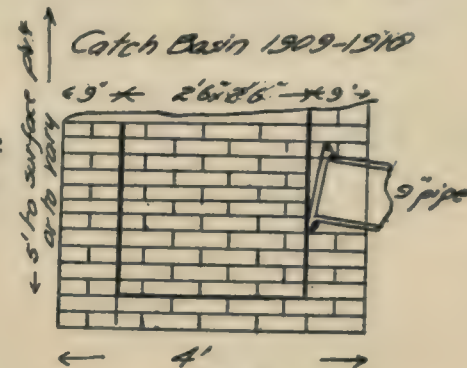


Fig. 4

Concrete Base.—The concrete base for Wyndham street, 1908, and Carden street, 1909, was composed of gravel concrete, 1 part Portland cement to 9 parts gravel.

In 1909 the proportions for the base were changed to 1 part Portland cement to 6 parts of aggregate, consisting of 40 per cent. broken stone, size 1 1-2 inch, and the remainder of gravel. On account of the difficulties of inspection in getting the proper amount of stone, and because results were not better than with gravel, in 1910 the proportions were made 1 part Portland cement to 6 parts of approved gravel.

The method of laying the concrete is to set pegs in the roadway and drive them in the sub-grade until their tops will be at the finished top of the concrete. The concrete is then placed on the roadway and finished flush with the tops of the pegs. The pegs are set in the

Header 1908

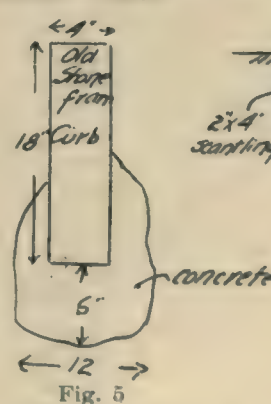


Fig. 5

Header 1909-10

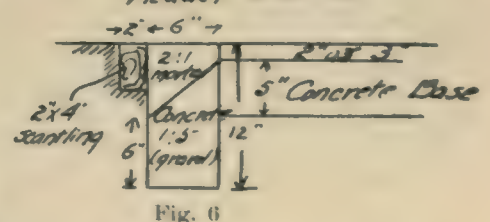


Fig. 6

sub-grade by offsets from a string stretched between the tops of the curbs or set by boning rods used between tops of curbs.

The writer does not believe in setting the pegs for either excavation or concrete with an instrument, except possibly, for a badly warped street intersection. He has put in some intersections that were extremely difficult by boning from curb to curb and setting the stakes by cuts figured in the office, and the results, both as to time saved and appearance, justify the above statement.

Headers.—Headers placed in 1909 were made of the old limestone curbs set in concrete. See Fig. 5.

This was changed in 1909 to one of concrete (Fig. 6)

Catch Basins.—The catch basins are built of good, hard brick, set in cement mortar and they are constructed in accordance with the plan given, Fig. 4. The tops are of cast iron and have a cast iron back to fit into and form part of the curb. They are cast from pattern in the city.

The catch basins are connected to the storm drain with 9 inch pipe, so as to render it impossible to have the water back up into basin and flood gutter.

The curbing is usually put in before the rest of the work is commenced. Some contractors prefer to take out part of the excavation along the sides of the roads before placing the curbs.

Crown.—Rosewater's formula was used in a modified form.

$$e = \frac{W(100-4p)}{5000} \text{ was modified to}$$

$$e = \frac{100}{5000} W = \frac{1}{50} W \text{ since most streets flat,}$$

i.e., crown = 2 per cent. of the width.

W = width of road, p = per cent. of grade.

This is only a general rule, as we have had to vary the crown in a great number of cases on account of the two walks being at difference elevations.

The form of crown is the parabola.

Excavation.—When the curbing is set, the excavation

made part of the pavement base. The header has a 2 inch x 4 inch scantling placed in front to withstand the wear for the first year.

Surfacing.—The surfacing that has been employed consists of asphalt block, vitrified brick, Westrumite (both "A" and "B" specifications) and tar macadam.

Fig. 7 shows sections of paving. In all pavements it is customary where a concrete gutter is employed to keep the surface of paving from one-quarter inch to three-eighths inch above the gutter to allow for wear.

is mixed with a certain proportion of stone dust, water, and Westrumite asphalt composition. Mixed thoroughly in a concrete mixer, it is placed on street, raked to required thickness (allowing for compression) and then rolled. A flush coat of stone dust and Westrumite asphalt with water is then applied and swept over the surface of street. Then a layer of sand is placed over the top and the whole pavement is rolled. The thickness used in the "A" specification is 2 inches.

In 1910, Norfolk street (Quebec to Woolwich street)

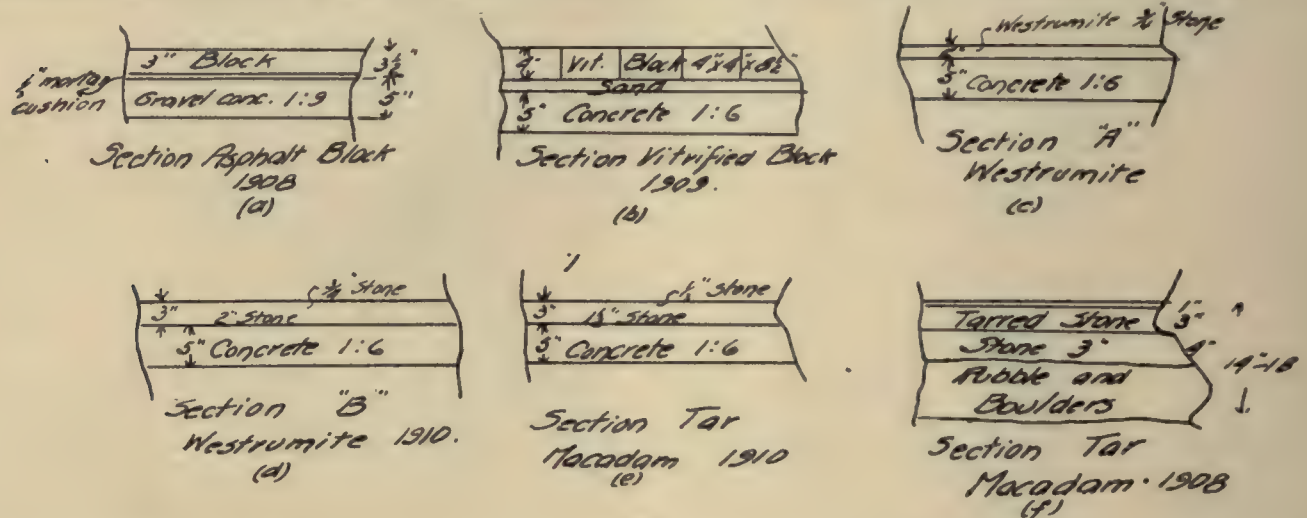


Fig. 7

Asphalt Block.—This block was made by the Ontario Asphalt Block Company, and is 3 inches by 5 inches by 12 inches. They were laid on their "flats" as follows.

On top of the concrete was spread the mortar cushion, consisting of 4 parts of sand to 1 part Portland cement. This was made just moist (If the mortar is wet and sloppy the brick will tilt when rolled). The cushion was then spread over the concrete. It was drawn off to an approximate thickness of one-half inch by a straight-edge, which acted on strips laid on concrete at right angles to street.

The strips were taken out and their place filled with the mortar, drawn off by a hand lute. The blocks were then laid by men standing on the block already in place and were placed three rows at a time across the street. When the day's work was completed, they were rolled, all loose block and block with an uneven cushion were removed and replaced, and the whole then thoroughly wetter.

The joints were filled by cement grout. This was made of fine sand, 2 parts, and 1 part of Portland cement, mixed with water to the consistency of thin cream. The brick were wetted with water and then the "filler" applied and swept into the joints. It was found on one street, where the grout was poured on the bricks when dry, that the joints were not properly filled. A thin film formed over the joint and prevented any grout getting between the bricks. This grouting had to be done three times before satisfactory.

Brick Pavement.—This was laid in the manner recommended by the National Brick Manufacturers' Association, expansion joints being placed along the curb and every 50 feet in length of the street. These joints were made of bitumen and were one-half inch to three-quarter inch in width. They have given satisfactory results so far. The cushion for the brick was of 1 1-2 inch sand and the joints were filled with cement grout, Portland cement 1 part, sand two parts.

Westrumite.—This material is an asphalt macadam. "A" specification is as follows: three-quarter inch stone

was paved with Westrumite, "B" specification. This provides for a wearing surface of 3 inches and is made up as follows. A layer of 2 1-2 inch stone was coated with the asphalt composition laid on the street, and then covered with about 1 1-2 inch or 3-4 inch stones mixed with stone dust. This was raked evenly over the lower course, allowed to stand for about half a day to dry somewhat, and then rolled so that the finer stone was forced into the voids of the larger. After rolling, a flush coat or sealing coat was applied as for the "A" specification. It is necessary with Westrumite, or at least the company thinks so, to have it stand for one week to two weeks after completion, before opening to traffic.

Tar Macadam.—As far as the writer has been able to ascertain, the method adopted for Douglas and Cork streets was as follows: After the curbs were constructed the street was excavated to about 18 inches below surface of finished pavement. Then a layer of boulders and rough rubble was placed. All projections were knocked off and the whole then well rolled. On top of this a layer of coarse broken stone (2 1-2 inches) was placed and well rolled. This was sprayed with tar to bond with the top. On this was placed a layer of 1 inch stone well tarred, with a mixture of tar to which had been added a proportion of cement. This layer was well rolled. On top of this was placed a layer of tarred chips, one-half inch in size. This was well rolled also. The surface was then flushed with hot tar by means of brushes dipped in it. On top was placed a layer of sand. The tarred stone was left to stand a month or six weeks after mixing and before placing on the road, to mature.

Personally, the writer does not think there was any necessity for the coarse stone foundation, as the sub-grade was of gravel and required no drainage, nor was there any danger of the sub-grade not carrying the road. The better and cheaper way would have been to use only broken stone on the sub-grade and roll the sub-grade and first course thoroughly.

Upon the recommendation of the engineer's department, in the spring of 1910, the base for Norfolk and McDonnell streets was let by contract and the surfacing done by day labor.

The method was based on that of "tar grouting" the stone. After the base was completed it was allowed to dry for about two weeks. Then hot tar was spread over the surface and broomed to as thin a coat as was possible. About 2 1-2 to 3 inches of broken stone was then spread over the tarred concrete and rolled.

The remainder of the work was tried as follows:

I. This broken stone was rolled into place, then the tar was poured over it by means of coal scuttles until the whole seemed tarred. Then was placed a layer of hot screenings of one-half inch size. This was rolled and another application of tar made by the use of watering cans. Then was applied a layer of sand, rolled in. This method was found not to answer because (1) when the loose stone was rolled the surface stone could be forced into the large stones; (2) the roller crushed the first layer of one-half inch stone and the tar could not then penetrate to all parts, and we did not get an even mix; (3) with the use of coal scuttles, too much tar got into the pavement and as the base was concrete the tar ran to the gutters; (4) the road did not look like a "tar macadam" as it was white. This white color aroused some adverse comment, so it was decided to change the method.

II. After the first course of stone was added, the stone was run over by the roller once, to partially bring it to position. Then it was tarred and a layer of one-half inch stone was heated and placed on the road. This was immediately sprinkled with tar and then rolled. The next day this was coated with tar applied by brooms. And then a layer of sand was added. This was found satisfactory, but it did not give promise of making much headway.

III. EXPERIMENT.—After the stone was placed, the roadway was only rolled once. Then a layer of one-half inch stone was heated and tarred by hand-mixing, and placed on the road. This was well rolled into the roadway and a "surface sealing" coat was then applied by brooming hot tar over the surface. Finally, a layer of sand was placed over the street. This gave good results

some of the tar into water and then noting whether it would draw out into threads when placed between thumb and forefinger. When sufficiently boiled it was run out by the outlet pipe into tank and hauled to the work (Fig. 10).

(2) TANK. The tank employed was built of Norway pine. After about two days the wood had shrunk badly, so that the tank leaked so much that it looked like a sieve. It was then lined with galvanized iron, soldered and rivetted. This was fine—for about half a day, at the end of which time the solder had all melted off. It was resoldered and refixed, but did not give satisfaction. As it was impossible to obtain another tank at the time, we were compelled to use the leaking one to keep the work going. After about two days' use with the tank leaking, we were surprised to note that the leaks stopped, and we had no more trouble with it for the remainder of the summer.

(3) MIXING BOARD. The mixing board for mixing the stone and tar for the surface was built of 1 inch lumber in the same manner as a concrete mixing board. The stone was then dried thoroughly, and, with dust screened out, was placed on the board. Tar was poured on it while the stone and tar were mixed by men with shovels. This mixed stone was immediately placed on the roadway and raked off to a thickness of about three-quarter inch to one inch. It was then rolled in thoroughly. The board was placed on the road immediately in front of the surface being treated, so that the tarred stone was readily shovelled off the board to the position required. The board was moved forward as necessary.

(4) The plant for drying was of the simplest. An excavation in the boulevard was made and covered with one-quarter inch sheet iron. The stone was placed on this and heated, until dry, by fire beneath the plates. When the weather was warm, the one-half inch stone was spread over the concrete and dried by the sun. This we were able to do for the greater part of the time. When dry, the stone was screened to remove the dust.

(5) The roller employed was twelve tons in weight and of the size and kind usually employed for macadam roadwork. The tar employed was at first obtained from the gas works. The boiling that was given was necessary to removed the water and lighter oils. This tar

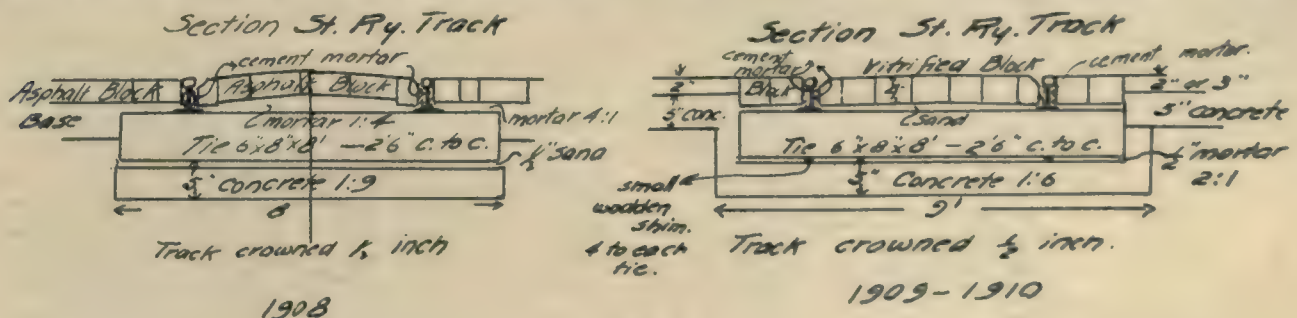


Fig. 8

both as to the road and as to rapidity. Also less tar was used, so this method was adopted.

Plant.

(For general layout of plant in yard, see Fig. 10.)

(1) BOILER. The boiler was an old steam tubular boiler. It was bricked in and a platform built at one side. The barrels were brought from the gas works by truck and rolled on to the platform. Then the tar was run into the boiler—one-half barrel at a time until about four or four and one-half barrels were in. This was boiled until the mixture attained a certain consistency. This was determined by rule of thumb methods rather than by any standard test. It was done by dropping

was used also in 1908-1909. It has given entire satisfaction.

When the work was about half completed, this supply gave out and we had to use Tarvia X. Part of this was obtained in tank cars which were heated by steam. Part was obtained in barrels. The latter was the more satisfactory method, as the tar could be heated to a higher temperature and consequently we got a better penetration when grouting the lower course of stone.

Observations.

(1) Tar must be hot. This ensures better penetration, for with tar on cold surface, the material does not get in sufficiently between stones.

(2) Dust must be removed. Dust prevents tar from penetrating the pavement. A better mixture is obtained for surface when dust is removed.

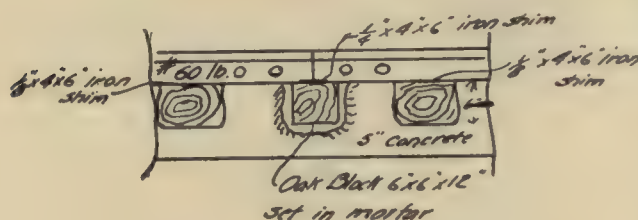
(3) Allow roadway to set. We had to keep traffic off surface for some four or five days after completion.

(4) Too much tar is detrimental with concrete base, as it runs in warm weather.

(5) A great deal of room is left for standardization of tar. This seems to be the weak point.

(6) Do not roll bottom course too much, as it pre-

Longitudinal Section



Plan

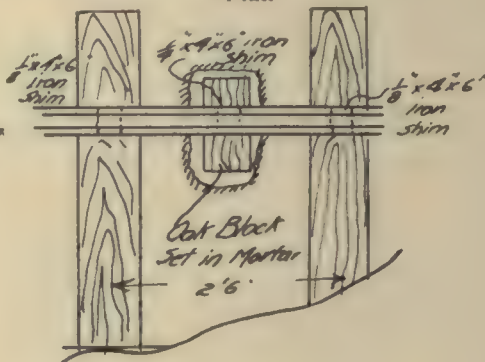


Fig. 9

vents the surface stone from being forced into the space between larger stones. The secret of any pavement lies in its density.

(7) A tank should be made of steel (rivetted) to give satisfaction.

Street Railway Track.

The street railway track has offered somewhat of a problem. There was, and is, only a twenty minute service and not any likelihood of any more traffic for some years, so that there was no necessity for a double track. To make it possible to double track later on Wyndham street the track was laid in its proper position, i.e., the centre line was placed about 4 feet 6 inches to the east of the centre line of street. At the square called St. George's Square, the track runs around a fountain and a small park. The old track was laid with old 56 pound steel rails, about 12 feet long. This had to be renewed and was relaid with 60 pound steel. The remainder of the track was laid with old 60 pound steel. The old angle bars, with two bolts to each rail, were used. The track was firmly spiken in place to ties 2 feet 6 inches centre to centre. The whole track was then placed on

tion of the concrete. (2) The old angle bars did not give sufficient support. This has been remedied for the present, after a number of experiments, as follows:

(1) Placed new plate under the rail ends and packed with concrete. Kept traffic off for three or four days. Not successful, as concrete rapidly pulverized.

(2) Cut out concrete, placed oak block and placed iron plate over the top, and packed with cement mortar. Not successful, blocks soon worked loose.

(3) Placed oak block under tie and tightly against

rail. Packed with mortar, 2 to 1, and kept traffic off until set. Then a one-quarter inch steel plate 6 inches by 4 inches was driven in under rail and a one-eighth inch plate under each adjoining tie. This tends to raise rails at joint, but also to take out any bending caused by traffic. (The rails are old ones.) It also eliminates to some extent the effect of brooming. Also there is a certain amount of settlement of the steel plate into the tie which will gradually tend to eliminate the greater height at the joints. See Fig. 9. This was placed last June and seems to have given satisfactory results to date.

In the work last year, 1909, the same street railway construction was followed as in 1908 to a great extent. The method of construction was amended by bringing the ties to grade by inserting small wooden shims under them—four to a tie. These were driven in tightly until the rails were to grade. The space under the ties was then filled with cement mortar, mixed 2 to 1, which was forced under the ties by tamping bars. The broomed ends of the rails were cut off by a jig saw, so as to make an even joint. This caused considerable extra labor and expense, both by cutting of rails and also by extra drilling of one hole at each end of rails and extra cost of taking rails to and from saw. It was thought that the extra cost would be overbalanced by consequent lasting of the joints. This has been done to a great extent, but there are two or three joints already in need of repairs and in consequence the method adopted this year is to place a tie under each joint and place a 6 inch by 4 inch steel plate one-quarter inch thick in order to eliminate, as far as possible, any play that may occur.

In 1909 the street railway track on Carden street was laid with new 80 pound A.S.C.E. steel, with angle bars at joints. There has been no trouble at all with this portion of track. Not one joint shows any sign of breaking down.

WITH ASPHALT BLOCK. The asphalt block was continued to the rails on the outside of track. The first brick was laid longitudinally, and the others then at right angles to street. The space between the block and rail is filled with cement mortar, 2 to 1.

BETWEEN RAILS. Block was laid as follows: A chamfered vitrified block was laid just within the rail, leaving a space 1 1-2 inches wide by 1 1-2 inches deep

Tar Boiling Plant 1910

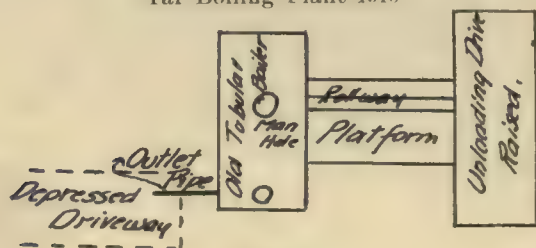


Fig. 10

this and then brought to line and lifted to grade by packing sand in under the ties by shovels and tamping bars. See Fig. 8. When this was done concrete was placed between these ties and flush with their tops, and firmly tamped to surround each tie.

The rails were laid with broken joints and the joints suspended, the concrete being firmly packed under the joints.

The joints have since given out, due largely to the following causes: (1) old joints uneven and the consequent knife-edging of the rail ends caused a rapid disintegra-

for flange of rails. The asphalt blocks were then placed between these.

The surface was crowned one-half inch between rails. The blocks were set on cushion of cement mortar 4 to 1. When the blocks were in place, cement mortar, 2 to 1, was placed between the vitrified block and rail to form bottom of flangeway. The joints were filled in the same manner as for the rest of pavement. To give good results, street car traffic should be kept off the pavement for at least five days.

The surface adopted for 1909 and 1910 is vitrified brick, on a sand cushion. The vitrified brick are laid at right angles to street both inside and outside the rail, except that the chamfered brick is laid longitudinally. The flangeway is formed as for the 1908 work, except that it is made 1 3-4 inches wide and 1 3-4 inches deep to accommodate the new types of freight car wheels.

The joints are filled as for brick paving and a 2 to 1 cement mortar is placed under rail heads, i.e., between rails and brick.

Costs.

(Mainly contract prices except that of tar macadam.)

1908. Asphalt Block. Wyndham street.
Per square yard, including base \$2.52
Gutter, per foot 63
Walk, per square foot
Header, per linear foot 30
Track basin, each 12
Street railway track cost 15 per cent.
Catch basins, complete with cover.
Tar macadam, total cost, \$1.66. City crushed our stone.

1909—Tar macadam finished from 1908..... \$1.62

CARDEN ST.—

Asphalt block same as Wyndham street.

WOOLWICH ST.

Brick car track and Westrumite paving.
Concrete curb and gutter, straight..... \$0.54
Concrete curb and gutter, circular 56
Pavement, Westrumite per square yard complete, including base and excavation 1.98
Street railway track, per square yard... 2.80
Catch basins 30.00
9 inch sewer, per foot 12.00
Headers, per foot 50

QUEBEC ST.—Brick.

Concrete curb, straight 33
Pavement, including base and excavation, per square yard 1.98
Catch basins (without cover) 15.00
9 inch sewer, per foot 47
Headers, per foot 50

1910—Paisley St., from 1909, same as Woolwich street.
Norfolk street and McDonnell street.

Concrete base, etc.
8 in. excavation and concrete foundation \$0.64
Curb, 6 x 12 inch gutter, straight..... .39
Curb, 6 x 12 inch gutter, circular..... .42
Headers, per lineal foot 25
Concrete walk, per square foot 09½
Catch basins (without cover) 18.00
9 inch sewer, per lineal foot 50

NORFOLK ST. (UPPER): Westrumite.

Concrete foundation and excavation, per square yard \$0.63
Curb, 6 foot x 12 inch gutter, straight, per foot 38

Curb, 6 foot x 12 inch gutter, circular, per foot 42
Headers, per foot 40
Catch basins (without cover) 21.50
Street railway track, per foot 2.25
Concrete walk, per square foot 12
9 inch pipe per foot 45
3 inch "B" Westrumite surfacing, per square yard 1.35

NORFOLK ST. and McDONNELL ST.

Square yards. Total yards, 13645.7.

	Total.	Per sq. yd.
Total wages, including haulage, rolling, help in office, foremanship	\$2576.31	\$18.15
Tar	2734.68	20.04
Coal	137.01	1.004
Plant, including wages on plant	284.69	2.09
Stone, estimated at		0.14

Total \$55.32

This latter does not take into account a supply of larger stone left on hand which can be used for repair of roads.

The city crushed all the stone used. This is estimated at \$1.50 per cubic yard, in the city yard. This is somewhat high. The cost of delivering stone for one-half mile of haul is included in the wages.

The plant also is in good shape and may be used for future work. No account is taken of the present value of this plant.

A reinforced concrete well lining, 46 feet deep and 3 feet 7.8 inches in inside diameter, was recently sunk in Munich as a monolith. The concrete, it is stated in "Beton and Eisen," was 6.88 inches thick, except for the lowest 3.28 feet, in which the thickness was gradually increased to 8.8 inches at the base. The cutting ring was made of oak timber 4 inches thick and the same size as the bottom of the concrete. The reinforcement consisted of five vertical channels in the centre of the concrete, banded with rings of ¼ x 2 ¾ inch bars placed at intervals of 4 feet 11 inches and bolted to the channels. This iron frame was put together exactly above the well site and the concrete molded around it in layers 3 feet 3 inches high. The cylinder was then lowered by excavating the soil below it. As each succeeding lift of concrete was added more earth was excavated. The entire operation consumed 160 working days.

George H. Webster, of Vancouver, has been awarded the contract for the Dewdney dyke at Matsie Slough. The work will be completed at once as the contract calls for its completion by March 1 next. The dyke, which will reclaim a large area of rich land flooded annually by the Fraser river, will be six or seven miles in length and will cost about \$80,000. The dyking commissioners who will have the work in hand are Messrs. Kenworthy, Shook and Tupper, Mr. Douglas being secretary. Mr. C. E. Cartwright, of Vancouver, is engineer for the commissioners.

Surveying has been commenced in connection with the project of the Canadian Collieries for the development of a 50,000 horse power on the Partridge river in the centre of the Comox coal fields, British Columbia. The proposed improvements will cost \$1,000,000.

Satisfactory Methods of Underdrainage

Laying out a Field for a Drainage Survey—Taking the Levels—Construction of Drains — Advice to the Clay Tile Industry

Specially Contributed by W. H. Day, Department of Physics, O.A.C., Guelph, Ont.

Underdrainage in Ontario has doubled in extent during the past five years, the amount done in 1909 being approximately 58,000 acres, as compared with 30,000 in 1905. The character of the work has undergone a similar transformation. Formerly it was done in small jobs of 10, 15 or 20 acres per annum, requiring one, two or three miles of drains; now it is being done in large blocks of 50, 100 or 200 acres, requiring 5, 10 or 20 miles of drains. In one case I know of 22 miles, on one man's farm. Operations on this scale have developed two great needs:

(1) The systematic drainage of a large area requires a minute topographical survey thereof, level readings every 100 feet square, with occasional readings between in case of prominent features, such as knolls and basins. From this survey a contour map can be made, the drains located thereon, the grades determined and the cut of the main fixed so as to give effective drainage to every portion of the block surveyed. Without such a survey it would be impossible in many cases to tell how deep the main should be in order to drain the depressions farther back.

(2) The individual ditcher, with his spade, capable of digging only in the spring and fall when the ground is soft, and very slowly at the best, must give place to more rapid methods than can be used from early spring until the ground freezes in the autumn. Such methods are indispensable if the people are to construct anything like the quantity of drains they are planning. These two phases of modern drainage will be discussed in this article.

Laying Out a Field for a Drainage Survey.

Experience has shown that, in most cases, convenience in mapping and determining grades demands readings every 100 feet square. To obtain these it is not necessary to stake the field entirely, but only to set two rows across it each way, or possibly four if the length is too great for the stakes to be distinguished with the naked eye half way across, the rows of each pair and the stakes in them being 100 feet apart. Figure 1 illustrates the method. In most cases it is found wise to set the rows parallel with two fences, end and side, respectively, as the permanent fences constitute the farmer's starting point for all operations. The fences most suitable for base lines, the probable outlet, and any peculiarities that exist are noted as the owner conducts the surveyor over the area previous to the commencement of the survey work. No attempt need be made to stake out the area permanently, for in few cases will the draining be done immediately, and permanent stakes through the fields would be in the way in the meantime. But enough permanent stakes should be set along the fences to enable the farmer to put up the rows again, if necessary, to locate the drains. As a matter of fact, however, the drains are nearly always located by the fences.

Taking the Levels.

When the staking has been done as indicated, the staffman, by sighting himself in line with two stakes, north and south, and at the same time in line with two east and west, can place himself at stations 100 feet

apart each way all over the field. The level is set up at L., and as the staffman proceeds along course O readings are taken at the various stations within the range of the instrument. The staffman returns along course I, readings being taken as he does so. This operation is continued until all stations within the range of the instrument have been read. A convenient station in the last course is chosen as turning point, and the level moved to L₂; and so on until readings have been taken all over the area requiring drainage.

No attempt is made to refer the readings to sea-level. An arbitrary datum is chosen 10, 20 or 30 feet or more below the surface at station O, course O. The elevations should be calculated in the field while the staffman moves from station to station, as there is plenty of time. And besides knowing the elevations as one proceeds aids

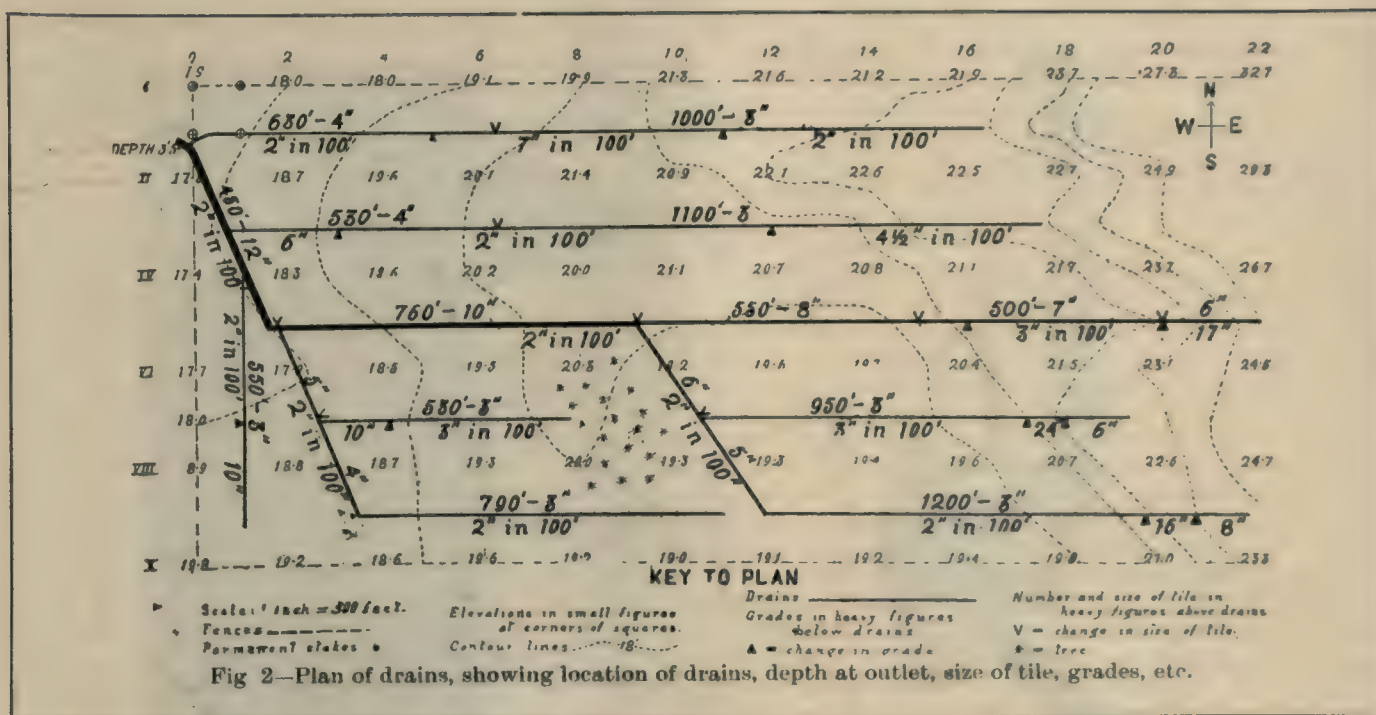


Fig. 1—A Field laid out for Drainage Surveying

in gaining some idea of what the system of drains will be, which in turn helps to decide what levels are necessary in dealing with prominent features, or in determining the outlet.

Making the Map.

In making maps for farmers it is necessary to provide something simple and at the same time complete in itself. These considerations have shown it wise to put all maps on cross section paper on a scale of 1 inch equals 100 feet, accompanied by a key explaining every symbol appearing on the map. The paper being laid out in squares, the farmer at once sees that the heavy division lines represent the courses along which he as staffman (it is wise to have the owner carry the staff, if possible) travelled during the survey. This at once gives him something tangible upon which to build his interpretation of the map (a blue-print would not serve near-



ly as well). By this time his eye has caught the "key," he begins to study—and experience has shown that not more than one in a hundred fails to understand the map sufficiently to put in his drains according to it. A few come back for some further explanations.

Figure 2 shows a plan of drains taken from one originally made for a farmer, but for clearness of reproduction three-fourths of the elevations and two-thirds of the drains have been left out. The scale was modified to correspond with the reduced size; and the lines of the cross section paper failed to show in the reproduction. The details of preparing this may need not be entered into, as the readers of the "Contract Record" are familiar with such work. Suffice it to say that the main drains are run in the lowest ground, as far as possible, and the laterals at right angles to the contours as nearly as may be. At the same time it is wise to adopt a system that gives long drains rather than short ones, as there will be fewer junctions, unless such a system is distinctly inferior in some other way. In determining the grades and depths of the main it is necessary to select the hardest spot in the whole area to drain, i.e., the "low spot" farthest from the outlet, and make a profile from there to the outlet, using the minimum depth in the low spot, getting as steep a grade as possible, and yet striving to avoid too deep digging. When the depths of the main are known, the grades of the laterals may be determined. When the grades and the area to be drained are known the sizes of the tile may be decided on.

Size of Tile.

To aid in determining size of tile there is perhaps nothing more helpful than McConnell's table, given below. I have been unable to learn what formula was used in preparing this table, or to find the co-efficient of friction for clay tile, but using Fanning's formula for smooth brick-lined conduits six inches or over in diameter and a maximum rainfall of two inches in 24 hours, of which one-half inch runs off and three-quarter inch is absorbed by soil, leaving three-quarter inch to be carried by drains, I have found that the large sizes of

tile on the grades mentioned would carry off the drainage water from areas indicated in approximately two days. As this is considered fast enough to avoid seri-

TABLE I.—SIZE OF TILE PIPE OF MAIN DRAIN.
(McConnell.)

Fall.	Foot in	Acres Drained.					
		3-inch tile.	4-inch tile.	6-inch tile.	8-inch tile.	10-inch tile.	12-inch tile.
1	20	18.6	26.8	74.4	138.0	276.0	426.0
1	30	15.1	21.8	60.4	128.0	220.8	346.0
1	40	12.9	18.7	51.8	109.8	189.6	296.4
1	50	11.9	17.0	47.7	98.0	156.0	246.0
1	60	10.9	15.6	43.4	90.0	144.4	228.1
1	70	10.0	14.5	39.9	83.0	135.0	213.0
1	80	9.3	13.4	37.2	77.0	127.0	200.5
1	90	8.1	12.3	35.0	72.5	120.8	190.5
1	100	7.3	11.9	33.1	68.3	115.8	184.4
1	150	6.7	9.5	26.6	56.0	97.3	154.4
1	200	5.7	8.2	22.8	48.0	84.4	132.5
1	250	5.1	7.6	20.4	42.4	74.4	117.0
1	300	4.6	6.9	18.4	38.2	65.5	107.0
1	400	4.1	5.9	15.5	32.6	56.0	90.7
1	500	3.7	5.2	14.8	30.1	54.0	81.6
1	600	3.3	4.7	13.8	28.0	48.6	74.0
1	800	2.9	4.1	11.4	24.0	41.9	65.0
1	1,000	2.6	3.7	10.2	21.2	37.2	56.0
1	1,500	2.1	3.0	8.5	16.8	30.8	47.0
1	2,000	1.9	2.8	7.4	15.0	25.0	40.8

ous injury to crops, we have adopted this table as a guide in determining the size of tile to use.

Depth and Distance Apart.

The depth of drains and the distance apart are related questions, and one cannot be intelligently discussed without consideration of the other. We may lay it down as a fundamental law that the drains should be deep enough to permit the fullest root development of which the plants are capable, and which they demand for best results. The roots of many farm crops penetrate from two to four feet deep. Now, for some time in the spring, the water-table in a drained field is in a zig-zag form like a rail fence, low at the drains and high between. In a clay in fairly good conditions this slope is about 1 foot in 15, in loam 1 foot in about 33. Applying these gradients, we see that for depths of 3 to 3 1-2 feet drains placed from 50 to 66 feet apart in clay and from 66 to 100 in loam will give approximately two feet of drained soil half way between the drains, which cor-

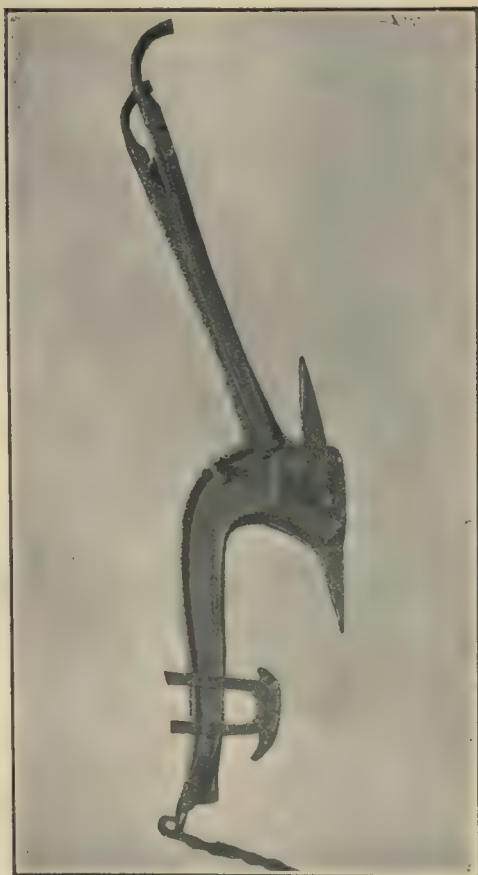


Fig. 3—The Pick Plough



Fig. 4—Ditching Plough

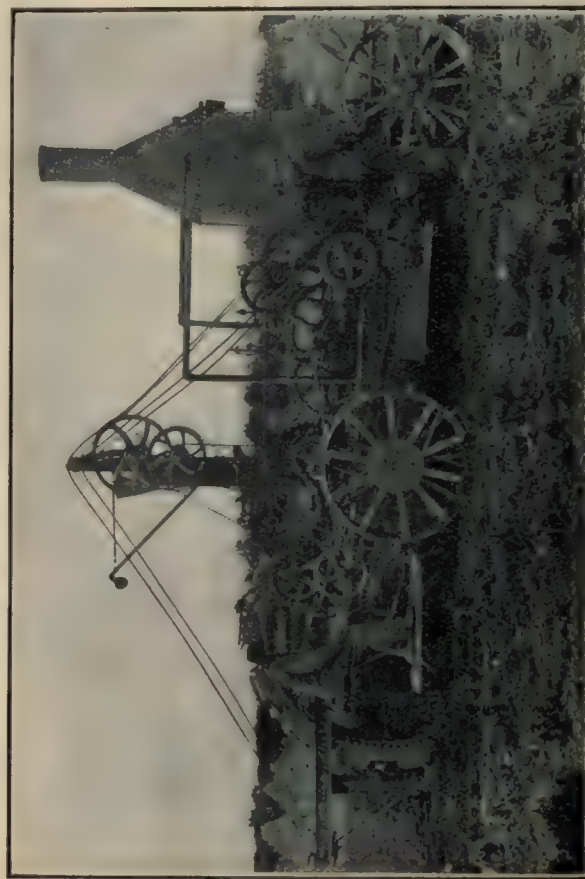


Fig. 6—Traction Ditcher Cutting a Trench

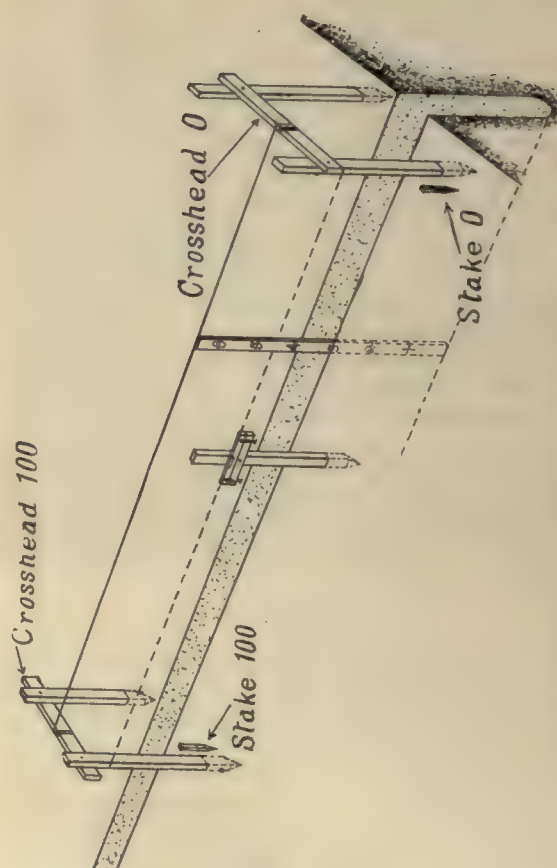


Fig. 5—Overhead Line Method of Grading a Ditch Bottom

responds with minimum depth desirable for roots of plants. Hence we may conclude that these depths and distances apart represent in a general way what should be aimed at in laying out a system of tile drains, though at the same time we must recognize that no cast iron rule can be laid down as soils vary so much.

Construction of Drains.

In extensive drainage operations the trenches must be cut either by a large gang of men or by ditching machines. In the former method the ploy can be used to good advantage. The ditch may be opened up with an ordinary plow, and two more furrows at once cut in the bottom. These are shovelled out. A long double-tree is used so one horse can walk on each side of the trench, and a chain six or eight feet long from the double-tree to the ploy allows the latter to go down in the trench. When the common ploy can no longer be used for loosening, a heavy pick plow (fig. 3) or a ditching plow (fig. 4) may be substituted. These may be used till the drain is almost full depth. There are many methods of grading a ditch by hand, but the overhead line is probably the best. Fig. 5 shows the method. The line is given the same slant as the ditch bottom, all points of which must test the same distance from the line—6 1-2 feet in the particular case shown in the figure.

The traction ditcher, however, outclasses every other method of putting in tile drains. Fig. 6 shows one of them at work. It cuts a trench full depth, true to grade, ready for the tile in passing once over the ground. During recent years help has been so scarce in the country that many who wished to drain have been unable to get the work done. The ditching machine, if generally adopted—as it promises to be—will remedy this difficulty.

Underdrainage, in Ontario, is only beginning. Upwards of four million acres of the cultivated land needs drainage. At the present rate it would take 100 years to complete this amount. Then, besides, some five million acres of marsh, swamp, and slash will yet be brought into cultivation by means of drainage—the best of our land is now too wet for use. In this vast undertaking the systematic survey and the ditching machine will play the leading parts.

Significant to the Clay Tile Industry.

The clay tile industry has already felt the effect of the growing interest in drainage. Indeed it is from the reports of the tilemen that we learn that underdrainage has doubled in amount during the past five years—the number of tile made has doubled. And the supply has not kept pace with the demand in some parts of the province. Nothing better than clay tile has been put on the market, but continued shortage in places and a desire for cheapness are leading the people to cast about for a substitute. Many tile plants have doubled their capacity and some fifteen or twenty new ones have been established, and still there is a shortage in many localities. The clay tile industry must expand—and that very rapidly—if it is to cope with the growing demand.

Slag Paving Blocks have been manufactured for many years in England. The bricks, it is stated, are manufactured from molten blast furnace slag which is drawn into caldrons lined with fire brick. The caldrons are mounted on bogies for transmission to the brick plant. Slag is poured from the caldrons into iron moulds which have a hinged bottom and are mounted on the circumference of a circular iron framework which revolves and allows the moulds to be filled separately

Pavements and Illumination

Pavements and illumination were recently associated in a novel way by Mr. Preston S. Millar, who claimed in a paper read before the Illuminating Engineering Society that the character of street surfaces has an important effect on street lighting. This is a novel source of complication to the already involved problem of paving, says the *Engineering Record*. The municipal engineer is expected to train his ear so well that the delicate shades of noise from granite and gneiss blocks can be detected and estimated quantitatively. He is expected to know just how much more easily a horse will slip on blue gum blocks as compared with those of long-leaf pine. He is assumed to know the effect on public health which will follow the paving of Main Street with sheet asphalt and Front Street with brick. He is also expected, ex-officio, to be able to purchase a \$3.00 pavement for \$1.25, with a 10-year maintenance guaranty thrown in by the contractor. All these things the city engineer has learned the expect among his official duties, but a protest is inevitable when it comes to selecting pavements on the basis of their properties for absorbing and reflecting light. A noisy pavement is a nuisance in some localities, a slippery pavement is dangerous on some grades, a smooth pavement offers special advantages in the way of cleanliness; these considerations are based primarily on the direct service due from pavements and must be given due weight. But it is unreasonable to select pavements with a view to improving the quality of street lighting, much as the electric companies would rejoice in this practice. By all means let us learn all we can about the absorption and radiation of light from street surfaces, but let it be distinctly understood that the information is to be used in improving the quality of the illuminating service and not in adding another condition to those now prescribed for pavements.

A concrete pavement with expansion joints was laid at Delphi, Ind., in the following manner: After the subgrade had been rolled it was covered with crushed limestone which was rolled to a thickness of 4 in. with a 10-ton roller. Next a concrete base 5-in. thick, mixed in the proportions of 1 part Universal Portland cement, to 7 parts gravel, was placed, the surface being left rough. A 1-in. wearing surface of 1 part cement to 2 parts sand was put on, floated with a cork float, trowelled, and gone over with a brush to roughen the surface. Expansion joints were put in every 40 ft. They were made with 1 x 6 in. boards beveled to 1/4-in. on one edge and were extended through the cutters. After the top course had been spread the boards were removed and the joints

filled with tar.

A road for four kinds of traffic, with a total width of 69 ft. and a length of 73 1/2 miles is proposed in the County of Northumberland, England. The plan provides for a center footpath 9 ft. in width; on the east side of this path is a 24-ft. road for motor and light fast traffic. On the west side heavy slow vehicles are to be accommodated on a 22-ft. road. Beyond the latter highway a width of 14 ft. is to be reserved for light railway or trolley purposes.

Screened refuse destructor clinker is being used in one of the large neutralizing filters of the new disposal works at Redditch, England. In a paper before the Institution of Municipal and County Engineers Mr. A. J. Dickinson states that the winter clinker makes a good tar paving for foot paths where the traffic is not excessive.

The New Grain Exchange at Calgary, Alta

One of the First Fireproof Structures erected in the Western Capital—
Some Details of Design — Contractors' Methods and Schedule

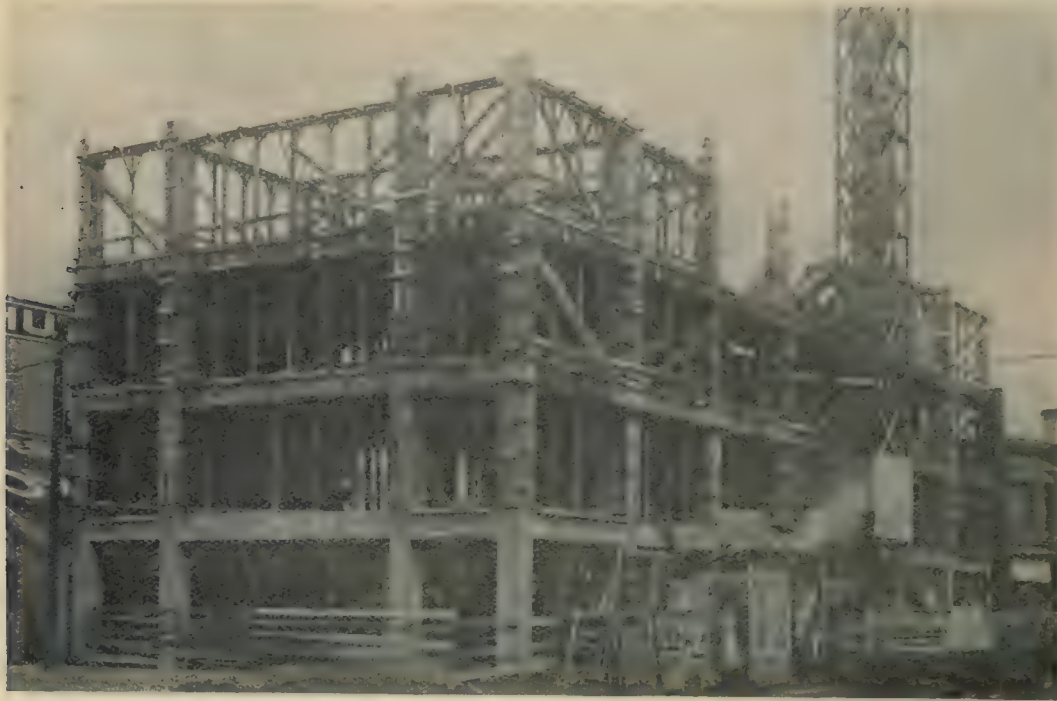
The Grain Exchange, Calgary, was one of the first fire-proof structures erected in Calgary. It has a frontage of 130 feet on First street West and 50 feet on Ninth avenue, two of Calgary's busiest streets, and presents an imposing appearance, being six stories in height, and 92 feet from sidewalk to top of coping. It is of skeleton reinforced construction, and is of Kahn design and material. Messrs. Hodgson, Bates & Butler, of Calgary, were the architects, and they have shown that the West is not one whit behind eastern cities in architectural design. The structure is faced with local sandstone, backed with brick on three elevations. The rear walls are 8" reinforced concrete panels.

The interior is in accordance with modern office planning. An Otis-Fensom elevator has been installed. A

with an automatic skip. By this means three working days sufficed to pour the columns and slab of a floor and the contractors laid out a schedule of one floor per week. Unfortunately owing to a wash-out on the railroad, by which material was delayed, this schedule could not be maintained, although the dates as set out show that it could have been done.

Ground	June 11th, 1909
1	June 21st, 1909
2	July 8th, 1909
3	July 16th, 1909
4	July 23rd, 1909
5	Aug. 3rd, 1909
Roof slab	Aug. 14th, 1909

Possession was given to several tenants by December



The New Grain Exchange at Calgary, Alta, in course of construction

wide staircase of concrete with non-slipping treads is a feature. There are roomy corridors and light offices. Lavatory accommodation is provided on each floor. The interior finish is of native woods, B. C. fir of selected grain being general. The show fronts and entrances are in oak with fine bevelled glass to the design of the architects. All the partitions are of metal and all lath is 24 gauge wire. The rear and lane windows are all according to underwriters' specifications, with polished wire glass. The corridor doors, which open on to the fire escape are kalameined doors with cast wired glass.

The contractors, Messrs. Geo. H. Archibald & Company of Winnipeg and Calgary, were confined as to working room and arrangements were made for a steady supply of crushed rock and other material as the work proceeded. A half-yard Ransome mixer was installed at the foot of a hoisting tower working in conjunction

14th, 1909, although the final touch was not given until the end of February, 1910, when the whole of the building was tenanted.

Reinforced construction had not been employed extensively in the west at the time of operation and great difficulty was experienced in procuring men capable of framing and handling the steel.

The ratepayers of Toronto will be asked to vote \$100,000, the city's share of the good roads fund. The County of York and the Provincial Government are each to contribute similar amounts. Extensive road work is under way and projected throughout Ontario. The County of Peel alone is spending \$150,000 on the Dundas street highway, known as the Eaton road, within its limits.

Canadian Railroad Development

The Canadian Northern Railway is applying for a charter for a railway from Stewart, at the head of the Portland Canal, across northern British Columbia, north of the Grand Trunk Pacific to the eastern borders of the province, there to connect with a line to Edmonton.

The Montreal & Southern Counties Railway Company, of Montreal, is said to have plans under way for an extension of the Southern Counties across the peninsula to Chambly Basin and Richelieu. In connection with the plans the old Central Vermont is to be electrified and run in connection with the new electrical railway.

P. Hartnett and S. A. Eslick, composing the firm of Eslick & Hartnett, Spokane, Wash., have been awarded a contract for work on the construction of the Canadian Northern Railway on Vancouver Island. The contract is said to amount to about \$250,000 and to involve considerable rock work. Construction work is to be started this month.

The Western Railway Company, incorporated by the Ontario legislature, is seeking a federal charter. It desires that its electric railway, authorized to be constructed from Toronto to London, with branches to Stratford, Woodstock



Calgary Grain Exchange Upon Completion.

and Wellesly, may be extended from London to Winder in the same province and connecting therewith that ferries may be maintained across the Detroit river.

The Provincial Government has passed an order-in-council providing for the building of a branch of the Temiskaming & Northern Ontario Railway from a point on the main line near Kelso to Porcupine. The distance will probably be 30 or 32 miles, and the cost about \$430,000. This work will be done under the powers given by legislation last session, and will be rovepeded with without delay. S. B. Clement, North Bay, Ont., is chief engineer.

Grading work on the Canada Northern Railway, between Belleville, Ont., and Trenton is now nearly completed. The location is exceptionally favorable, there being no deep cuts and little filling or elevating. Cuverts are being built and there is a small steel bridge to be erected east of Belleville.

Work is being rushed. The grade is generally highly favorable, but there is some heavy grading where the line crosses two railways leading into the cement works at Belleville.

Since the announcement that the Government would build a branch of the T. & N. O. Railway into Porcupine from a point near Kelso, there has been some speculation as to whether it would be a steam or electric road. The price at which the road will be built, \$450,000, did not seem to be enough, in the opinion of some men, to build a road through such a rough country. But the route to be taken by the new branch is not so rough as the country from North Bay north. From the main line to Night Hawk Lake there is a sand plain, which offers no difficulties for railroad construction. There will have to be a bridge built across the lake, and another over the Porcupine River, but outside of that there are no great difficulties to overcome.

Chairman Englehart, of the Temiskaming & Northern Ontario Railway, had a conference in Toronto last week with Superintendent J. H. Black and Chief Engineer C. E. Clement, regarding the immediate commencement of the work of extending the railway to the Porcupine district, in accordance with the decision reached by the Ontario Government. The preliminary survey made is a satisfactory one, but an instrumental survey is now necessary, and this will consume at least three weeks. In the meantime, the purchase of supplies and material will be rushed and the right of way cleared. The commission will endeavor to make a record for rapid construction, and it is planned to have the ne completed before the end of next summer. No special difficulty in getting labor is anticipated as some of the extra gangs employed on the existing line are laid off and most of them will go to work on the extension.

The Northern Construction Company, of Winnipeg, Man., which recently secured the contract for the first 60 miles of the Canadian Northern Railway, from Vancouver to Chilliwack, has also been awarded the contract for the work as far east as Hope, B. C., a distance of 79 miles from New Westminster. Construction will be prosecuted throughout the winter months. Tenders for the construction of the first section of the island line out from Victoria, B. C., will be called for at once. Rails for the Fraser Valley section have been ordered from the steel works at Sydney, Cape Breton, and will reach Port Mann by the end of April. No additional contracts for construction up the Fraser beyond Hope will be awarded until the railway commission announces its decision on the Canadian Northern application for approval of its right of way through a portion of the Fraser canyon near Lytton. M. H. MacLeod, Winnipeg, Man., is general manager of the Canadian Northern.

Latest reports from Western Canada regarding the progress on the Grand Trunk Pacific Railway announce that the grading, fencing, telegraph line and track laying has been completed on the Yorkton branch running north of Melville, the distance being $25\frac{1}{4}$ miles. Track laying has also been completed into Canora, a distance of four miles from Yorkton, and the end of this extension. On the Melville to Regina branch, a distance of 25 miles, the track laying, fencing and telegraph line has been completed to Belcarres, and from that point to Regina is now under construction, also 90 miles of the branch from Regina towards the boundary are now under construction. On the Battleford branch, a distance of 48 miles, approximately 45 per cent. of the total grading has been completed. The grading on the Prince Albert branch, now under construction from a point west of Watrous on the main line, is 85 per cent. completed, and track laying has been started. On the Calgary branch the track is laid to mile 47.

The Reader's Views on Current Topics

The Day Labor Discussion: City Engineer of Prince Albert Furnishes Costs— Training the Engineer-Contractor: Is Specialization Overdone?—A Definition

Prince Albert, Sask., Nov. 29, 1910.

Editor, "Contract Record":

Mr. Curtis' letter, published in your issue of Sept. 14th, seems to have provoked a very widespread expression of opinion on the above subject, though, with very few exceptions, your correspondents seem to do little more than touch on the general principles under discussion, without in any instance quoting a case to illustrate their contentions.

As Mr. Curtis in his letter undoubtedly refers to a certain contract for the construction of concrete sidewalks in the city of Prince Albert, the writer will explain briefly the situation with regard to that particular contract and show the results as they finally worked out.

The council, for various reasons, originally intended doing this work by day labor, without calling for tenders, for which purpose they had entered into a contract for the supply of cement, had purchased a concrete mixer and had also engaged a superintendent to take charge of the work. The cement was purchased by sealed tender, three prices being submitted, viz., \$2.94, \$2.96 and \$2.97 per bbl. The lowest tender was accepted, and the fact that the cement was supplied by a company in which one of the aldermen was interested was certainly not a factor in determining to whom the contract should be let.

At this stage a certain firm of sidewalk contractors appeared on the ground and, after putting forward various arguments, induced the council to call for tenders for the work of construction. Accordingly, specifications were prepared and tenders called for, with the result that two bids were received at 18 cents and 18½ cents per square foot respectively, while the estimate submitted by the city engineer as the probable cost was 17 cents per square foot. After some discussion it was finally decided to do the work by day labor as originally intended.

The alleged advance in price to be charged the contractor for cement is purely imaginary, as the estimate was made at the same price at which the city agreed to furnish it to the contractor. Under the specification the cement was to be furnished to the contractor on the work as required, the city being responsible for all unloading from the cars, storing and hauling, and for returning the empty bags to the factory, also for all damage and loss until the cement was delivered to the contractor.

The writer has delayed taking part in this discussion until the season's work was completed and the costs were calculated so that accurate information might be submitted.

The actual working out of this contract was as follows:

Final estimate at prices of highest bidder,	\$43,249.38
Final estimate at prices of lowest bidder,	42,569.93
Final estimate at prices of city engineer,	38,183.26
Actual cost of work,	35,527.66

This work was done under very adverse conditions which certainly added materially to the cost. Except for the finishers, there were no men obtainable who had ever done any work of this class before. Even a competent foreman to take immediate charge of the work could not be secured, so that the management lay entirely with the superintendent, who naturally was unable to devote his whole time to it, and in consequence a serious loss in the item of labor most certain-

ly occurred. The quality of the work done evidently did not suffer as has been shown conclusively by numerous openings made in the new walks by the Telephone Company for the purpose of reconstructing their lines.

Notwithstanding the figures given above, the writer does not contend that it is good practice to ask an engineer to bid on work in competition with contractors, but, particularly where the number of contractors bidding on work is limited, an engineer's estimate of the probable cost is necessary for the guidance of the body letting the contract, in order to protect the corporation from paying an excessive price for the work.

In municipal as well as in other work, it is vastly more important to secure the best possible construction than it is to cut the cost down to the last notch. It is not probable that any engineer would lower the quality of the work in order to keep the cost within the estimate submitted, but the charge made by some of your correspondents, that certain men would endeavor to make capital out of the fact, that they had done work at a low cost, is not altogether unfounded, and this, in itself, is sufficient reason for not holding city workmen too closely to a specified price.

The experience of laying water mains and sewers in this city has not been very favorable to the contract system. The original installation was made by contract and, notwithstanding the fact that the contract carried with it a nine months' guarantee and that the work was all done under inspection, both water mains and sewers have given continual trouble ever since. Several portions have had to be taken up and laid again. The contract work done since the first installation has, it is true, proved more satisfactory, but, whenever any work of this nature has been undertaken by day labor it has invariably cost less than the ruling contract prices and has always proved perfectly satisfactory.

To sum up, the writer is of the opinion that no general rule can be laid down for the guidance of a city council or city engineer in deciding whether a certain piece of work shall be let by contract or not. Local conditions, such as the character and magnitude of the work, with the difficulties likely to be encountered in its execution; the state of the labor market; the contractors available who are willing to undertake it; and numerous other considerations all have a very important bearing on the question. Furthermore, many pieces of work, for various reasons, contain a certain element of gambling which it is impossible to eliminate. There is no doubt that such construction should be done by day labor, as few contractors can be found who are willing to take serious chances—and if they do take them, a corporation has no right to get its work done at less than the proper cost to the contractor.

Should there be good reasons, apart from the question of price, for doing the work by day labor these should be determined beforehand and tenders should not be called for unless it is seriously intended to let the work by contract. Tenders being once called for, a council is committed to the necessity of letting the contract to the lowest tenderer, provided his price is not excessive and if he is financially able to carry out his contract.

In conclusion the writer would urge the point that an estimate from the city engineer should always be submitted for the guidance of the body awarding the contract, but that

it should not be considered as a tender submitted in competition. And the work should not be done by day labor if a suitable contractor can be selected to do the work at a fair price. In the contract referred to by Mr. Curtis it would certainly be most unreasonable to expect the city of Prince Albert to pay out an extra \$7,000 on a \$35,000 contract simply because they had taken tenders for the work.

Yours very truly,
F. A. Creighton, City Engineer.

"Engineer-Contractor" Defined

Editor, Contract Record:

In my opinion contracting and engineering should be strictly separated. An engineer may with experience become a successful contractor, or a contractor may, by acquiring a certain amount of technical knowledge, become an engineer, but the Engineer-Contractor is a hybrid that the public justly looks upon with suspicion.

Very truly yours,
Willis Chipman.

"Specialization Going Beyond the Bounds of Reason"

Montreal, December 1, 1910.

Editor, Contract Record:

I have read with interest Mr. W. R. Harris' paper in your issue of November 2nd, in which he states that "many contractors have been disappointed in the work rendered by graduates of engineering colleges," and in which he suggests a new course for the already overworked student.

It seems to me, Mr. Editor, that any contractor who would take an engineering graduate and expect to receive the work of a man of experience has nobody to blame but himself. In the majority of such cases as have come under Mr. Harris' observation I should not be surprised to find that the employers were not only non-graduates, but that they have a mistaken notion of what a technical engineering course means. Happily such cases are rare in this country because, as I see it, the employers recognize in the engineering graduate a young man ready to commence to learn engineering. The years spent in college must only be considered as a training.

The tendency to specialization is going beyond the bounds of reason in the mad rush to obtain ready made employees. No person should think of "specializing" until he has mastered the general principles of his profession. These principles can only be thoroughly understood after years of actual experience. How then a man can "specialize" before leaving school is hard to understand. It sometimes seems to me that the students in all the applied science courses take the same work and lectures for at least the first three years at college. After that, perhaps, let their ways separate into the different branches. But even then the graduate is not a specialist nor even an engineer. He is well equipped to study engineering. If placed side by side with an untrained man who has been equally well endowed by nature for engineering work, the graduate will in a few years outstrip his running mate. This is as it should be, for the one has been receiving an emolument from his employer while the other has been spending time, energy and money to obtain a trained mind.

The suggestion to add particular branches to the engineering courses should not be adopted without serious thought, for there is more than enough in the present curriculum of any recognized engineering course to occupy the attention of the average student for four years. In my judgment the service of a reliable manufacturer or contractor is

the best school in which any young man, graduate or not, can learn the proper value of the dollar and of the hour. If he be suited to the work in hand, and given a few months' opportunity, the graduate will fill the position and the employer will be able to pay such a salary that he will in the natural order of things become a permanent part of the organization.

Yours very truly,
Walter J. Francis.

Winnipeg Street Commissioner's Report

Some interesting figures are contained in the semi-annual report of Mr. W. F. Tallman, street commissioner, Winnipeg, Man. In the city at this time there are 335 miles of paved streets and 403 miles of sidewalks. The entire cost of caring for these thoroughfares for the first six months of this fiscal year from May 1 to October 31 was \$154,621.91, as compared with a cost of \$149,524 for the corresponding period of 1906, which shows a reduction in the cost of upkeep from \$664.55 to \$406.75 per mile. The commissioner reported that owing to the increased population of the city over 1906, which was approximately 33 per cent., traffic in the city had correspondingly increased to an extent, conservatively estimated at 50 per cent. Of the yearly appropriation for street cleaning and maintenance there was still a balance of \$40,370.09. The commissioner pointed out that the higher wages paid during 1910 had caused an increase of \$1,300 a month in his salary lists. For materials used in repairs, during the six months, \$19,061.82 had been expended. During the summer and fall seasons, 23,826,250 gallons of water have been used to flush the asphalt pavement and to sprinkle the other compounds used in paving, which is almost double the amount used in 1906. The cost of this water to the department was \$2,812.20. In the matter of grading work, the department had saved \$6,988.53 under the estimates.

Union of B. C. Municipalities

The 6th annual convention of the Union of British Columbia Municipalities held recently at Salmon Arm, B. C., was the most successful meeting ever held by the society. Among the many important subjects discussed were the good roads question, municipal advertising and town planning. Mayor Lee, of New Westminster, stated that transportation was the greatest problem before the people of British Columbia. If they could improve their roads and offer better transportation facilities, unprecedented development would follow. Mayor Bell, of Enderby, B. C., President of the Union, dealing with the subject of town and city planning, suggested that the Provincial Government be asked to pass the necessary legislation to insure intelligent planning and development work and the most satisfactory design of streets, so as to facilitate the installation of efficient sewerage systems, etc. Mayor Plante, of Nanaimo, B. C., was elected president, and Victoria, B. C. was selected for the 1911 convention.

The 7th annual convention of the American Road Builders' Association was held at Indianapolis, Ind., December 6-9. An important feature of the meeting was a splendid exhibition of the various materials and the most improved machinery and appliances for road making and street paving. The programme was most comprehensive and covered practically every phase of the work. A number of the most interesting papers will appear from time to time in later issues of the "Contract Record."

Personal News and Notes

The "Contract Record" extends hearty congratulations to Mr. E. A. James, editor of the "Canadian Engineer," upon the occasion of his recent marriage.

Mr. Arthur St. Laurent, Mem. Can. Soc. C. E., Assistant Deputy Minister of Public Works, left Ottawa recently to attend the National Rivers and Harbours Congress at Washington.

The 7th annual convention of the American Road Builders' Association is now being held at Indianapolis. A comprehensive list of addresses has been arranged, these covering every phase of the subject. A number of Canadian engineers are present.

City Engineer Doan, of Halifax, N. S., has submitted his annual report, which contains detailed information on the waterworks system, the total cost of which to date is given as \$1,243,137. The cost of maintenance for 1909-10 was \$91,114.

The estimates for the next fiscal year presented to the Commons recently, amount to nearly 139 millions, an increase of more than 6 millions over the amount for last season.

Messrs. Fuller & Company, Limited, contractors, New York City, received the \$600,000 contract for the erection of a new Art Gallery on Sherbourne street, Montreal. Only a portion of the structure, involving half this amount, is to be built at the present time.

On the 24th ult., Mr. A. C. D. Blanchard, who has charge of the Main Drainage Works for the city of Toronto, gave the members of the local branch of the Canadian Society of Civil Engineers an interesting talk on the design and progress of the Toronto sewage disposal system. The address was illustrated by a number of excellent lantern slides.

It is interesting to note that at Victoria, B. C., an effort is being made to arrive at the difference in cost of civic works done under the contract system and by day labor. Investigation is stated by the local press to have been brought about by the presentation of a bill for extras amounting to \$3,300 by the Pacific Coast Construction Company, whose original contract price was \$17,532.

Mr. James A. Bell, for 21 years city engineer of St. Thomas, Ont., has finally resigned his position in order to devote himself exclusively to private practice. He is succeeded by Mr. Mason H. Baker, a sketch of whose career appeared in our issue of April 20, 1910. A short biography of Mr. Bell was published in the Contract Record of May 4, 1910.

It is reported on the authority of Mr. Wm. Phillips, general eastern agent of the C. N. R., that the company will be running into Hamilton by next fall. Construction work has already been started east of Oakville and every effort will be made to get the line in operation before next winter. The C. N. R. officials refuse to say what route will be used for an entrance into the city or to give any information as to the possibility of the C. N. R. and C. P. R. building a union station.

City Engineer Clement, of Vancouver, has prepared an itemized statement of the work accomplished by his department during the current year. It shows that no less than 23 miles of concrete walks and 2½ miles of curbing have been laid. There have been four miles of plank roadways, 30½ miles of new streets opened up and graded, 10 miles rocked and 3.45 miles graded permanently. There have been 3.1 miles of paving completed and 9.1 miles are still under way.

The Architects' Association of Victoria, B. C., has been organized with the following officers: E. M. Rattenbury, hon.

president; S. Maclure, president; W. Ridgway Wilson, vice-president; H. S. Griffith, J. C. S. Keith, Crawford Coates, committee; P. Leonard James, secretary-treasurer. The association has offered to aid the city in revising the building by-laws, some of the clauses of which, as at Toronto, Montreal and other places, are very antiquated.

The western provinces of the Dominion have been asked by Hon. Thomas Taylor, Minister of Public Works for British Columbia, to co-operate with the latter province in the construction of a trunk line highway from Winnipeg to Vancouver. British Columbia already has plans laid for the construction and completion of its share of this road. Alberta is well along, and the matter has been taken up in the other provinces on the route. When this highway is completed it will give the longest continued stretch of first-class road in the world.

A report has been made by Mr. George Janin, chief engineer and superintendent of the Montreal waterworks, upon the report submitted by Messrs. Hering & Fuller, who estimated the cost of filtration and water extensions, \$1,687,000. Mr. Janin agrees with the plans outlined, but states that it will be necessary to make an appropriation of \$318,670 to cover the cost of extra land and also to devote the sum of \$675,000 for the enlargement of the aqueduct, laying of intake pipes and installing machinery.

At a recent meeting of the South Vancouver council a communication was read from City Engineer Clement, of Vancouver, who forwarded a copy of a motion passed by the Vancouver board of works and approved by the council with reference to the employment of a consulting engineer for Greater Vancouver. This was discussed and it was finally decided that Vancouver be informed that the municipal council did not propose to engage an engineer jointly with the city, but requested the City of Vancouver to join with South Vancouver in securing the services of an engineer for the special purpose of supervising sewer work for Greater Vancouver.

Messrs. Brown & Vallance, architects, Montreal, have opened a Winnipeg office in the McArthur Building, in charge of Mr. E. E. Sheppard, who for the past four years has been western representative of the Dominion Bridge Co., Ltd., Montreal.

The 5th annual dinner of the Manitoba Association of Architects was held in Winnipeg on the 24th ult. The officers elected at the business session held prior to this function were: president, J. D. Atchison; vice-president, Victor Norwood; second vice-president, John Woodman; secretary, J. Pender West; treasurer, Donald A. Ross. Among the guests at the banquet was Col. Ruttan, city engineer of Winnipeg. Replying to the toast, "Our Sister Societies," the Colonel referred to the coming convention of the Canadian Society of Civil Engineers, which is to be held in Winnipeg next month.

The annual meeting of the Ontario Portland Cement Company, Limited, was held at Brantford, Ont., on the 2nd inst. The director's report and auditor's statement were presented and disclosed a most satisfactory state of affairs. The report dealt with the business generally, the outlook for the future, the increased production and sales, which were larger than ever before, and also stated that the company had continued along independent lines. The old directors, Messrs. E. L. Gould, W. S. Wisner, A. A. Bixel, H. Cockshutt and A. E. Watts, were re-elected, and a resolution passed heartily thanking the directors, officers and staff for the able manner in which they had conducted the affairs of the company during the past year. At a subsequent meeting of the directors the following officers were elected: E. L. Gould, president; W. S. Wisner, vice-president; John A. Colter, manager; S. H. J. Reid, secretary, and A. A. Barrett, treasurer.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Carlyle, Sask.

The laying of cement sidewalks, because of the excavating for water pipes, will be postponed until the spring.

Chilliwack, B.C.

The by-law to expropriate 6 feet off the Dominion Hotel property for widening of Young street was defeated.

Elora, Ont.

The ratepayers will vote at the next municipal elections on a by-law authorizing the borrowing of \$5,000 for construction of sidewalks. Henry Clarke, clerk.

Harriston, Ont.

The ratepayers will vote on a by-law to expend \$35,000 to instal a waterworks system.

Lethbridge, Alta.

The city is having plans prepared for the construction of a gravity waterworks system from St. Mary's river, a distance of 35 miles. Estimated cost, \$700,000.

Meaford, Ont.

The ratepayers will vote at the municipal election on the borrowing of \$10,000 to be expended on the improvement of the streets.

Montreal, Que.

Superintendent Janin in his report endorses the estimates as prepared by Hering & Fuller, of New York, N.Y., for the proposed new aqueduct and other water supply improvements. The work as proposed includes the following: Construction of filtration plant, \$1,687,000; completion of enlarging aqueduct now in course of construction, \$675,000; to purchase 7,000 extra h.p., of which 3,000 to pump 50,000,000 gallons more and 3,000 h.p. for other municipal purposes—enlargement of aqueduct, \$1,900,000; enlargement of tail race, \$50,000; machinery, turbines, pumps, etc., \$250,000, and building, foundations, weirs, etc., \$100,000.

North Vancouver, B.C.

Two by-laws are likely to be introduced for the decision of district voters in January. One will be for \$30,000 for road improvements and the other for about \$15,000 for sidewalks.

Port Hope, Ont.

A by-law will be submitted to the ratepayers at the next municipal elections to authorize the issue of debentures for the sum of \$13,000 for construction of cement walks, etc. J. W. Sanders, clerk.

Prince Albert, Sask.

The ratepayers will vote on by-law to spend \$40,000 on granolithic walks; \$48,000 on sewers.

Smith's Falls, Ont.

The ratepayers will vote on a by-law to borrow the sum of \$10,000 to purchase

a pump and a turbine water wheel to be installed in pumping station.

Victoria, B.C.

W. W. Northcott was authorized to call for tenders for various projects which have been decided on in connection with a large number of streets.

Vancouver, B.C.

The ratepayers will vote on by-laws for waterworks in city extensions, \$200,000; on waterworks, north shore extensions, \$200,000; Clark drive improvements, \$75,000; opening and rough-grading of lanes, \$50,000; extension of 8th avenue at Main street, \$46,000.

Tenders were ordered to be called for the block paving of Pender street from Main street to Campbell avenue.

Wingham, Ont.

On Jan. 2nd the ratepayers will vote on a by-law to issue \$2,500 5 per cent., 20 instalment sewage debentures.

Winnipeg, Man.

Tenders addressed to the chairman, Board of Control, will be received until December 28th for supply of water meters, as follows: 10 2-inch; 22 1½-inch, etc. Specification, etc., at office of City Engineer, 233 James avenue; also until same date for construction of water mains on several streets.

Tenders addressed to the Chairman, Board of Control, will be received until December 23rd for construction of water mains on various streets. M. Peterson, secretary.

AWARDED.

Point Grey, B.C.

Messrs. McLean & Company have the contract for construction of reservoir here, \$58,000 approximately. Messrs. Cleveland & Cameron, engineers.

Vancouver, B.C.

The Paterson Contracting Company refusing to fulfil its tender for paving of Richards street from Georgia to Robson, the work was awarded to M. P. Cotton, next lowest.

Railroads, Bridges and Wharves trial Plants

Calgary, Alta.

We are informed that no tenders were accepted for the construction of steel bridges, for which tenders were to be in by Nov. 7th. New plans will be prepared. J. T. Child, city engineer; W. D. Spence, city clerk.

Edmonton, Alta.

The construction of a bridge is under consideration. A. J. Latonell, city engineer.

Fort William, Ont.

Permit was issued for C. P. R. harbor bridge recently, \$400,000.

Kamloops, B.C.

Mayor Robinson and the city council will

shortly present a proposition to the Canadian Northern Railway in regard to the extension of the line into that city. T. G. Holt and T. H. White represent the company.

Ottawa, Ont.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, will be received until Jan. 24th for about 61,200 gross tons of 80-pound steel rails and the necessary rail fastenings.

Prince Rupert, B.C.

Surveys for a railroad line between Port Simpson and Prince Rupert by the Port Simpson, Prince Rupert & Northern Short Line, are in progress and the management states that the line will be completed in two years. The line is of standard gauge.

Tenders addressed to Minister of Public Works, Victoria, will be received until Jan. 2nd for erection of Prince Rupert wharf. Plans, etc., at offices of the Government agents, Prince Rupert; of the Provincial Timber Inspector, Vancouver, and at the Public Works Department.

Port Mann, B.C.

The last link in the proposed route of the Canadian Northern Railway from Lytton to Port Mann has been finally surveyed. Mr. W. K. Gwyer finished work on the survey revision between Popkin and Hope. The section from Hope to Lytton was completed some time ago, and if any alterations are made there they will be slight. It is announced that the contract for the preparatory construction from Popkin to Hope, some 20 miles, will be let as soon as the season opens in the spring. By that time revised surveys from Lytton to Kamloops, and on up the North Thompson will be completed to permit of other contracts being awarded on this portion of the line.

Renfrew, Ont.

A by-law to raise by way of loan \$2,500 for the purpose of constructing bridge across Smith's Creek will be voted on at the municipal elections.

Seaforth, Ont.

D. Patterson, county engineer, reports the necessity for either new bridges or considerable repair work in this district.

Trail, B.C.

The wash borings of the bed of the Columbia river taken in connection with the proposed erection of the large steel bridge on the transprovincial trunk road have been completed and are at Public Works Department. Plans are being prepared for concrete foundations. F. C. Gamble, Public Works engineer.

Victoria, B.C.

Plan and profiles for the first section of the Canadian Northern Pacific on Vancouver Island have been filed by Divisional Engineer G. B. Hughes with the Hon. W. R. Ross, Provincial Minister of Lands. These plans bring the located line of the railway to Cooper Cove. The location of the new

line as shown by the plans does not involve any exceptional engineering difficulties, there being no deep ravines to be traversed or mountains of a formidable character to be subjugated. The plans, by provincial railway law, must be filed thirty days for inspection.

Vancouver, B.C.

The ratepayers will vote on the following by-laws: Burrard street, Kitsilano bridge, \$500,000; Dunsmuir-Keefer viaduct, \$400,000; Second Narrows bridge stock, \$200,000.

AWARDED.

Belleville, Ont.

The contract for building the cement piers on the C.N.R. bridge across the Trent river has been let to Mr. Henderson.

Public Buildings, Churches, Schools, etc.

Brampton, Ont.

The county of Peel have under contemplation the erection of a hospital to cost not less than \$30,000. The Women's Peel County Institute initiated the movement. Mrs. E. G. Graham, president.

Chilliwack, B.C.

The by-law to raise the additional \$6,000 for city hall was carried.

Collingwood, Ont.

The ratepayers will vote at the municipal elections on a by-law to raise by debentures the sum of \$14,000 for the purpose of erecting a fire hall.

Calgary, Alta.

Tenders for new schools will close on the 16th of January. Tenders to be sent to the secretary of the Calgary School Board. Noted previously.

Carcross, Yukon Territory.

Tenders addressed to J. D. McLean, secretary, Department of Indian Affairs, Ottawa, will be received until February 26, 1911, for erection of frame boarding school building near here. Plans, etc., at offices of the Inspector of Indian Agencies, Vancouver, Victoria, R. C. Miller, Whitehorse, Y. T., etc.

Edmonton, Alta.

The estimates for public buildings in the Province of Alberta include \$515,000 for partial completion of new Parliament Buildings, \$140,000 to complete the new court house, \$50,000 for a site and building for new land titles building and \$30,000 towards the construction of new government house in Glenora.

Hamilton, Ont.

The county council have accepted the plans of Stewart McPhie for the House of Refuge. Plans call for expenditure of \$24,000. Work of erection, it is stated, will commence in the spring.

Kamloops, B.C.

The construction of the new provincial home for the aged here, will, it is stated, begin in the spring, the expenditure involved being about \$70,000. Estimated total cost, \$250,000.

The site for the new hospital has been chosen and final plans will be prepared at once. Estimated expenditure, \$70,000. Hospital committee: Messrs. Bethune (chairman), F. E. Simpson (secretary), and others.

Listowel, Ont.

The plans for public building are on view. Estimate provides \$13,000 for erection.

Moose Jaw, Sask.

The town council has made the necessary guarantee to provide for the erection of a \$50,000 Carnegie library building, which will be erected if Mr. Carnegie will receipt the proposition.

Montreal, Que.

Plans are being prepared for a new moving picture theatre on Notre Dame east.

The Board of Control have taken into serious consideration the need of a new city hall.

North Vancouver, B.C.

The plans prepared by Hope & Baker, architects, Vancouver, for the proposed new fire hall at Thirteenth and St. Georges avenues, have been accepted. Estimated cost, \$8,000.

Ottawa, Ont.

The Belcourt Club, of which Dr. Chevrier is president, is preparing to erect a modern hall.

Tenders addressed to the secretary of Militia Council, Ottawa, will be received until Dec. 23rd, for the construction of a magazine building, etc. Eugene Fiset, colonel, Deputy Minister, Department of Militia and Defence.

Pakenham, Ont.

On January 2nd a by-law will be voted to authorize the issue of debentures, Tps. of Pakenham, to the amount of \$4,000, for the purpose of building a hall.

Phoenix, B.C.

The congregation of St. Andrew's Presbyterian church will erect a church to replace the one recently destroyed by fire.

St. Paul, Man.

On Dec. 29th a by-law will be voted on to issue \$6,000 school debentures. Alfred Masters, secretary-treasurer.

Saskatoon, Sask.

The congregations of Wesley Church, Third Avenue Methodist, and St. John's, will build new churches during 1911.

St. John, N.B.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until January 9th for construction of drill hall here. Plans, etc., at above Department and on application to Mr. D. H. Waterbury, Supt. of Public Buildings, this city.

Victoria, B.C.

Bids for the alterations of and extensions to the isolation hospital were as follows: Messrs. Parfitt Bros., \$20,051.60, or if Rockolith flooring is used \$3,303 additional; Woodworkers', Limited, \$18,622, with Rockolith, \$4,403 additional; Messrs. Knott & Jones, \$17,723, with Rockolith flooring, \$2,739 additional. Referred to purchasing agent, W. M. Northcott.

Vancouver, B.C.

The architect and contractor in charge of the erection of "Avenue Theatre," corner of Westminster avenue and Harris street, is Mr. G. B. Purvis.

The First Presbyterian Church, south-east corner of Hastings street and Gore avenue, has been sold for \$150,000. This will materially enable the congregation to carry out their intention of erecting a church on Pender street east on the expiration of the year's lease.

The time for receiving tenders for submitting competitive plans for refreshment pavilion, animal buildings, and improvements to grounds at Coal Harbor entrance, Stanley Park, has been extended to Jan.

1st. Address, Secretary, Park Board, City Hall.

The council finally decided to submit the following by-laws for public buildings: School by-law, general purposes, \$572,000; Britannia and King Edward schools, \$295,000; sites for additional schools, \$100,000; total, \$967,000. General Hospital, addition, \$240,000; exhibition purposes, \$115,000; General Hospital additional site, \$29,500; city morgue, \$25,500; additional fire hall, wards 3, 5 and 6.

Wetaskiwin, Alta.

Mr. R. M. Angus will start at once on the erection of the new theatre (capacity, over 1,000).

Warren, Man.

The trustees of the consolidated school district have the authority to erect the new school here.

Winnipeg, Man.

Competitive plans for the erection of infectious hospital will be called after the approval of the Board of Control. Estimated cost, \$200,000.

Permits were issued to W. O. Edmunds, for theatre, Portage avenue, \$30,000; Avenue Theatre Company, theatre, \$15,000.

Tenders addressed to the chairman, Board of Control, will be received until January 6th for supply and erection of steel cells for the two police sub-stations now in course of erection. Plan, etc., with Inspector of Buildings. M. Peterson, secretary.

AWARDED.

Cranbrook, B.C.

Tenders for the new city hall were as follows: W. R. Beattie, \$14,000; Geo. Leask, \$15,320 (accepted). Consideration was shown the latter because of the original contract being awarded to him which was cancelled when the Board of Trade requested the hall to be of brick.

Megantic, Que.

The contract for erection of Knox Presbyterian Church was awarded to Messrs. Lagnet & Godbout, of St. Hyacinthe.

Ottawa, Ont.

The Pease Furnace Company has been awarded the heating for the Westboro public school.

The contracts awarded recently by the Dominion Public Works Department are: Grand Falls, N.B., new public building, of stone and brick, to Powers & Brewer, of Grand Falls, for \$17,774; Nanaimo, B.C., addition to public building, of stone, to Alex. Henderson, of Nanaimo, for \$23,441; South Ingonish, N.S., wharf extension, to Robert Mosgorve and Bart Mosgorve, of North Sidney, N.S., for \$5,100; Birkhead, N.S., breakwater, to A. W. Girroir and Sweet, of Antigonish, N.S., for \$35,490.

Victoria, B.C.

The contract for Isolation Hospital, we are informed, has been awarded to Knott & Jones, Victoria, total, \$20,462.

The contract for addition to the Victoria West school was awarded to Messrs. Luny Bros., \$17,600, the lowest.

Residences

South Vancouver, B.C.

Work will be started shortly on the erection of six dwelling houses which Mr. J. C. Hudson will build on Martha street. The buildings to plan, will cost \$3,000 each, or over.

Plans for a six-storey apartment house

were recently presented by Mr. P. Tardiff. The block is to be located at the corner of Comox and Broughton streets and will cost \$100,000.

Vancouver, B.C.

Mr. G. E. Grenson took out a permit for a 6-storey apartment house at 652 Jervis street, \$120,000. A permit for another apartment house was taken out by Mr. E. W. MacLean, corner of Burrard and Pender streets. At present it will be only two storeys in height, but the plans provide for additional storeys at a later date. Initial outlay, building, \$50,000.

AWARDED.

Victoria, B.C.

Nelson, Benneck & Sons have secured the contract for the erection of a residence for Duncan Ross on Rockland avenue. James & James are the architects.

Business Buildings and Industrial Plants

Blyth, Ont.

The Kelly block here was destroyed on the 19th inst. Loss about \$15,000. Among the losers are Dr. Perdue, W. Bently and others.

Dauphin, Man.

The hardware store owned by A. E. Macpherson was destroyed by fire on the 14th inst. Loss, \$25,000.

Edmonton, Alta.

Building permits were issued to Hudson Bay Company, elevator, \$8,000; J. A. Pitch, 116 Sinclair street, store, etc., \$3,000.

The property owned by Robert Tegler has been purchased by a Toronto capitalist, it is said, who will erect a 6-storey block to be ready for occupancy by September, 1911.

H. H. Macdonald, of Fairbank, Alaska, has purchased lot 64, block 6, H.B.R., where it is stated a business block will be erected. Seton Smith & Company effected the sale.

Fort Frances, Ont.

Mr. Backus has asked the Government for more land between Front street and the river on which to build a paper mill. Mr. J. F. Whitson, of Crown Lands Department, will report. Prepared plans call for a paper mill of from 140 to 160 tons daily capacity.

Fort William, Ont.

C. R. Hosmer, director of the Canadian Pacific Railway Company, and the Bank of Montreal; F. W. Thompson, director of the Ogilvie Flour Mills Company, and S. Holt, president of the Royal Bank and of the Montreal Light, Heat & Power Company, have formed a new steel company, which will establish a plant here to manufacture wire and nails. Arrangements have been completed to purchase the necessary materials from the Lake Superior Corporation.

Galetta, Ont.

It is stated the Canadian Cooperage Company will stock the factory here for another season.

Gananoque, Ont.

A by-law to assist the Ontario Wheel Company in the re-erection of their plant will be submitted to the ratepayers at the next municipal elections. S. McCammon, clerk.

Halifax, N.S.

The council have granted the civic concessions to the Nova Scotia Car Works,

Limited, purchasers of the Silliker Car Company. It is stated that extensions will be made.

Hamilton, Ont.

The Dominion Power & Transmission Company will spend about \$100,000 on new sub-stations, it is stated, in this city. W. C. Hawkins, general manager.

London, Ont.

It is reported that the McLaughlin Manufacturing Company, of Oshawa, will erect here a garage and warehouse. Estimated cost, \$40,000.

Michel, B.C.

It is rumored that a large modern hotel will be built on the island opposite the Rock Cut. The C. P. R. are said to be back of the project.

Moose Jaw, Sask.

The proposition to erect a first-class hotel here has taken shape. Mr. J. P. O'Leary, representing Brown & Vallance, architects, Montreal, Que., is stated to have offered to build an up-to-date hotel, cost \$250,000, provided a lease is taken for ten years, etc. Board of Trade president, Mr. R. Loney.

Montreal, Que.

The Colonial Real Estate Company (Jas. Morgan, Rep.), will erect next spring an 8-storey office building, costing \$300,000.

The plans for the new building to be constructed on Craig street by the City Furnishing Company are now complete and contracts will be asked for shortly.

New Westminster, B.C.

The B. C. E. Railway have purchased a 5-acre block on Young street as the site for combined freight and passenger depot.

Ottawa, Ont.

Leon Petergorski will erect stores on the corner of Somerset and LeBreton streets.

Negotiations are in progress between an iron and steel manufactory with a sub-committee of the publicity department, which includes Mayor Hopewell, Stewart McLenaghan and others, with a view to locating here.

Port Hope, Ont.

At the municipal elections the ratepayers will vote on the by-law to grant exemption to the International Tool Steel Company.

Prince Albert, Sask.

Mr. Locke, of Vancouver, will erect a business block here.

Quebec, Que.

A. M. A. Beaulieu received permit to construct a three storey building at the corner of St. Vauar and Paul streets, \$6,000. Messrs. Jinchereau & Lamonds, contractors.

Regina, Sask.

Storey & Van Egmond, architects, are calling for tenders for a brick warehouse at Regina, for Messrs. Haug Bros. and Nelleremo. The work will not be started until the weather permits in the spring.

Saskatoon, Sask.

Fred Kerr has purchased the Sutherland Block on Second avenue and will enlarge it next spring.

Sydney, N.S.

Arrangements have been made, it is stated, between the Dominion Steel Corporation, Limited, and the firm of Alexander Cross & Sons, Limited, Glasgow, Scotland, for the establishment of the fertilized industry which has been under con-

sideration. Tenders for construction of plant will be called as soon as engineer arrives. President of Dominion Steel Corporation, J. H. Plummer.

Victoria, B.C.

Kelly, Douglass Company, Limited, of Vancouver, expect to have their warehouse ready by April next. Site chosen on a cart street.

Tenders were called until December 17th for erection of brick once building, plumbing and heating included, for P. R. Brown. H. S. Griffith, architect, 1006 Government street.

Vancouver, B.C.

The G. N. R. have plans filed for erection of passenger station here on the north shore basin, head of False creek.

Plans were submitted for extension of Hotel Vancouver, \$300,000; application has been made for erection of 4-storey building on Homer street for Mr. J. Ollason.

Plans have been prepared by Gould & Champney for the erection of 10-storey block, Granville and Pender streets, for Mr. Jonathan Rogers. Estimated expenditure, \$500,000.

Tenders were called until December 20th for erection of new warehouse for Kelly, Douglas & Company, Limited. Plans, etc., at office of Gardiner & Gardiner, architects, Westminster Trust Block, New Westminster.

The Canadian Fishing Company presented plans for the large cold storage plant which it is proposed to erect on the Inlet waterfront. This undertaking will represent an expenditure of \$150,000.

The Lester W. David Company are carrying out their intention to establish a townsite, hotel, dam and wood pulp mill at Ocean Falls, on Cousin's Inlet. Already fifteen cottages have been built. Mr. Kelly, of the Northern Construction Company, is constructing the dam, which will be finished in the spring. The mill will have a capacity of 500,000 board feet per day. It is estimated the power furnished will be about 20,000 h.p. Acting manager, Mr. Robert E. Nevins; Lester W. David, president; Mr. Perry, New York, engineer of construction.

Woodstock, Ont.

Blasingnam & Snook of Logansport, Indiana, have opened negotiations with this city regarding the location of a motor factory. Ald. J. McBeath, president, Board of Trade. Proposed capitalization, \$250,000.

Winnipeg, Man.

Tenders on prescribed forms, addressed to Chairman, Board of Control, will be received until December 29th for steel work, substation 1. Plans, etc., at office of the power engineers, Carnegie Library. M. Peterson, secretary.

Permit was issued to Manitoba Government Telephone for stores building, Henry avenue, \$40,000; also Canadian Bank of Commerce, \$15,000,000.

AWARDED.

Port Hope, Ont.

Mr. Thos. Garnett has secured the contract for the masonry of the International Tool Steel Company.

Sydney, N.S.

The Dominion Iron & Steel Company have given a contract to F. L. Dixon for construction of shed, 300 feet x 72 feet.

Saskatoon, Sask.

W. D. Smith, of Watts & Company, has secured the contract for heating a new hotel at Kerr Robert. This firm has a similar contract for the city market.

Tenders and For Sale Department

Tenders for Cement

Tenders will be received up to DECEMBER 30TH for the supply of Cement during the year 1911.

Specifications and particulars furnished on application.

M. FERGUSON
City Engineer.

Stratford, Ont., Dec. 19 1910. 51-52

City of Winnipeg Power Development

Electric Generator Wanted

Proposals will be received at the office of the undersigned up to DECEMBER 23RD, 1910, for supply of direct current Electric Generator, new or second-hand, 50 K.W. Capacity, along with Steam Engine for direct connection or for belt driving.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, Dec. 7th, 1910. 50-51

Tenders Wanted

Sealed tenders addressed to the undersigned will be received up to SATURDAY, THE 21ST DAY OF JANUARY, 1911, for the several trades required in the erection and completion of an Agricultural Exhibition Building at the Town of Thornbury, Ont.

Plans and specifications can be seen at the Office of John Wilson, Architect, Collingwood, or at the Office of the Town Clerk, Thornbury. The lowest or any tender not necessarily accepted.

EDWARD RORKE,
Town Clerk.

Thornbury, Dec. 9th, 1910. 50-51

Patent Rights for Sale

Take notice that the undersigned are prepared to supply, at a reasonable price sheet metal dumping cars for railroad contractors' use described in Canadian Patent No. 116297, or to grant anyone desiring to use the same a license to have the same manufactured for him at a manufacturing establishment in the Dominion of Canada. They are also prepared to receive offers for licenses to manufacture and sell under the same. Ridout & Maybee, Manning Chambers, Queen St. West, Toronto, attorneys for the Goodwin Car Company. 51-51

Railway Construction

Tenders will be received up to noon JANUARY 2ND, 1911, for the construction of the Roadbed and Structures of the following sections of the Manitoulin and North Shore Railway:—

Ocean Hill, mile 22.7 west of Sudbury, to connection with present line at Espanola.

Espanola, south to a point at or near Mile 61.

Plans, profiles and specifications may be seen at the office of the chief engineer, Sault Ste. Marie, Ontario, at the offices of the "Canadian Engineer" at Montreal, Toronto or Winnipeg, and at the office of the "Railway & Marine World," Toronto.

All tenders addressed to R. S. McCormick, Chief Engineer Manitoulin and North Shore Railway, Sault Ste. Marie, Ontario.

The lowest or any tender not necessarily accepted. 51-52

City of Regina

Tenders for Power Plant

Tenders are asked for by the City of Regina for the supply and installation of any or all of the following, together with the necessary connections ready for operation:

- 1 1500 k.w. Steam Turbine Generating Unit.
- 1 500 k.w. D.C. Generating Unit.
- 2 500 Horse Power Boilers.
- 1 Economizer.
- 1 Hand Power Travelling Crane.
- 1 Coal and Ash Conveyor.

Tenders will be received for the above until 10 p.m., TUESDAY, JANUARY 17, 1911. Specifications and all information will be furnished on application to the undersigned or to E. W. Bull, City Electrician.

(Signed) A. J. McPHERSON,
City Commissioner.

51-2

Miscellaneous

Advertisements under this heading one cent a word per insertion. B x No. ten cents extra

A reliable and well established firm wish to represent for Manitoba a manufacturer of Canadian Concrete Mixers of reliability and moderate cost. Address Box 176 Contract Record, Toronto, Ont. 51-52

WANTED—HOISTING ENGINE with swing derrick complete, to lift about three-quarter yards earth. Address J. H. McKnight Construction Co., Limited, 152 Bay St., Toronto. 51-51

Cement in Refuse Disposal.

In slag making at the destructor works of the corporation of Kingston-on-Thames, the clinker removed from the destructors is converted into paving slabs in the following manner: It is first ground up to the necessary size, and is then mixed in the proportions of 2½ bushels of granite chippings, 4½ bushels of screened clinker and 2 bushels of Portland cement. The granite chippings and cement are gauged 4 to 1. The chippings and cement are first placed in the mould to a depth of 1-inch, and the mass is shaken about so as to cause the chippings to fall to the bottom, in order to give a good hard wearing surface. The rest of the mould is then filled with clinker and cement. One gauging, as given above, will make 32 feet super of 2-inch stone. The slabs are allowed to remain in the moulds for one week, in order to set, at the end of which time they are taken out and stacked in the open for from three to six months to mature. The moulds consist of wooden frames with a bottom of sheet zinc. Slabs of varying sizes are made, as also crossing blocks and gutter channels. By using granite chippings for the surface a very much more durable stone is produced, though, of course, the cost of production is increased. K. H. Clucas, the borough surveyor, estimates this to be from 2 shillings expense to 2 shillings 9 pence (60 to 66 cents) per square yard.

Graham Bros. & Company, lumber manufacturers and merchants, Kinmount, Ont., are stated to have assigned to George A. Jordan.

Unique Roof Truss for Library Building.

A noteworthy feature of the new library designed for the University of California by J. G. Howard, architect, is the main reading room, 210 feet long by 54 feet wide, with a maximum height of 45 feet. The profile of the ceiling, approximately elliptical, was struck from five centres. The roof principals are of somewhat unusual form, owing to architectural requirements governing the position and slope of the roof and the position of the curved ceiling. Although ample depth was secured at the middle of the principals, the distance between the ceiling and the outer surface was so small that the web was formed of steel plates so as to impart the requisite strength to the construction.

Moreover, to secure the maximum possible depth for the principals, the upper and lower flanges were spaced so that the purlins when rivetted in place should have their upper surface flush with the top of the principals, and that the beams carrying the ceiling supports should be flush with the bottom of the principals. Further lateral bracing was provided by lattice girders, 5 feet 1¾ inches deep, rivetted between the principals at the distance of 8 feet 11 inches from the centre line.

The principals measure 57 feet 4 inches from centre to centre of the supporting columns, and they are spaced apart at distances ranging from 15 feet to 30 feet the reason for variations being found in demands made by the architectural designs.

Fire Resistance of Bricks.

In the proceedings of the Engineers' Society of Western Pennsylvania particulars are given of experiments conducted on different classes of bricks. It was found that with mixtures of magnetite and marble with kaolin the refractoriness of the magnetite brick decreases as the amount of clay increases, and the same applies to the addition of lime. With mixtures of alumina and silica, additions of kaolin bring down the melting point of pure alumina considerably below the normal value of about 2,900 deg. C., and if quartz be added with 9.1 per cent. alumina the melting point is reduced to about 1,566 deg. C., after which a very small amount of alumina raises the melting point rapidly to 1,790 C.—the melting point of pure silica. In the case of a silica brick with a certain amount of clay introduced as a binder, it was found that as the amount of clay is increased the refractoriness rapidly falls off after the added amount reaches 6 per cent. This points to the desirability of making bricks either very high in silica or entirely of clay. Other investigations indicated the effect of potash, soda, lime, magnesia and iron on the melting point of clay. Slight additions of the fluxes named reduced the melting point, the reduction being proportionate to the quantities added.

The McQuin Lumber Company, Limited, Sussex, N.B., are applying for charter.

Imperial Dredging & Construction Co., Limited, Oromocto, Que., are applying for charter.

Power Plants, Electricity and Telephones

Arnprior, Ont.

A by-law will be submitted at the municipal elections to authorize the Galotta Electric Power & Milling Company, Limited, the power to supply this municipality electric power, and to provide for the issue of debentures for \$6,000 for the purpose of making improvements in connection with waterworks system, etc.

Barrie, Ont.

This municipality is negotiating for the purchase of hydro-electric power.

Brockville, Ont.

At a meeting called of the representatives of the eastern towns wishing to secure hydro-electric power, a union of those municipalities was formed. Mr. Elliott, of Kingston, was elected president, and Mr. Wm. Shearer, of Brockville, secretary.

Dundas, Ont.

On Jan. 2nd the ratepayers will vote upon a by-law to issue \$12,000 5 per cent. 30 instalment Hydro-Electric debentures.

Edmonton, Alta.

The annual report of the telephone superintendent recommends the erection of sub-telephone stations in Norwood and the Groat estate.

Hamilton, Ont.

The Canadian Westinghouse will supply a new generator of 8,500 h.p. capacity for the Dominion Power & Transmission Company. Estimated cost, \$200,000. Substations are also being built.

Listowel, Ont.

A by-law to authorize this municipality to borrow \$5,000 to complete erection and installation of electric light works will be submitted.

Midland, Ont.

Deputations from Penetanguishene and this municipality have interviewed the Hydro-Electric Commission regarding the supply of electric energy.

Montreal, Que.

Tenders addressed to Board of Commissioners will be received until December 28th for supply of electrical supplies required for the fire alarm department. Information to be obtained from purchasing and sales agent in office of the above. L. N. Senechal, secretary.

The National Hydro-Electric Company of Montreal has been incorporated at one million dollars, and the powers are general. Incorporation is in the names of Arthur Surveyor, Royal Lesage, Marie A. Favreau, T. R. Chabot, and Louis Gosse, all of Montreal.

Ottawa, Ont.

Sir Henry Bate, chairman of the Ottawa improvement commission, is arranging a conference with the electric, telegraph and telephone companies in order to come to some understanding whereby all the poles on the streets will be painted one color, as near the color of tree bark as possible.

Port Hope, Ont.

The council decided to submit the by-law of the Seymour Power Company re application for franchise in Port Hope on January 16th.

Toronto, Ont.

The issue of city of Toronto street railway debentures to the amount of \$645,743 has been authorized.

Victoria, B.C.

Tenders will be called soon for 2,000 pounds of copper wire for city light department. W. M. Northcott, purchasing agent.

AWARDED.

Weston, Ont.

The contract for construction of transformer station and fire house has been awarded to George B. Moog, Berlin, \$6,900.

Winnipeg, Man.

A contract for the supply of 47,000 telephone poles has been awarded to J. H. Hyland & Company, timber merchants, Winnipeg, by the Manitoba Government Telephone Commission.

Miscellaneous

Hamilton, Ont.

The following building permits have been issued: W. A. Noble, erection of two brick dwellings on Canada street, between Pearl and Ray streets, to cost \$3,600; W. A. Noble, erection of two frame dwellings on Shaw street, between Victoria avenue and Emerald street, to cost \$2,800.

Ottawa, Ont.

Among the building permits issued recently were: Patrick McKeown, shop and dwelling, \$2,250; Exhibition Association building, Smith Bros., contractors, iron clad construction; Robert H. Turner, dwelling, Fentiman street, \$2,550.

The village of Eastview will vote on a plebiscite in January with regard to the purchasing of fire fighting apparatus for the corporation.

Carleton County Council will not open the tenders for a new stone crusher until the January meeting.

Considerable repairing will be done to the Rideau Canal during the winter. The repair work is done by day labor and the new work by contract. All the work this year will be in the nature of repairs. A. T. Phillips, superintending engineer.

Quebec, Que.

Tenders addressed to J. Gallagher, waterworks engineer, will be received until January 3rd for 500 feet of rubber hose, 2½-inch diameter, 4-ply, in lengths of 50 feet, with couplings to fit local hydrants.

Victoria, B.C.

Tenders for additional equipment, fire engines, etc., will be called for at once by the fire wardens.

Recent building permits include: James Couch, dwelling on Princess street, to cost \$2,000; Beaumont Boggs, two storey brick store building on Courtney street, to cost \$3,700.

Vancouver, B.C.

Tenders were ordered to be called for another steam roller.

Tenders addressed to Wm. McQueen, city clerk, will be received until Dec. 30th for construction of launch to be used in connection with the new Isolation Hospital.

Building permits were granted as follows: D. Edwards, 1245 Pender street, \$8,000; Sunset Sash & Door Company, 724 Broadway, \$2,000; H. Matheson, Gravely street, \$2,500; G. W. Robertson, 2007 Trafalgar road, two houses, \$16,000; R. Band, 2619 Second avenue west, \$7,000; D. J. McPhail, 561 Broadway, \$7,000; D. McDougall, 1149 Beach avenue, \$7,000; T. W. Hemphill, 558 Keefer street, \$5,000; Dominion Glazed Cement Pipe Company, 155

1726 Twelfth avenue west, \$4,500; Ellis & Clayton, 1618 Twelfth avenue, two houses, \$3,000; Vancouver Furniture Manufacturing Company, 122 Dufferin street, \$4,000; 000; Mr. J. C. Runkle, for a five storey J. Anderson, 1787 Eighth avenue east, \$2, brick block on Cordova street, \$45,000; F. N. Trites, 1356 Albert street, \$5,000; North Pacific Lumber Company, Thirteenth avenue, \$2,000; E. Hughes, Eveleigh street, \$2,500; J. B. Arthur, 2797 Alberta street, \$6,000; Mr. Eastfelt, Second avenue, \$2,000; F. C. Copeland, 824 Twelfth avenue east, \$2,500; C. W. Shannon, 1021 Fourteenth avenue east, \$2,200.

Winnipeg, Man.

Recent building permits include: J. Sangster, two houses, west side of Ruby street, \$7,000; G. A. Harrison, two houses, north side of Tweed, \$5,500; W. J. Atkinson, house, east side of Ashburn street; Robt. Lane, for the erection of a large frame structure on Fifteenth street, to be used as an ice house, \$5,000.

AWARDED.

Dartmouth, N.S.

The tender of McKie & Baxter, Glasgow, Scotland, for the construction of a steel steamer according to plans and specifications with modifications suggested in the letter of October 1st for \$60,750 be accepted. Four other tenders were opened as follows: John I. Thorncroft & Company, Limited, of Southampton, \$102,060; AUSA Shipbuilding Company, Limited, of Troon, for wood superstructure, \$73,143, of steel superstructure, \$65,100; Halifax Graving Dock agreed to build a steel steamer in Halifax for \$89,900 or if built in England, \$84,200; E. F. Williams, of Dartmouth, agreed to build a steamer, material wood, with fore and aft propellers, for \$71,872.

Ottawa, Ont.

S. Coseline and James Fox were awarded the contracts for supplying stone to the county jail at \$4 a ton.

Barrett Brothers were awarded the contract for wood for the county court house and jail at \$5.40 a cord for hardwood and \$2.75 a cord for softwood.

New Companies

Construction Works, Limited, Montreal, Que., incorporated; capital, \$50,000. Incorporators: A. S. Archambault, avocat; P. J. Hubert, accountant, both of Montreal, Que.

Utilities, Ltd., Montreal, Que. Capital, \$50,000. Incorporators, James Allen Williams, physician; George Ackland Gillies, engineer, both of Montreal, Que., and John Stark Gillies and David Armitage Gillies, lumberman, both of Braeside, Ont.

Dryden Timber & Power Co., Ltd., Dryden, Ont. Capital \$3,000,000. Incorporators, Ephraim F. Singer, student at law; Frederick G. Waters and Herbert Mill, accountants, all of Toronto, Ont.

The Griffith Steel Construction Company, Limited; incorporated; capital, \$500,000. Incorporators: J. S. Hough, barrister; Chas. Williams and John Mahood, accountants, both of Winnipeg.

The Bourget Brick Manufacturing Co., Ltd., Bourget, Ont. Capital, \$20,000. Incorporators, Arthur A. Bourque, physician; Rev. Leon C. Raymond and Alfred Goulet, merchant, all of the county of Russell, Ont.

The Spanish River Pulp & Paper Mills, Limited, capital \$4,000,000; incorporated. Head office, Toronto. Incorporators: W. J. Sheppard, Waubesa, J. B. Tudhope,

Building Prospects at Ottawa

Government Work and Other Large Projects to be Started in the Spring—Market and General News

Ottawa, Dec. 17th, 1910.

While it is a little early to estimate the buildings of the larger variety to be erected next year, yet already a number of capitalists have been asking the opinions of their architects on various propositions which leads to the belief that outside the big works now in progress and the government work, there will be a great deal of commercial building again next summer. Bank street, which has been rapidly growing in importance as a commercial street, has made a great number of sales of property in the southern end during the past few weeks at prices nearing \$200 a foot. Nearly all these are vacant properties and it is believed that a large number will be built on in the spring as the majority of the owners will not wish to hold them without revenue at such high prices. This will necessitate a very great deal of building of stores for which the present seems an opportune time. Of the mile of shops along Bank there is claimed to be not one vacant. In fact, throughout the city there are very few vacant stores and with the exceptionally good fall trade there is great encouragement for more of this kind of building.

It is given out as practically definite that the big Government departmental building will go ahead as early as possible in the spring, and the construction of a plaza joining Dufferin and Sappers bridge will be begun very soon.

Mr. Patrick Labelle has about completed the construction of 18 flats on the corner of Metcalfe and Gilmour streets, at a cost of \$40,000, and is now one of the movers in a proposal to form a company for the purpose of erecting a \$100,000 apartment house on the corner of Somerset and Cartier streets. It will be an eight-storey building of reinforced concrete, fireproof.

Just now there is a slackness in some of the trades such as carpentering. However, painters and decorators are surprisingly busy for winter. It is almost entirely improving residences that have been built for some time. Paints have been quite stiff in price all the summer and more so during the past few months. Paint oil and white lead advanced steadily governing the price of other paints. However, there has been a slight drop in these very recently. Paint oil is selling at \$1.12 a gal. by the barrel and \$1.17 in smaller quantities, while lead is selling at 6 cents for the best.

It is expected that steel for construction will be a little dearer next year. While the price quoted in the capital this summer was \$2.75 a cwt., there was considerable cutting from that quotation. However, the dealers and agents state that after Jan. 1st there will be no selling under that figure.

Until the past few days the fall was a favorable one for brick work, and the brick manufacturers state that the demand since Nov. 1st has been greater than the year before.

There is a slackness for team work and therefore for the past few weeks the teams and driver could be engaged at a lower rate than any time during the past summer. During the summer they ranged closely around \$4.50 a day, while now they are available at under \$4. This is chiefly because of the unsatisfactory condition of the roads for heavy work.

The painters union will ask the master painters to sign an agreement for a minimum wage of 30 cents an hour to become operative on April 15th next. Many of the painters already receive more than 30 cents an hour.

Negotiations are still in progress between the Van Dyke Motor Car Company of Detroit and the Watson Carriage

Company of this city, whereby the local firm will manufacture the commercial car here for the Canadian trade.

The Ottawa Vacuum Cleaning company has not yet secured suitable premises in which to locate its plant, but has several locations in view which would be satisfactory.

A representative of an iron and steel manufactory is in the city looking for a site on which to locate a factory to employ 200 or 300 men and use about 300 horse-power to operate.

Canadian Railroad Development

The Niagara Falls, Dunnville & Welland Electric Ry. Co. has applied to the Stamford Township Council for a right of way through that section. This company projects a line to run from Niagara Falls to Welland, and on to Dunnville. The road will extend from the Queen Victoria Park to Drummondville, out Lundy's Lane to a point near Allenburg, thence south to Port Robinson and on to Welland. From Welland it will run south to the Air Line Junction and then due west along the Forks Road to Dunnville. It is planned to extend the line to Port Dover at a later date. Between Welland and Dunnville the road will run over the highways for the most part, but between Welland and Niagara Falls it will have a private right of way the greater part of the distance. It will be for both passenger and freight and mail and express service. A local service will also be put on between Welland and Niagara Falls with an hour schedule. The road will bridge the Welland River and the Welland Canal at Port Robinson. The cost is estimated at about \$1,000,000. F. R. Lawlor, Dunnville, Ont., is President and F. E. Misner, Welland, Ont., is Secretary.

Application is to be made at the present session of parliament for a charter for a railway, as follows: Main line—From Lloydminster, Sask., via St. Paul, de Metis and Lac la-Biche, to near Fort McMurray, near the junction of the Clearwater and Athabasca Rivers. Branches—(a) From a point on the main line south of the Saskatchewan River, westerly to near Bruderheim and onward to Edmonton; (b) from Lloydminster southerly via Medicine Hat to near the Milk River crossing of the international boundary; (c) from Lloydminster or a point on (b) southwesterly via Buffalo to near Black Falls and Red Deer, Alta.; (d) from Lloydminster or a point on (b) southwesterly near Manitou Lake near Scott to Saskatoon; (e) from Lloydminster or a point on the main line northerly via Cold Lake to Lac la-Loche and the headwaters of the Clearwater River; (f) from Lloydminster via Elbow, near Fort Pitt via Dore Lac and Lac-la-Rouge to Hudson Bay or a point on the Hudson Bay Ry. The name of the company which is to apply for the charter has not been given out. The solicitors for the applicants are H. R. Hall and H. C. Lisle, of Ottawa.

The Canadian Government now has already in hand or in view over \$3,000,000, from western land sales to be devoted to the construction of the Hudson Bay Ry. Under the legislation of 1908 respecting the disposal of western lands for pre-empted homesteads, and the finding of purchase money for the defraying of the cost of the Hudson Bay Ry., 16,375,000 acres have already been sold, either as purchased homesteads or pre-emptions. The payments received on purchased homesteads now total \$627,000, and payments received on pre-emptions total \$667,000. The amount still to be paid on the purchased homesteads is \$1,100,317, and on the pre-emptions, \$21,678,717.

The new aqueduct at Ottawa, which is to cost \$300,000, was inspected last week by members of the city council. About \$135,000 has been spent to date.

Contract Record

ESTABLISHED 1886

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"Cold Shoulder To Alien Labor"

Under the above caption, a Victoria, B.C., paper publishes an article which is doubtless intended to inspire the idea of "Canada for Canadians." There are subsidiary head lines: "Workmen Rush Here from Across the Line," and "City Engineer Determined to Protect Interests of Victoria Men." The information is given that a number of men from Seattle and points on the other side of the line, where conditions are in a very depressed state, have lately come to look for work at Victoria, attracted by the report that the city is prosperous and engaged in the prosecution of a large amount of work, which will continue throughout the winter.

The city engineer is stated to be adhering strictly to the policy of favoring all who make their homes permanently in Victoria. So far, so good. But the official is further credited with saying that there are too many strangers from American cities looking for work at Victoria, and that while the city is in need of a considerable amount of labor in connection with various work he would prefer to be inconvenienced for a few days, waiting for Canadian labor, to putting on the men who drift in from neighboring American cities.

The situation at Victoria is very different from what it is in eastern Canada. Quite recently City Engineer Rust of Toronto was advocating the abolition or suspension of the regulation whereby it is necessary for an immigrant, upon entering the country, to have twenty-five dollars in cash in his possession. We will not attempt to discuss this proposal, for there appear to be as many "cons" as "pros." Certain it is though, in our opinion, that it is unwise to offer direct discouragement to laborers seeking to improve themselves in the Canadian field.

According to the Victoria paper the city engineer has issued instructions to all foremen to see that no outsiders are taken on until every available citizen has been put to work. From the viewpoint of local sentiment this is all very well, but if the question is considered in the more general aspect of the country's welfare, it must be conceded that Victoria has established rather a bad precedent. At this stage of her history Canada should give encouragement to labor. The country has to be developed and the work cannot be accomplished with the comparative handful of people now in the field. In a case like the one under discussion a certain amount of judicious discrimination is justifiable, perhaps, but we certainly think that it militates against the interests of the country to issue articles under such scare headings as the above. We want to bear in mind the interests of our own people, but in doing so we must guard against forming unfair prejudices. If we expect to get the other fellow later on we will have to give him a show now.

To The Reader

The publisher, after all, is only human. He is just as much susceptible to encouragement as the reader, and it is quite as much a stimulus in the one case as in the other. When the publisher is guilty of a mistake or an omission he invariably hears about it, but his scanty successes are not always impressed upon him so infallibly. We make no apology for reproducing the following extract from a letter dated Kingston, Ont., Dec. 13, 1910:

"I must compliment you on the excellent Special Number you have issued. It is a splendid compilation of useful information for brick men. I think your advertisements are a great piece of instruction and information in themselves. The illustrations used in the "Ads" are exceptionally good, and full of information to the trade. I am sure you will receive much praise for this excellent compilation."

The letter containing the above is not an isolated instance. An extract from a letter received from Ithaca, N. Y., last week reads as follows:

"I was much pleased with the special number of the "Contract Record." I must congratulate you upon the appearance of this number, which I certainly think sets forth the clay industry of Canada in very attractive shape."

It is gratifying to know that one's efforts are appreciated. It acts as an incentive to greater things in the future. We want the reader to take a personal interest

"My thoughts go out to you, my friend, this happy Christmas time, wishing you joy in all your deeds and days, wishing you time for the task, wisdom for the work, peace for the pathway, friends for the fireside, and love to the last."

The Editor

in the "Contract Record" and to give us the benefit of his views occasionally. Criticism is always valuable—adverse and otherwise. The man who reads critically reads intelligently and encourages thought, endeavor, advancement.

Enlightening the Elector

John C. Macdonald is a candidate for aldermanic honors at Edmonton, Alta. According to the Edmonton Capital, Mr. Macdonald has several "new ideas" for the citizens. One of these he propounded at a recent meeting. It was that the city could save thousands of dollars a year by doing all civic work by day labor instead of by contract. That originality could be claimed for such a suggestion, even as far west as Edmonton, is almost incredible. Evidently Mr. John C. Macdonald is not a reader of the "Contract Record." If he were he would surely not be so bold in his assertions. As proof of his contention Mr. Macdonald pointed to the success with which the water department had carried out its construction programme. We would like a detailed statement of the work showing clearly all costs and disposition of material. Further, Mr. Macdonald stated that if the city of Edmonton adopted the method of day labor employment it would have great influence in settling strikes. We are writing to Mr. Macdonald and sending him one or two recent copies of the "Contract Record" in which the day labor system is discussed. Now that the elections are so near he will probably not care to change his tactics, but if he is unsuccessful this time he may like to espouse a better cause later on.

Unit Price Contracts

Unit price contracts should be for simple units of work, and not for several classes of work grouped under one head. In reading over a recent set of specifications for the construction of a small reservoir and appurtenances, we find that a great mistake has been made in this connection, says the Contractor.

For instance, under the head of excavation, there is included the clearing and grubbing of the site of the earthen dyke and the sheathing and shoring of the trenches for core wall and conduits. Under embankment prices, not only must all the work be done necessary to build the embankment, but also the turfing, sodding and planting of grass seed. Under the head of a concrete syphon, the excavation must be made, the concrete placed, and the embankment over it built in 6-inch layers. Let us consider some of the results of this grouping of such work.

First, as to its effect on bidding. Scan carefully the bids on work to be done under such specifications. There are generally one or two bids, that are from 15 to 25 per cent. lower than the other bids, caused by the contractors making low prices by overlooking or ignoring some of the various kinds of work to be done under the unit price. The contract being awarded on such prices means a financial loss to the contractor and frequently trouble and delay to the company letting the work.

Then, again, prices named on groups of work often mean trouble and disputes during the progress of the job. If a change must be made in the location of some structure, as a concrete conduit, the price bid may prove an unsatisfactory one to the contractor and he will object to the change. Yet it may be absolutely necessary to make the change, owing to soft ground or some other reason. By such a change, the amount of excavation may be increased fifty per cent.

If a separate price had been named for a cubic yard

of excavation, a price per cubic yard of concrete, and an independent price named for the refilling and embankment, and if such a change were necessary, there could be no dispute, since the prices for each unit of work would be fixed, and the basis of payment would be plain to both parties of the contract. This is not possible when the excavation and embankment is included in the price named for the contract.

The greater the number of divisions of work, the easier it is for a contractor to name or fix prices for the job. Such prices will be reasonable, for he will know exactly what work is to be done, and thus will be able to estimate the cost and will only ask a fair profit. But should there be any doubt as to the amount of work to be done or as to its nature, as there frequently is when prices are asked on several classes of work under one unit, the responsible and far-seeing contractor must bid high in order to protect himself against possible loss.

It is very true that the grouping of work under one price means less work for the engineer, as in sewer construction, which is paid for by the lineal foot of completed sewer; yet the principle is wrong. The extra work thrown upon the engineer by unit bidding is more than compensated by the lower prices bid, and the fact that the contractor is more contented.

Much could be said on the subject to show the evils arising from the idea of saving work for the engineer. Within the past year a contract was let for some trench excavation, the price for the excavation including the sheathing and shoring. As the excavation was of considerable depth, it was contemplated that heavy timbers would have to be used to shore the banks, but the material proved to be such that little shoring was necessary and that with light timbers. The contractor's profits were enormous, much larger than they should have been for the amount of money involved in the job. In this case there should have been a separate price for shoring and for the excavation.

This example also calls attention to another practice which is wrong. In New York city shoring is often paid for by the square foot of area to be shored. Thus, on jobs stretching over a long section, where the depth of shoring would vary considerably, the city is compelled to pay an exorbitant price for such work. To protect himself against loss, the contractor must bid a price that will be suitable for great depths and unstable materials. Thus when depths are slight or when only light timbers are necessary he is overpaid. The best practice for both parties is to pay for timber shoring by the thousand feet board measure, and in some cases it is well to have separate prices for timber furnished and for placing.

All contracts should call for fixed units and great care should be exercised in the selection of these units.

The Vancouver Dry Dock & Shipbuilding Company, Vancouver, B.C., will next spring commence to build its dock and works at Roche Point on Burrard Inlet, about five miles from the city of Vancouver, where the company has some 7,000 ft. of deep water frontage and 600 acres of land. The financing of this proposition has just been completed in London and the work of clearing land at Roche Point is now under way. Other industries are also arranging to locate here. The company has obtained a subsidy from the Dominion Government for this work, of 3½ per cent. yearly for 25 years on \$1,250,000, for the building of a steel pontoon dock of a lifting capacity of 15,000 tons. The company has now amalgamated with the Imperial Car, Shipbuilding & Dry Dock Corporation, Ltd.

Metal Wall Forms for Concrete Houses

The Design of a Washington Architect well known in Canadian Building Circles—Constructional Details and Cost of Equipment—Various Advantages

Last winter it was announced at the convention of the National Association of Cement Users that steel molds were to be used in the construction of all-concrete dwellings at Virginia Highlands, across the Potomac River from Washington. The work has been prosecuted during the past summer, according to the Engineering Record, and at present three houses are completed, and three more under construction.

The forms used are an outgrowth of studies made with a view of erecting economical sanitary houses. The forms consist of panels of No. 12 gauge sheet steel, 24 in. square, flanged on all four sides by a right-angled bend of the sheet. Each flange is punched at three points to receive wedge keys for locking the forms together. The panels are used in sets each two tiers high. In order to facilitate moving, the tiers are connected together by light rods attached to the panels at the mid-height of each joint, so that three or four of the panels of a tier are left rigidly fastened together in raising, the set being simply revolved by the aid of the rods to the new position for the next lift of concrete.

To obtain the required wall thickness a pipe or circular spacing block of the proper length is placed between the inside and outside forms at the meeting point of four panels. A thin metal strap passes through the spacing pipe or block. The strap projects beyond the ends of the pipe or block and is punched to receive a wedge placed outside the forms, thus locking the latter to the block. The entire equipment is held together by wedges so that any joint may be loosened by a stroke of the hammer. The entire form has ten different parts.

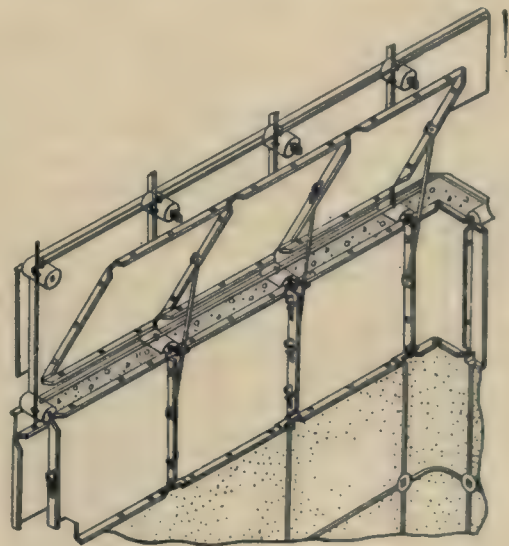
At building corners bent panels are used, and for filling out and piecing where full-size panels cannot be used wood and galvanized iron sheets are employed.

Experience has shown that the forms are quite rigid and do not, as a rule, need any outside bracing. Each time before using, the forms are cleaned and greased.

The same forms are also used for the floor construction. The reinforcement and spacing blocks are placed on the metal panels, the concrete poured and the upper form then slid into place, forcing out the surplus concrete. As a result very little finishing of the floor space

is required. The spacing blocks for the floor are cast with projecting flanges, so that they give considerable support to the slab in that particular neighborhood and thus permit the lower plates to be removed after three days. A post is wedged under each spacer, giving up ports for the floor 24 in. apart. These are left in place until the concrete is able to carry the load.

It has been found that ridges are left in the surface by the joints and that the spacing blocks have a color different from the body concrete. These features have been used for ornamental effect, the lines and the



Metal Wall Forms

spacing blocks, on which a rousette is cast, forming a pattern which is said to be quite pleasing. A sloppy concrete mix is used and stirred well in depositing. The concrete was mixed in proportions of 1:2:4, using gravel. A slight amount of clay was added to secure water-tightness. Upon the removal of the forms the surface is given a thin brush coat in order to secure an even color.

The window and door frames are made of the same



Metal Wall Forms in Use on a Dwelling



Completed Residence Built with Metal Forms

thickness as the walls. A dove-tailed strip is nailed to them, they are then dropped into the molds and the walls poured around them.

It is stated that the entire equipment of forms for a dwelling measuring 28 x 28 ft. in plan cost about \$600. Experience during the summer just passed indicates that the forms have a very long life, giving a low cost per house.

The forms were designed by Mr. Milton Dana Morrill, architect, Washington, who also designed the houses and superintended their erection and the use of the

forms. He states that during the past summer 6-in. walls in these buildings have cost 11 cents per surface foot or about \$6 per cubic yard, this figure including all material and labor required for setting the molds and also the cost of the concrete material. The cost of forms, however, is not included. The price of gravel was 60 cents per cubic yard; sand, \$1.10 per cubic yard; cement, \$1.04 per barrel. Mr. Morrill points out that the greatest saving in the work has been in the elimination of skilled labor, all the men, except the foreman, being common laborers receiving \$1.50 per day.

Reinforcing Piers Which Have Failed

Straightening Bulged Walls without Demolishing and Rebuilding—An Inexpensive and Satisfactory Method—The Application of Channel Beams—Practical Directions

Very often the builder is called upon to straighten or reinforce the walls or piers of a building which have become bulged, twisted out of place or possibly fractured by reason of a variety of causes. Sometimes it is due to settlement through the presence of soft spots in the area of the site of the building, thus permitting the footings to become more or less displaced; sometimes the

needling, demolishing and rebuilding, is illustrated in the sketches presented herewith.

Take, for example, the case illustrated in Fig. 1. Here we find the front 12-in. wall of an old store and loft building badly bulged at the second and third stories through over-weight of the floors. The difficulty was overcome by placing against each front pier and the

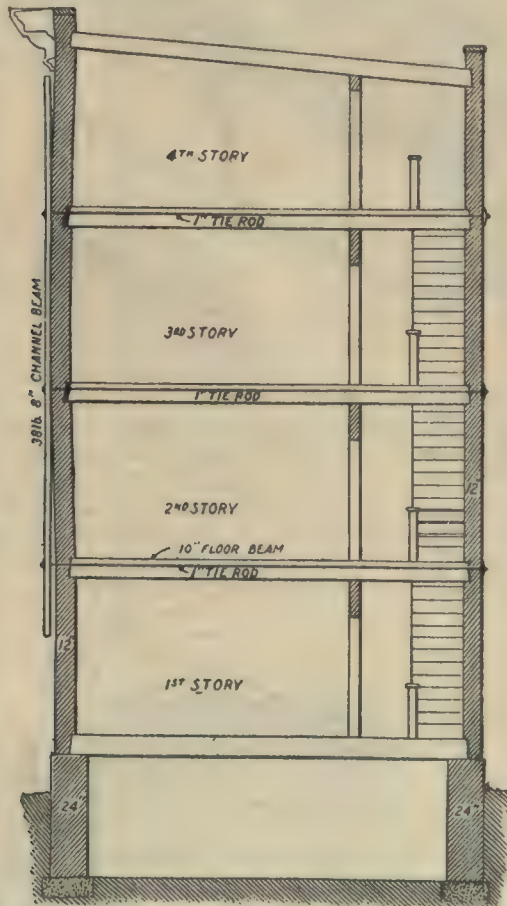


Fig. 1—Vertical Section Through Building showing method of Securing Channel Beams to the Bulging Front

trouble is due to overloading of floors and then, again, it may be traceable to bad construction, says Building Age. Various, therefore, are the means required for overcoming the difficulty. A simple and inexpensive remedy calculated to render the building stable and safe without going to the trouble and expense of shoring,

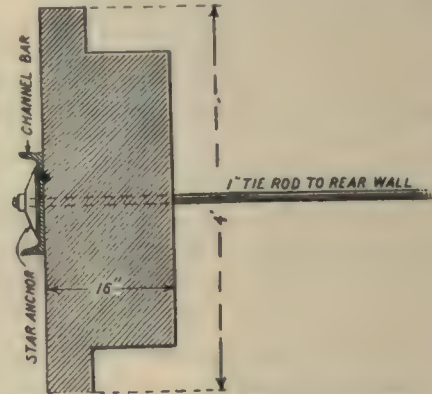


Fig. 2—Detail of Tie-Rod Connection

wall between, as well as in the center of the piers, channel beams which were drilled for one one-inch tie rods and anchors. The tie rods were placed through the front wall between, or across and notched into, the floor beams, then through the rear wall, where similar anchors of larger area held them in place. A general idea of the arrangement may be gathered from an inspection of Fig. 1, while Fig. 2 is a horizontal section through the front

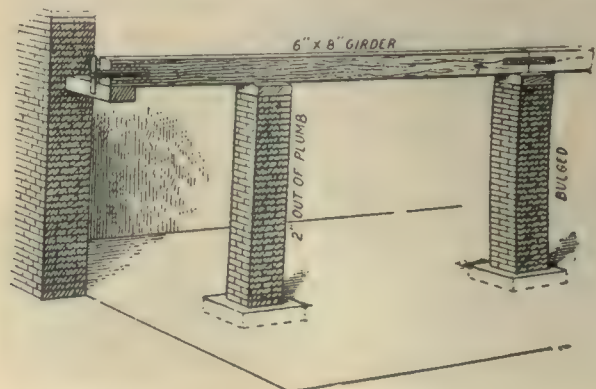


Fig. 3—A Row of Piers Out of Plumb

wall, showing more in detail just how the tie rods and anchors were used.

With a man stationed at the end of each rod and all acting in concert in carefully turning up the nuts tight against the anchors, the channel beams were made to exert a vertical pressure on the front wall of the building and to gradually draw it back into plumb without serious possibility of injury. When made safe and secure from a constructive standpoint, the channel beams were covered with sheet metal to form pilasters, after which they were painted to match the brick and stone details, thus producing a decorative effect.

In Fig. 3 of the sketches is represented a case where a line of brick piers in a flat-house or dwelling has settled

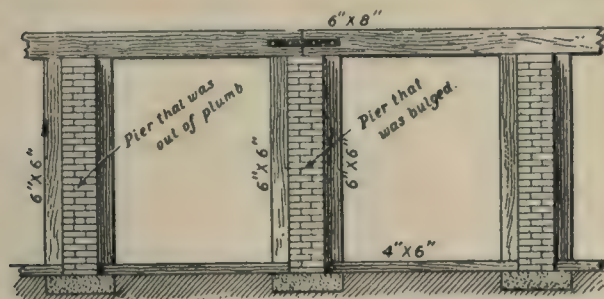


Fig. 4—Manner in which the Brick Piers were Reinforced

so that they are out of plumb, thus rendering the construction unsafe. To shore up the girder and rebuild the piers was obviated by the simple expedient represented in Fig. 4 of the sketches, where a reinforcement of yellow pine timbers was introduced in the following manner:

A line of "sleepers" or 4 x 6 in. floor timbers was cut in tight between the piers and resting on the concrete floor. Reaching from these to the bottom side of the fore and aft girder 6 x 6 uprights were driven into place with mauls, each upright being $\frac{1}{4}$ of an inch longer than the neat height. Needless to say, the power exerted by these shores or uprights was so great that the girder was lifted clear of the cap stones of the piers and then wedged up tight from the cap stones.

Public Heating Plant

The heating mains of the Brandon system, as already installed, cover the principal business district of that city. The plant is said to have proved very successful and to have attracted considerable attention on account of its economy and convenience.

Besides the saving in fuel, the installation in individual blocks and houses is described as inexpensive, the ordinary steam pipes in a building being simply connected with the central plant. As an evidence of the satisfactory work of the Brandon plant, it is said that the largest building may be heated throughout in twenty minutes.

The Brandon Electric Light Company, which has installed the system, plans next season to extend it over the business portion of the city, as well as a large portion of the residential district. The company is sparing no pains to make the plant throughout adequate to the needs of the climate.

With this end in view the wrought-iron mains are carefully insulated against loss of heat. They are first carefully wrapped with asbestos paper held in place by spirally-bound copper wire. Between the iron pipe and the wooden insulating casing there is a 1-inch air space,

the pipe being centered and supported by roller and ball bearing guides, which allow free expansion and contraction with change of temperature. The chief insulation is secured by the use of wood casing 4 inches in thickness. This casing is made up of kiln-dried, tongued and grooved white pine. The inside of the casing is lined with bright tin and the outside tightly wound with heavy galvanized wire. To prevent decay, the whole log is covered with a coating of asphaltum. A thorough system of under drainage is secured by placing porous drain tile along and below the entire system of mains, and piping same to sewers.

It is said that this construction results in an insulation against loss of heat so near perfection that condensation in the street mains is reduced to an average of not 5 per cent. of the season's output. Expansion devices are inclosed in brick boxes every 50 feet, and man-holes give access to the valves at the street intersections. The heat is metered by a system of water condensation; the meter is a simple device which measures the water as it flows from the building.

An Emergency Hypochlorite Plant

In localities where the evidence points to a contaminated water supply as the cause of an epidemic, sterilization of the water is necessarily the best means of preventing further infection. Whenever it has been necessary to install an emergency hypochlorite plant in the small municipalities of Minnesota, the greater part of a week, and in some cases even longer, has been required for the work. This delay is usually caused by lack of material for the apparatus to administer the chemical. This gives an opportunity for further exposure to infection. After actual experience of such delays in installation the idea suggested itself that a small emergency plant could be constructed and kept in readiness by the State Board of Health. Such a plant could be transported by express to any municipality in the State within 24 hours and could in most instances be installed and in operation within 48 hours. This saving in time would undoubtedly prevent a number of infections. This plan of constructing and keeping constantly on hand a portable emergency hypochlorite plant was presented to the Minnesota State Board of Health at a recent meeting. The construction and maintenance of such a plant was authorized and designs are in course of preparation along the following lines, according to a paper presented at the Milwaukee convention of the American Public Health Association by Messrs. H. A. Whittaker and J. A. Childs:

Briefly, this plant will consist of a mixing tank, storage tanks and an administering device. The mixing tank will be about 30 inches in diameter and of equal depth. A cone is placed in it with the small end fixed about 1 inch from the bottom. A propeller is revolved within this cone, which causes the solution in the tank to circulate through the cone in either direction as desired, thus securing rapidly a thoroughly uniform solution. From the mixing tank the solution is drawn into the two storage barrels, which are used alternately. These hold about 50 gallons. From them the solution is fed into the administering box, in which a constant level is maintained and from which the solution is fed to the water supply at the desired rate. It is estimated that this plant will easily treat a water supply at the rate of 1,000,000 gallons per day, which is about the maximum consumption of most of the smaller municipalities of Minnesota.

Canadian Clay Workers' Annual Meeting

Enthusiastic Work at Toronto Convention — Helpful Addresses and Practical Discussions — Increasing Evidences of the Industry's Progress and Expansion — Technical Education

The eighth annual convention of the Canadian Clay Products Manufacturers' Association was held at the Prince George Hotel, Toronto, December 14-16. The meeting was a most successful one. The attendance was representative, and the various sessions were notable for the earnestness of the proceedings. "We are here for business," said President McCredie on the opening day, and the thought seemed to pervade the assembly throughout the whole convention. The oratory of the brickmaker is forceful and to the point. In the circle of the clay workers there are many men capable of eloquence, but the general feeling is in favor of short business-like discussions.

The proceedings opened on Wednesday afternoon, December 14th, after the registration of members. Those present included:

W. McCredie, Lyons, Ont.	J. P. Martin (American Clay Machinery Co.) Bucyrus, O.
O. Baird, Parkhill, Ont.	J. F. Wilson, Parkhill, Ont.
J. W. Ball, Toronto, Ont.	Geo. Whittington, Napanee, Ont.
S. J. Fox, M.P., Lindsay, Ont.	H. E. Hunt, Toronto, Ont.
John Wardle, Blenheim, Ont.	Geo. Crain, Beamsville, Ont.
G. B. Mentz (G. B. Mentz & Co.), Walkill, N.Y.	R. C. Brandon, Cannington, Ont.
W. H. Wood, Brockville, Ont.	Henry Janes, Delaware, Ont.
Samuel Wright, Oshesley, Ont.	David Martin, Thamesville, Ont.
B. F. Davenport, Orwell, Ont.	J. Watson, Orillia, Ont.
H. J. Norton, Alliston, Ont.	J. S. McCannell, Milton, Ont.
Wm. Elliott, Glenannan, Ont.	S. J. Heafield (American Clay Mach. Co.), Columbus, O.
Jno. Watson, Bracebridge, Ont.	Chas. A. Millar, Toronto, Ont.
D. A. Lochrie, Toronto, Ont.	C. G. Frank & Sons, Strathroy.
H. Brownscombe, Cargill, Ont.	S. Furniss Co., Beaverton, Ont.
W. J. Packham, Brampton, Ont.	W. H. Freeborn, Brantford.
B. E. Bechtel, Waterloo, Ont.	C. J. Lewis, Milton, Ont.
Anton Berg, Toronto, Ont.	W. J. Barchard, Toronto, Ont.
Milton Smith, Cowal, Ont.	C. A. Campbell, Hamilton, Ont.
W. J. Crowhurst, Port Hope, Ont.	J. C. Wright, Proton, Ont.
D. New, Hamilton, Ont.	G. B. Drennan (J. D. Fate Co.), Plymouth, O.
J. H. Warwood, Toronto, Ont.	J. E. Frid (Geo. Frid Co.), Hamilton, Ont.
Wm. Pears, Toronto, Ont.	
A. Weller, Highgate, Ont.	
G. W. Moody, Ingersoll, Ont.	
W. E. Hales, Kingsville, Ont.	
F. Curtin, Lindsay, Ont.	

In the absence of Mayor Geary and Mr. Jos. Russell, M.P., addresses of welcome were made by Messrs. William Pears, of the Toronto Builders' Exchange, and C. A. Millar, of the Standard Brick Company. Replies were made by Mr. W. McCredie, Lyons, Ont., President of the Association, and Mr. B. E. Bechtel, of Waterloo.

In his annual address President McCredie dwelt briefly upon the advantages of Toronto as a convention city for the manufacturers of clay products. Toronto, he said, was the largest brick-making centre and he trusted that the convention would be permanently located there. "I need not tell you," he continued, "that we have had a very prosperous year. The outlook now is that manufacturers will be out of stock before the opening of next season; many have orders that will carry them far into 1911.

"During its eight years of existence our Association

has accomplished a great deal. It has been of much benefit to its members in helping to solve difficult problems connected with their work, and it has also developed a spirit of co-operation, where acute competition and rivalry existed previously.

"I note with pleasure the attitude of our Association towards technical education. I have no doubt that we shall see in the near future a properly equipped school of ceramics established at Toronto or Ottawa.

"As clayworkers we have not done as much for the promotion of the industry as we might have done. We have been plodding along, trying to fill our orders and have not reached out into new fields. Some time ago a convention of a rival industry was held at London, Ont. From the pages of advertising given to that meeting and from the expenses incurred by the promoters in the way of exhibits and so on, one would think they were producing the only building material. We do not appreciate, as we ought, the importance of our products, for which in this land of great building development and greater possibilities, there is a vast field.

"We have not yet solved the problem of economical burning, nor, to my mind, shall we until we have a continuous kiln for the small brickmaker. Here is a field that might well engage our attention until we have learned the folly of wasting fuel. The thanks of the Association are due to the machinery men for their active interest in these conventions. We owe more to them than we are willing to admit."

The report of the secretary-treasurer, Mr. D. O. McKinnon, which was adopted, showed a balance of some \$30 on the right side.

Technical Education

A number of the members of the special committee on technical education gave an account of what had been accomplished in this direction during the past season. This work was outlined briefly on page 87 of our issue of December 7th. Mr. J. S. McCannell, Milton, Ont., cited the success that had attended technical education in Germany. In that country every new industry started in at the bottom and studied every detail connected with the education of the workmen required. No subject was of greater importance to the clayworkers of Canada. They had all experienced the difficulty of obtaining good men. Mr. McCannell concluded by expressing confidence in the work of the Royal Commission on Technical Education.

Mr. S. J. Fox, M.P.P., who was a member of the special committee which visited the ceramic school at Columbus, established by the Ohio State University, gave the early experiences of that institution and urged the Association to send a resolution to the Dominion Government. Clayworkers had every claim to consideration, the combined value of their plants and deposits being one of the country's important assets.

The remainder of the session was devoted to general business and discussion. Amended articles forming the constitution of the Association were read by Mr. J. W. Ball, vice-president. There was some discussion over the proposal to make it compulsory for the president-elect to have had at least two years' experience. Mr.

William Pears was strongly opposed to such a provision. The opposition finally prevailed and the clause was reconstructed so as to confer absolute freedom of election upon members of the Association. A somewhat similar point arose in connection with the proposed appointment of the executive from past presidents. Messrs. Pears and Crain led the opposition against President McCredie, Mr. S. J. Fox and others. An amendment to the clause by Mr. Crain was finally carried.

On Thursday morning a committee, which had been specially appointed for the purpose on the previous day, brought in the following resolution, which was submitted to the members and carried unanimously:

"That this convention heartily approves of the Technical Commission appointed by the Dominion Government, and would urge upon the commission the necessity of considering the interests of the clay workers of the Dominion, and would suggest that they recommend the formation of a department for the study of ceramics, as it is one of Canada's largest and most important industries."

A committee was appointed to wait upon the commission's next sitting in Toronto, to urge the necessity for prompt action.

Tile Manufacture

An interesting address on the subject of Tile Manufacture was given by Mr. E. Biglow, of New London, O. Mr. Biglow is a recognized expert in this department of ceramics and attended the convention at the invitation of the Association. The speaker emphasized the necessity for care in the preparation of the clay in the manufacture of thin tile, describing the process in detail. The construction of the kiln also required much attention. It paid to use only the very best material. Mr. Biglow favors the use of long arched brick, 22 inches long, for tops of fire-boxes; also large blocks for the sides of fire-boxes. Kilns, he said, should be lined with nine inches of fire-brick laid mostly as headers, with through joints and with good fire clay. All the fire brick should be laid in the same manner. The process of water-smoking requires close attention. After the tile is dried the heat should be increased until it is all through the kiln. The kiln should not be allowed to settle until there is a white heat at the bottom. It will then settle safely and easily, with proper care in firing. There was some discussion on this subject at the afternoon meeting, and later, both Mr. Biglow and President McCredie gave their experiences in the manufacture of hollow clay blocks.

The paper on "Kiln Construction," read by Mr. J. H. Warwood, will be found in another column.

Mr. J. W. Ball, Toronto, vice-president of the Association, read an interesting and comprehensive paper entitled, "Defects in Manufacture Due to Kiln Troubles." Mr. Broadwell, Kingsville, Ont., gave an address on "Kiln Design," and distributed printed copies of the same.

Electricity in the Brick Plant

The feature of this session, perhaps, was an address by Mr. Chas. A. Millar, of the Standard Brick Company, Toronto. Mr. Millar discussed the various advantages of electricity in the brick plant. It was not only economical and reliable, but it helped greatly in keeping the plant clean and presentable. In this respect, and in many others, it was greatly superior to steam equipment. Mr. Millar dealt at some length with the installation of electrical equipment, giving a number of practical and helpful pointers. Motors should be placed on a perfectly dry bed, preferably hollow. Induction motors with a voltage of 550 were the best, he considered,

for the heavier classes of work. The motor was reliable, easy of operation and made the manufacturer independent. It dispensed with the engineer and the fireman. Another point in its favor was the evenness of the power. For safety, comfort and economy, he considered that there was nothing equal to electricity as a motive power. As to cost, a 50 h.p. motor could be purchased for from five to six hundred dollars. In the course of his remarks Mr. Millar admitted, humorously, that one occasionally received a shock of some 550 volts, but this was not very intense unless one happened to be standing on damp ground. An interesting discussion ensued, in which Messrs. J. W. Ball, William Pears and D. A. Lochrie were prominent. Mr. Ball said that if a comparison were to be made, only the most up-to-date steam equipment should be considered. He ventured to think that such a plant, furnished with all modern improvements, had many points in its favor. In both cases great precautions were necessary. Personally, he would prefer not to receive a shock of 550 volts. In his opinion, the element of danger in the use of electricity was not to be overlooked altogether. In the United



Mr. D. A. Lochrie, Toronto, 1st Vice-President.

States they killed men with it; it had superseded hanging (laughter).

An address by Mr. A. M. Wickens, of the Canadian Casualty & Boiler Inspection Company, on "The Advantages of Steam Equipment," and a paper by Mr. H. E. Hunt, of Toronto, on "The Proper Care of Moulds," brought the meeting to a close.

In the evening an enjoyable banquet was held at McConkey's Restaurant, at which about fifty members were present. Mr. J. W. Ball, of Toronto, acted as toastmaster, and interesting addresses were given by Messrs. Wm. McCredie, Chas. A. Millar, B. E. Bechtel, J. S. McCannell, S. J. Fox, M.P.P., G. F. Hamilton, Henry Simpson, A. Berg, Geo. Crain, Alfred Wagstaffe, G. B. Merks and others.

At the Friday morning session considerable time was devoted to a discussion of the relative economy of piece work and day work. Messrs. J. S. McCannell, S. J. Fox and W. H. Freeborn gave the members the benefit of their experience. The addresses given by Messrs. McCannell and Fox will be found in another column.

At the election of officers held subsequently, Mr. Robert W. Davies, proprietor of the Don Valley Brick Works, Toronto, was unanimously chosen as president

for the ensuing year. The remaining officers were elected as follows: 1st vice-president, D. A. Lochrie, Toronto; 2nd vice-president, W. H. Freeborn, Brantford; 3rd vice-president, David Martin, Thamesville, Ont.; secretary-treasurer, D. O. McKinnon; auditors, Messrs. Fox and McCannell. Executive: Joseph Russell, M.P., Toronto; W. McCredie, Lyons; J. S. McCannell, Milton; C. A. Millar, Toronto; S. J. Fox, Lindsay. It was decided to hold the next convention in Toronto. There was a pretty general consensus of opinion that Toronto would be the best meeting place for the next two or three years.

Piece Work and Day Work

Discussion by Two Prominent Brick Manufacturers—
Why the Former System is the More Advantageous

J. S. McCannell, Milton, Ont.

Which is the better system on a brick plant, day work or piece work? Someone might answer, neither, and say that the bonus system is the best of all. It is impossible perhaps to apply any one of the above systems and say that it is the best. What might be best on one plant might not work out at all on another. If a plant is not kept in first-class running shape one cannot expect employees to make a success of either piece work or day work, from the employer's standpoint.

With day work a workman is sure of his day's pay, but no matter how much harder he works than the other fellow he does not make any more money in a day. He has no incentive to spur him on to his best efforts. It is generally admitted that where it is possible there is an advantage both to the employer and the employee when some system can be worked out that will be agreeable to both parties.

On piece work an employee feels that he has something to work for; he is working more for himself. The harder he works, the more he makes. If he can get more work out of the machine he is reducing the cost of the goods, and his employer shares in his gain also. On piece work one should have an idea what the work is worth, and both parties should have confidence in one another that if a good day's pay is made the work shall not be cut down. If there is a lazy man in the gang, success will raise the standard of the men. The better workman will go where he can make the most money.

Will a piece worker take greater care of his machinery than the day worker? I believe that the inducements are greater. A gang of men will sometimes overlook a defect in the working of a machine that they would not overlook if they were on piece work. A system that will keep machinery to its maximum output is a saving in more ways than one. Less capital will be required as less machinery will do the work.

In one case a factory reported that they turned out more work in a week, working nine hours a day, with the Saturday half holiday, than they did formerly in a ten-hour day, six days per week. The employees did not suffer from the reduction of hours, but on the contrary, made more wages. It is admitted that in times of keen competition the firm that can produce goods at the minimum cost are serving their own interests as well as those of their employees.

When a man is working on the day work system, he knows what he is going to have for his day's work, and in some cases may not be willing to risk a certainty for what he thinks is an uncertainty. In cases like this the firm should explain fully any system of piece work and show that the object is more money, and not less. In one case, a company that worked all piece work installed a new machine the working of which was new to the employees. To overcome the difficulty this machine was worked two months on day work until the hands understood the working and saw that they could make more money by the piece

work system. In another case, a gang of Italians were loading shale by day work. The boss wanted them to try the work by the ton. He tried several times, but the men seemed afraid of it. But one day when he said "Ten men load one hundred cars, get ten hours pay, take pail and go home," they were willing to try it, and the bargain proved satisfactory to both sides. The one thing that they wanted to be assured of was that they were going to get the full day's pay. Once the element of uncertainty as to the amount of pay was eliminated they worked more cheerfully and did more work in shorter time than they had done before.

In some cases the premium or bonus system is employed successfully in place of piece work or day work. In this way the employee is sure of a certain amount each week, while if he works harder the amount is increased according to the work done over the amount agreed as a day's minimum. In other words, he makes his day's wages plus the bonus earned. This inspires a man to do the best he can, and in many cases he will devise ways to do the work better and more quickly than by day work, thus benefitting both himself and his employer.

In conclusion, any plan or system that will promote good feeling between employer and employee, and make an employee feel that his work is worth while and that he has a chance to make all there is in the work, is the proper system to have. No hard and fast rule can be laid down. What will work in one place may not work in another. The thing must be worked out, having in view the best interest, not merely of the employer, but of the employee as well.

S. J. Fox, M.P.P., Lindsay, Ont.

Personally, I am in favor of piece work where it can be done in that way, but there is a good deal of work that can not be carried out except by the day.

Let us first consider the kind of workman we have to deal with. For convenience we will make three classes:

1st. The careless, lazy and shiftless, who only works because he has to, who will stay with you just as long as you will put up with him and whose only interest in his work is quitting time and pay day.

2nd. The steady and honest laborer, who is contented in any place, who is satisfied with 10 hours' pay for 10 hours' work, who is always on hand for any work and at all times.

3rd. The man who is full of energy, quick and active, taking more interest in his work than quitting time and pay day.

With these three classes all working by the day, at the same work, it is very hard to pay each a different rate of wage per day. If they are at different jobs you can grade the men, so that the best gets the best place with the higher pay.

The steady and honest man is not to be despised, he is like oil to the plant, making the working smooth.

Now taking the above three classes working by the day, it appears as follows:

1st. The shiftless and lazy. The employer suffers.

2nd. The steady and regular. No one suffers.

3rd. The active and quick workman. It is he who suffers, because the employer dare not give him more pay.

Now the advantage of piece work is that it acts as a stimulus to the men. They know if they do not the work they will get less pay. Each is placed on his metal and has a chance to earn more money, which means a larger output of the plant.

In piece work the shiftless man must be looked after or he will do poor and rough work. The only thing to do with him is to put him at work that he cannot spoil, and not in a gang of good men.

The steady fellow is stimulated knowing that he can make a little more pay.

The smart active workman, whose pride is quality and quantity, gets the most responsible and best paying job in the plant.

A great deal depends on the grading of the men, the division of the work and having no drones in the gangs.

Up-to-Date Kiln Construction

Practical Brick Man on Relative Merits of Various Types—General Principles of Construction Outlined

By J. H. Warwood, Toronto

There are many different types of kilns to-day. In most cases each style is adapted to some particular kind of clay or line of manufacture. In this article it is my intention to discuss three types of kilns that are most generally in use: the round down-draft kiln, the rectangular or square down-draft kiln, and the continuous kiln. If we are to judge the above types of kilns by the number in use and the amount of ware burned in them, we must give precedence to the round down-draft kiln. I believe there are more of them in use to-day on the North American continent than all other types combined. The size and construction of round kilns vary to meet the requirements of the ware to be burned, but the size most generally in use and which gives the best all-round satisfaction, is the 30-foot inside diameter kiln, 8 feet to the spring of crown, and 7 foot spring in the crown. The kiln should be built of good material, and lined in the parts exposed to fire with a good grade of fire brick. It should be properly banded with at least six bands, three of one-quarter inch by six inch, and three of one-quarter inch by four inch iron.

In the matter of furnaces, there are several types, all of which are good for their respective purposes. Their selection is often best decided by the fuel used and the material to be burned.

The next question is that of kiln bottoms. Here we reach a point in kiln construction upon which I believe more thought and endeavor has been spent than on any other part of the manufacture of clay products. It has been my experience that the open or riddle bottom kiln with an individual stack is invariably the most successful, notwithstanding the fact that solid bottom kilns, and also another type, multiple chimney kilns, are successfully used in many places at the present time.

The points of superiority claimed by those who are using the round kiln are that, considering capacity, they are from twenty to thirty per cent. cheaper to build than the square kiln. The product is more exposed to the heat in the round kiln and therefore it becomes possible to burn the same clay more quickly than in a square kiln, and your brick will stand up better if you are making a vitrified article. Also, the more exposed condition of the brick when set facilitates the production of a better grade flashed brick. The importance of this may not be appreciated by many Canadian brick makers. It is a fact, however, that flashed brick is a very popular article in the United States at present, and the leading Canadian manufacturers are now making this brick. The upkeep for repairs is much less in the round than in the square kiln. In the matter of fuel consumption, it is impossible to set any fixed amount as the maximum or minimum to be used. I have burned at times one-half ton of coal per thousand to make all-hard brick, and again, with kilns which were connected, or continuous, I have accomplished the same with less than 400 pounds of coal per thousand, in which case it compared favorably with the best regularly constructed continuous kilns. With this advantage in firing kilns that are so connected, you have the opportunity to hold and handle the product until satisfactorily burned. In smaller-chambered or regular continuous kilns this is not so.

The square down-draft kiln is an excellent and popular kiln, and in many cases it is the most adaptable for the needs of the manufacturer. The general principles of construction are the same as in the case of round kilns. If you desire a satisfactory and lasting kiln, good material and good workmanship are essential. The usual size, as best adapted, is 18 feet wide by 7 feet 6 inches to spring of crown and 7 feet 6 inches spring of crown. If handled by a single stack about 54 feet is the desirable length, but if multiple chimneys are used they can be built much longer.

A very essential thing in square kiln construction is to have the kiln strongly and properly ironed. There is no part of a plant that, if not constructed satisfactorily, will cost so much for repairs and cause the owner so many uneasy moments as a bad burn, which is usually the result of a poor kiln.

The points in which a square down-draft kiln is superior to the round one are that it is more accessible to set and draw, and that the door can be made large enough to accommodate a wagon; also, that on account of the less exposed surfaces to the fire, where a solid colored face brick is desired, a better colored brick is obtained.

We have now reached a point where we can take up the question of continuous kilns. The principal need to-day with the brick maker is that of economy of manufacture and at no point in the process of making is there so much variance in cost as in the burning.

Individual down-draft kilns consume from eight to twelve hundred pounds of coal a thousand. The continuous system, using from three to four hundred pounds a thousand, more than halves the cost of burning in individual kilns.

The types of continuous kilns in use are many. The top firing and open top kiln has many supporters in the common brick trade. Its comparatively low cost of construction and its economic burning of ware make it in many cases a favorite with the manufacturer. But on account of the earth dressing, which is necessary on top of the kiln, the clinkers, dust and ashes caused by burning the fuel in the ware, makes a kiln of a type undesirable for anything but a common product.

The next type I will mention has a close relation to the last type of kiln described, with the addition of a crown or arch which does away with the top dirt. But on account of its being fired from the top we still have the undesirable clinkers and ashes to contend with. Then we have the continuous form of kilns with the side furnace, the same as an ordinary down-draft. The most modern construction of continuous kilns to-day is a series of compartments equal in size to many individual down-draft kilns. So it is seen that while continuous kilns are becoming more closely related to individual down-draft kilns, and while they retain their fuel-saving qualities, they are reaching for the individual control that the down-draft kiln possesses. While the continuous kilns have been becoming more like the individual kiln in their system of handling, the individual down-draft kilns have been leaning towards the continuous system. I have seen old down-draft kilns connected up by flues so as to work continuously and burn all hard brick with three to four hundred pounds of coal to the thousand.

The last and perhaps the most essential feature of all burning is attention and horse sense on the part of the man behind the shovel.

County Engineer Farley of Carleton has issued his report on the work of the past season. During the summer 12½ miles of road were graded; 16½ miles were graded and gravelled; 3¼ miles graded and macadamized. One reinforced concrete bridge and a large number of culverts were constructed. The expenditures up to date by the different municipalities are: Gloucester, \$3,975.98; Nepean, \$4,995.27; Torbolton, \$1,147.17; Fitzroy, \$2,271.74; Osgoode, \$4,001.75; North Gower, \$434.40; Huntley, \$1,733.68; Eastview, \$165.06; March, \$872.74; Marlborough, \$1,054.88; Goulbourne, \$3,014.10.

According to a recent despatch from Edmonton, Alta., construction will be commenced on the Southern Central Pacific Railway as soon as certain privileges have been granted by the Government. Roughly, this road will run in an almost direct line from Vancouver, B. C., to a port on Hudson's Bay, some hundred and fifty miles to the north of Fort Churchill. The company proposes to build several feeders across the international boundary as well as through the Peace River country, which the line will cross.

The Brick Resources of Western Canada

Medicine Hat and its Connection with the Industry—Alberta Clay Products Company's Great Plant — Progress at Prince Albert and Strathcona

Western cities are nothing if not progressive, and Medicine Hat, Alberta, is no exception. It would be strange, indeed, if there were nothing of interest to record as to this city's connection with the clay industry. It is situated in the centre of a clay belt, and is bountifully supplied with natural gas. Wells which have been in service for five years or more, show no diminution in pressure or loss in volume.

Two years ago this city started an advertising campaign for industries, the result of which was the location of the Alberta Clay Products Company, who, during the present season, started the construction of a three hundred thousand dollar plant. This company is constructing ten 30-foot and four 40-foot down-draft kilns; a dry room of four storeys, 100 feet by 300 feet in area; a brick press building, 50 feet by 70 feet, on the first floor of which are at present two dry-press machines, which are turning out thirty thousand brick per day each. Eventually this floor will have five presses. The upper storeys are devoted to elevators and storage bins for the ground clay, and the basement to the grinding pans. Adjoining this building is the terra cotta pipe and tile press, located in a building of the same size and capable of turning out pipe from four to twenty-four inches in diameter. Larger machines will be installed during the winter so that by the spring the plant will have pipe from four to forty inches in diameter. Adjoining the press room in a separate building is the power house, consisting of one unit heavy duty rolling mill type engine, of 450 h.p., and a battery of three Leonard boilers of 150 h.p. each. The company have also erected a machine shop to facilitate repairs in and about the plant. When the plant is in full operation its output will be twenty cars per day.

The manager, Mr. Overpack, intends, upon the completion of this work, to install plant and kilns for the manufacture of paving brick and light pottery. In the clay bed, which this company own, are found all the qualities of clay required for these various clay products. The company have already made some very fine fire brick, which tests have shown to have very high

fire resisting properties. This bed is found at Coleridge, five miles from Medicine Hat, and the material is brought to the factory on cars, passing into the clay shed on an elevated track. All the materials are burnt by natural gas. At present the company have in operation four temporary kilns for the manufacture of brick. These have a capacity of three hundred and fifty thousand brick each.

The city, alive to the importance of the industry and to the advantages accruing from the possession of an up-to-date plant within easy access of its operations, made generous terms with the company. The inducements offered were a free site of about ten acres, a gas well with a daily discharge of about three million cubic feet, exemption from municipal taxes for ten years, and water supplied at the rate of ten cents a thousand gallons.

At the present time the company are manufacturing all the brick required for the construction of their plant, and last month shipped two million brick, in addition to their own requirements. It is their intention to manufacture a heavy line of 4, 6, 8, 10 and 12-inch terra cotta pipe, so that they may be in a position to make prompt delivery in the early spring.

The officers of the company are: James Campbell, Lehigh, Iowa, president; A. R. Daughenbaugh, Gowrie, Iowa, vice-president; and Warren Overpack, Medicine Hat, Alta, treasurer and manager.

During this season the city of Medicine Hat has used 400,000 brick—250,000 for the construction of sewer manholes, and 100,000 for electric light and power plant, the balance being used for miscellaneous city work.

Opening of Alberta Clay Products' Plant

The half million dollar plant of the Alberta Clay Products Company was formally opened for the inspection of the public. Over 2,000 visited the works, including several hundred guests from points ranging from Brandon on the east,



Sewer Pipe Department and Dry House, Alberta Clay Products Company, Medicine Hat, Alta.



Prince Albert Brick Company's Plant at Prince Albert, Sask.

to Okotoks on the west, Lethbridge on the south and Edmonton on the north.

A banquet was held on the fourth floor of the building. The chair was occupied by William Cousins, of Medicine Hat. Among those present were: John Dixon, of Maple Creek, director of the company, Hon. C. R. Mitchell, Attorney-General of Alberta, Mayor Jamieson, of Calgary, Mayor Bowman, of Lethbridge, Supt. Coleman of the C. P. R., Mr. Hotchkiss chief of the provincial publicity staff, John T. Hall, publicity commissioner of Brandon, and Commissioner McMullen of the C. P. R.

There are now 325 men employed at the works. The plant is claimed to be the second largest on the continent. The main building has a floor space of 200,000 square feet and is six storeys in height. It is heated by over nine miles of steam piping and lighted by 535 thirty-two candle power electric lights. The electricity, heating system and fires for the kilns are all supplied by natural gas from a well on the company's property.

Prince Albert the Substantial

There are not very many towns or cities in the West able to boast of being located at the base of supply of two of the principal commodities used in building construction—brick and lumber, yet that is the fortunate position of the city of Prince Albert, the most northerly of the four cities of the growing province of Saskatchewan. Prince Albert lumber is shipped to all points in the prairie, where there is an ever

insistent demand. One hundred million feet will be cut in the district this winter, which will give some idea of the value of the industry to the city.

Prince Albert brick is not shipped out at present to any very great extent—there is too much local demand. There are in the city, or within a mile or two, four brick yards. Of these, perhaps the most modern is the plant of the Celtic Brick Company who are engaged at present almost exclusively in making pressed brick. The others, namely, the Red Rock Brick Company, the Prince Albert Brick Company, and H. H. Ittner, all make good common brick of a fine red color. The Celtic yard will probably turn out common brick also next year.

Between them, these four yards have turned out this year approximately four million and a half bricks. Of this amount practically all has been sold in the city and gone into building here.

The total value of permits issued to date amounts this year to nearly half a million dollars, nearly all of which is for buildings of brick construction. Prominent among these structures are a new theatre which will measure up 700,000 brick, the structure costing about \$30,000, and the Masonic Temple, which cost about \$60,000, and measured up about 600,000 brick. Other structures such as the wholesale warehouse for Messrs. Cameron & Heap, and the new Pollock block took about two hundred thousand apiece.

The building which has gone on this year has been confined mainly to business blocks and large residences. It is expected that next spring will see a good deal of small



Workshop and Temporary Cells of New Government Penitentiary at Prince Albert, Sask. 450,000 "Celtic" Pressed Brick are being used in this Building.

residence building, and for this there is a great opening as numbers of families have had to leave owing to there being no adequate place to live. In this connection, too, it might be added that it is probable that a sand-lime brick plant will be put in here by local capital.

There is hardly a building of any importance in the city which is not almost wholly brick. One or two are faced with stone and cement, but solid brick predominates, the larger ones being strengthened with structural steel and iron. It is no particular wonder with a good supply handy and the price running pretty low. Common brick this year has been worth



Celtic Brick Company's Prince Albert, Sask.

about \$10.50 per thousand, while pressed brick for facing has been bought for about \$20. Immediately outside the city limits there is being erected the big penitentiary for the Province of Saskatchewan. As a start, a contract was let for the construction of temporary cells, which will afterwards be used as a workshop. Four hundred and fifty thousand Celtic pressed brick are going into this building, which is shown in the illustration. The actual main building will be built by the inmates from brick made on the spot, a fine clay bed being on the grounds of the institution.

The municipality has not consumed a great deal of brick this year. Such as has been used has gone mainly into man-holes and so forth. Considerable extensions have been carried



High School, Prince Albert, Sask.

out to the sewer and water systems of the city, but this has not involved the use of much brick.

The effect of the brick construction at Prince Albert is to give the city a singularly substantial appearance. It is safe to say that no city of its size in the West, (Prince Albert's population to-day is about 8,000) has so permanent an appearance. Tenth street and Central avenue, which promise to be the two principal business streets, will shortly present a solid brick front, while First avenue west and River street are changing from frame to brick steadily, if somewhat slowly.

After all, Prince Albert can lay claim to respectable antiquity, as antiquity goes in the West, it being some forty

years old. It would therefore be unreasonable to expect the newness of the frame towns of the prairie. But the rapidity with which the district around is opening up and building of brick, the increasing railroad construction nearby, and the development of the city's natural resources go to make Prince Albert one of the soundest and most solid cities of the Canadian West.

Prince Albert Brick Yards

Of the four brick plants located at Prince Albert the most important is undoubtedly that of the Celtic Brick Company. This concern owns about 40 acres of fine clay situated about two miles from the city. The illustration gives a fair impression of some of the buildings. The company has a Chisholm, Boyd & White plant, with a daily capacity of 20,000, the clay being gathered by two Quincy clay gatherers. The plant has been working at full capacity this year, with about twenty men employed. A considerable quantity of Celtic brick has been shipped to different parts of the province—possibly as much as half of the output. This amounted in 1910 to a million and a half. The Company intend making a good common brick next year and Manager Ross says he is already receiving many enquiries. The Canadian Northern Railway have a spur line into the Celtic plant, and every facility for loading and shipping is to be found.

The next largest yard, so far as the output is concerned, is that of H. H. Ittner. Mr. Ittner has turned out about one and a quarter million brick this year. Almost all of it has been used in the city. The present bed is just about exhausted, and he has acquired, recently, 40 acres of new clay bed, which he proposes to open up next summer. The entire new plant will be bought by Mr. Ittner in the east this winter. He intends making a tour of the largest plants on both sides of the line, inspecting the machinery. His new yard will have track facilities, and with the building anticipated here next spring he will no doubt find a good demand.

The yard of the Red Rock Brick Company is situated two or three miles beyond the city on the north side of the river. The output of this yard this year has been a little over half a million, of which about half has been sold in the city and half outside. The Red Rock Company own 120 acres of splendid clay. This clay is covered largely with jack pine and poplar. As the land is cleared the clay is uncovered. This makes the fuel problem very simple. The output of this yard is towed up the river in barges by a tug and landed in the centre of the city.

The Prince Albert Brick Company, of which Mr. Wm. Knox is manager, made about three quarters of a million this season, most of which was used in the city. Both this plant and the Red Rock plant make a fine grade of common brick.

It will seem that with these four plants in operation Prince Albert is well situated in regard to her brick supply.

J. E. Woodward.

Cleaning Brick Fronts

An expert in the sand-blasting trade who has operated on many buildings, on being asked as to the efficiency of the sand-blast upon soiled brickwork, said that he could not advise it except when the brick were extremely hard. When used against stone the blast does not remove the original face, he said, "only the grime." But in the case of brick, not extremely hard, the result might be different.

The force with which sharp sand can be driven through a fine nozzle is very great. If permitted it would quickly cut a stone in two. In the case of granite, marble and cut stone the skilful operator preserves the original face of the block, but he cannot guarantee to do so with respect to all sorts of front brick. He advises cleaning front brick with acid

instead of sand-blasting. The same opinion seems to be held abroad. The cleaning of brick fronts was the interesting subject of a paper recently read before the German Association of Brick and Terra Cotta Manufacturers. The author protested against the use of sand-blast or other method by which the original face of the brick would be taken away, saying:

"When the blast is used, and the face of the brick taken off, the cleaned front will show a good appearance only for a short time, as the brick with the original face removed will be very much more porous than before, and absorb dirt more readily. The use of steel brushes is also very bad, and will not give a first-class job. The best method is cleaning the brick fronts with a solution of muriatic acid. The strength of the solution can be made to 1 in 12. When this solution

permits up to November 1st, 1910, totalled \$970,000, 80 per cent. of which are brick buildings.

Brick Paving At Berlin, Ont.

The town of Berlin laid its first permanent pavements this year. The contract was given to the Warren Bituminous Paving Company to lay a pavement on King Street from Scott Street to Water Street. It consists of a Bithulithic pavement laid upon a 5-inch concrete foundation with Metropolitan block vitrified brick in the street car track allowance. It is 2,572 feet long with an average width of 42½ feet. The ties for the double car tracks were laid upon a six-inch concrete foundation, and bedded in concrete. The bricks were placed upon a 2-inch sand cushion, upon this foundation, and the joints filled with a cement grout. Three rows of brick are



Collegiate Institute, Strathcona, an example of the Modern Educational Building now being erected in progressive Western Canada.

is too strong for the brick, acetic acid should be used. A good soap solution will, as a rule, take off all thick dirt, and the cleaning with acid solution can then be done easily."

Brick Making At Strathcona, Alta.

Brick of good quality is manufactured in the city of Strathcona, the brick clay being found from 15 inches to 2 feet below the surface. The depth of the brick clay is from 12 to 25 feet. At the present time there are three brick yards in operation with an output of 10,000,000; but so great is the demand that all the manufacturers are increasing their capacity so as to cope with the increased demand from the cities of Strathcona and Edmonton. Beside the manufacture of the ordinary wire cut brick, pressed brick and drain tile are manufactured extensively, and a company has just been formed and has the machinery installed for the manufacture of sewer pipe. The amount of brick used in the city of Strathcona can be arrived at from the fact that the building

laid along the outer rail of each track, making a total width of seventeen feet of brick pavement.

When this contract was completed, another was awarded to the same company to extend the pavement on the same street with a single car track, from Water street to Wellington street, a distance of 2,470 feet. It was also extended from Scott street to Alberta street, a distance of 1,252 feet. This has a double car track. The construction of these last two pavements is the same as the first one. The price for the brick pavement was \$1.83 per sq. yard, and \$4.60 per cubic yard for the concrete foundation.

Brick makes a very suitable paving material for the car track allowance. It wears well, and can be removed to make necessary repairs to the tracks.—Contributed by W. M. Davis, Town Engineer, Berlin.

The California State Legislature has issued bonds to the value of \$18,000,000 for good roads construction throughout the State.

A Leading Canadian Brick Plant

Situated at Laprairie, Que., with head office at Montreal, is the plant of the Laprairie Pressed Brick Company, considered the largest and best equipped of its kind in Canada, with very few to equal it on the North American Continent.

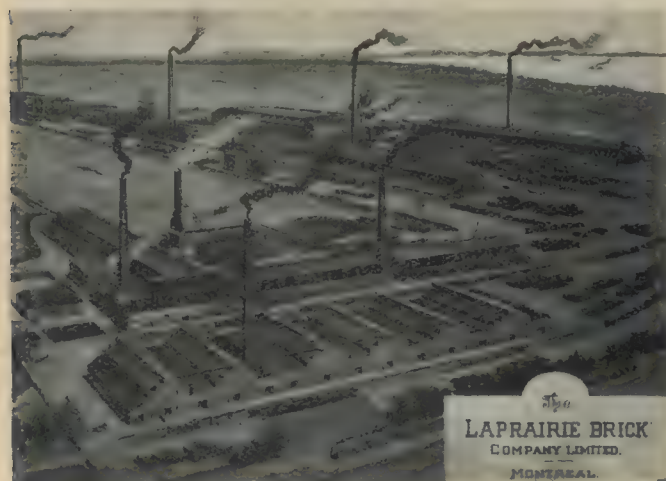
The company makes five kinds of brick, viz.:—red pressed, buff (patented), Roman, rustic (registered), and shale plastic (registered).

It is the only company in Canada to-day using shale entirely instead of ordinary clay, for all its raw material, and electricity as its principal motive power. The works consist of two plants, the older one steam-driven, the newer and larger driven by electric motor.

The steam plant has seven grinders, each weighing 32,000 pounds, with a total capacity of 500 tons of shale daily. The daily output of the company is now 300,000 bricks.

For the electric-driven plant the power is brought from Chambly, about fifteen miles from Laprairie. In it there are twelve grinders each weighing 32,000 pounds, with a total capacity of 800 tons of shale daily.

Some idea of the magnitude of the works may be gathered from the fact that it requires forty cars daily to bring the bricks from Laprairie to Montreal. The property is over 125 acres in extent, of which 12 to 15 acres are occupied by the plant alone. There are about four miles of heavy railway tracks in the yards and two miles of light tramways. When-



ever possible, labor-saving devices, steam or electrically operated, are used. The result is that the company is able to sell plastic brick at such a low price per ton of material on board the cars at Laprairie that it makes it almost impossible for the common clay brick to compete.

Reverting to the recent discussion as to the prevalence of disastrous fires in Montreal, the company claimed that if the fire walls had been made of Laprairie "shale plastic" bricks, the insurance companies would not have had cause for such complaints, nor would the risks, from their standpoint, be rendered extra hazardous. They claim that these plastic bricks are the best ever made for fire purposes, practically smoke-proof, thus minimizing damage to adjoining buildings. They are practically the same material as was used in the old Roman walls, which have lasted for centuries and are more difficult to destroy than the best stone.

It is interesting to note the report of results of tests of two specimens of red brick for the Laprairie Brick Company, made in the laboratories of the Faculty of Applied Science, of the University of McGill. For the compression test, the specimen was tested on flat, the loading faces being prepared with plaster of paris. The dimension of specimen were 8.2" x 4" x 2.4"; the area 32.8 square inches; the weight 6.119 lbs.

The load was 4,640 lbs. per square inch and the maximum load 215,600 lbs. In the absorption test, after being immersed in water for 48 hours, the weight of specimen before immersion was 5.998 lbs. and the weight after immersion 6.463 lbs., showing a gain of .464 lbs. or 7%.

In the "plastic wire cut shale brick" the gain in weight after being immersed in water for 48 hours was 121 lbs., or 2.1%, and in the compression test the maximum load in pounds per square inch was 15,000 pounds.

This is a test very rarely equalled and shows the superior quality of the product of the Laprairie Pressed Brick Company.

An Up-to-date Pressed Brick Plant At Sydney, N.S.

The plant of the Sydney Pressed Brick Company, Limited, Sydney, N.S., is situated at the junction of the Sydney & Louisburg and Intercolonial Railways, quite close to the Sydney passenger station of the latter railroad.

The bricks are manufactured from water granulated basic blast furnace slag, with a small proportion of slag cement as a bond. The slag is dried in a Ruggles-Coles dryer and then ground in a wet pan where the cement is mixed with it. The mixed materials are elevated to a hopper over a four-mold Berg press. After being pressed the bricks are cured in a steam cylinder, and treated in practically the same manner as silicate bricks. In fact, the process all through is quite similar.

The natural color, a light grey, is pleasing, and work done with bricks of the natural color and red or black joints is very effective. The bricks may be colored red or buff in the process of manufacture.

The special advantages claimed for the company's brick are:—(1) That they are turned out true in form and dimension; (2) That they make a strong bond with the mortar; (3) That they improve with age and changing atmospheric conditions.

The plant has a capacity of two thousand bricks an hour.

Brick moulds used in the manufacture of brick, no less than the machines, have undergone some radical changes in recent years. Under the old system, a single wooden mould with a loose bottom was used. The clay was placed by hand, pressed in and struck off with a knife. The introduction of the sanding machine has displaced this mould. Strength and accuracy are the main features in the manufacture of the sanding machine. One sixty-fourth of an inch in the depth of a mould would make a considerably difference in the manufacturer's output for a season. For example, 1-16 of an inch off the side of a million bricks would mean enough clay to make 15,625 brick 4 inches wide. The hard usage to which these machines are subjected necessitates the greatest strength in every detail of construction.

Messrs. Chapman & McGiffen, architects, Toronto, have been awarded first prize for their plans for the new Knox College. The award carries with it the commission for designing and superintending the erection of the proposed building. In addition to the first prize, three other prizes of \$500 each were given to Wickson & Gregg, A. McKenzie Bryden and John M. Lyle, all of Toronto. Nine plans were submitted for the work, which will be begun probably next spring. The new building will cost \$400,000 and will harmonize with the general design of the University of Toronto.

The Winnipeg Building Trades' Council are asking the Board of Control to frame a by-law looking to the safe construction and inspection of scaffolding.

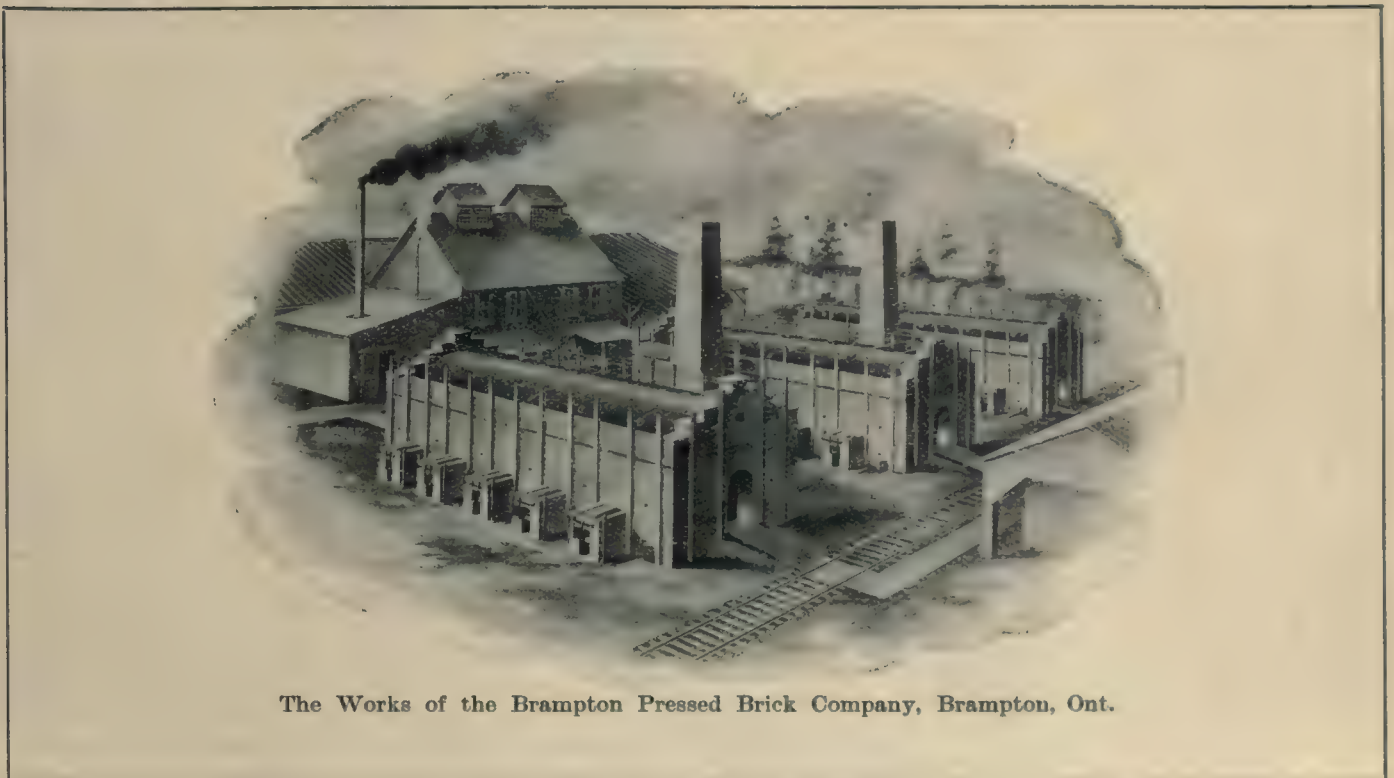
A Progressive Brampton Industry

Twenty-two miles from the city of Toronto and just beyond the limits of the enterprising little town of Brampton are located the works of the Brampton Pressed Brick Co., Ltd., a view of which is published herewith. Mr. James Packham, the President of the concern, was formerly the sole owner of the plant. The demand for Brampton pressed brick increased rapidly, however, and Mr. Packham formed a company for the purpose of increasing the capacity of the plant and extending the market for its products. This was five years ago. At that time the company moved the plant to a new site consisting of 17 acres of red shale bank. Additions now being made include new Berg dry pans and a complete equipment for making vitrified paving brick, wire cut brick and all kinds of terra cotta, drain tile and so on. The transportation facilities possessed by the Brampton Pressed Brick Company are excellent, a C.P.R. siding running right into the works. The company's property is favorably located,

Items of Interest

The recent excavations of the Roman Villa at Northfleet, England, have proven of immeasurable value to the antiquarian student. Among other important discoveries has been found the existence of an ancient ruin about two feet below the foundations of the present structure. Another valuable "find" is a large kiln built entirely of blocks of chalk lined with red clay, burnt through the process of firing to red brick. Buildings erected wholly or partly of blocks of chalk are to be found in the chalk district dating back to the Norman period, or even earlier, and Roman kilns built partly of chalk are comparatively common. This new kiln is uncommon, on account of both its material and its size.

The oldest temple in the world, so far discovered, says an exchange, has been unearthed by excavators at Bisya, in central Babylonia. The walls of the tower were first uncovered and the summit cleared. The first inscription on the sur-



The Works of the Brampton Pressed Brick Company, Brampton, Ont.

high and dry, free from all drainage or soakage water. There is a practically inexhaustible supply of fine red shale extending from near the surface of the ground to a depth which has not yet been ascertained. The same quality is found 40 feet below the surface. The brick press is a recent addition to the plant. It is one of the four mold Boyd brick presses, manufactured by Chisholm, Boyd & White Co., Chicago. This machine occupies a floor space of 8 by 9 feet. It is about 6 feet high and weighs some 10 tons. Mr. Packham has evolved the last developments in the economical and systematic operation of his plant. The shale from which the pressed brick is manufactured is carefully selected, and then crushed in a heavy crushing machine and screened through an 18-inch mesh screen. The fine material is then fed into the molds of the press, from whence they are delivered automatically and taken direct to the kilns and set for burning. These kilns are permanently-walled up-draft kilns. The brick are burned in the ordinary way, first with wood, then by coal and wood, and finally by coal alone, the whole process lasting about two weeks.

face was on a brick stamped with the name Dungi, which goes back to 2750 B.C. A little lower appeared a crumbled piece of gold with the name Param Sim, who lived in 3770 B.C. Just below were large square bricks peculiar to the reign of Sargon, 3800 B.C., who was probably the first Semitic king of Babylon. A large platform was discovered 2½ yards below the surface, which was constructed of peculiar convex bricks such as were used in building 4500 B.C.

Work on the Canadian Pacific bridge near the Place Viger Station, Montreal, will, it is expected, be started shortly. At present, traffic is carried on over a stretch of land between the two excavations for the station yard. Eventually this land will also be removed, and a bridge constructed, which will reach from Berri to Montcalm streets. This viaduct will be 1,055 feet long. Already the foundations consisting of 200 concrete pedestals, with two massive stone abutments have been built, and in a few days they will be ready for the placing of the steel superstructure.

History of Clay Sewer Pipe Construction

Early Methods of Manufacture Described—Discovery of Salt Glazing Process Evolution of the Modern Product: An Impervious and Indestructible Material

By J. M. McClave, District Superintendent, American Sewer Pipe Company.

Since man began to multiply and replenish the earth, the matter of proper drainage has been an important factor in all construction, and a careful research of history reveals to us that vitrified clay products have held a place in the front rank for buildings and other structures.

That the primitive man used vessels made of clay for cooking utensils is proven by the many relics excavated from abandoned cities of ages past. That the prehistoric man used the vessels made of the same material is proven by many relics taken from the mound where they have lain for unnumbered centuries, still in perfect condition.

A noted traveller of many years' experience, writes: "Vitrified clay is among the most durable materials known. While the marble palaces, temples and tombs of Rome and other ancient cities have crumbled away, those built of brick made from clay, remain almost perfect.

"Drains constructed of tile have been found in Pompeii, Troy and Nineveh, also in Urr of the Chaldees, the home of Abraham and the oldest city in the world. Here it was in general use, even the ancient tombs being drained with clay pipe, which are now in as perfect condition as when laid over 4,000 years ago."

The temple of Jerusalem had a perfect sewerage system cut out of solid rock. The Cloaca of Rome has continually performed its duties as a sewer system for more than twenty centuries.

Before the art of forming cylindrical tubes or pipes from clay and burning them was discovered, wood, stone and, later on, brick, were no doubt used for drainage purposes. There is no definite record as to the time vitrified clay pipe was first used. England, Scotland and other European countries began to use them in the 17th century.

The method of manufacturing at that time was very crude, compared with the present day processes. A lump of clay was placed on a potter's wheel, and by holding the hand in the centre of the ball, and revolving the wheel, the mass of clay was gradually worked into a round tube. A few feet constituted a day's work. For a glaze, a fusible material known as "Slip" was put on the pipe which was put in a small oven or kiln and burned until the "Slip" had fused sufficiently to adhere to the body.

In the early part of the 18th century, it was discovered that common salt, put into the kiln when a heat sufficient to vitrify the clay had been reached, would form a glaze on the surface of the clay.

Discovery of the Salt Glazing Process

Tradition tells us that this process was discovered in the following manner: "A Scotch potter, near Edinburgh, Scotland, was firing a small oven or kiln of ware with peat. The poor potter had exhausted both his cash and his credit; the fuel had run out and the kiln was not finished. In his desperation he broke up an old barrel that was near by, and used the staves for fuel and in that way completed the burning of the kiln. When the ware was taken from the kiln it was found to be altogether different from what had been expected, and when it was taken to the market, the merchant was very much taken with its appearance and began to question the potter as to how he had obtained such results, but he was unable to explain. So anxious was the merchant to get the process that he returned with the potter to his humble home and had him go over the whole process. Finally, coming to the barrel stave part of the process, it was learned that an old salt barrel had been used to complete the burning, and the merchant naturally concluded that it was

the fumes from the salt, which the staves of the barrel had absorbed, that produced the wonderful effect on the ware." Other experiments followed, and very soon the process of salt glazing came into general use.

History does not tell us whether the ancients used the "salt-glazing" process or not, but it is not likely that they did, for until late in the 17th century, salt was a very valuable mineral, so valuable, indeed, that some of the ancients used it as a medium of exchange in place of one of the precious metals.

The question of proper sanitary conditions is a very important one, and the sanitary engineer of to-day is ever alert for the proper methods and best materials.

Before a material for a sewer can be considered "first class," it must stand the following tests, viz., abrasion, acid and pressure. The cost of excavating and refilling is too great to take chances on a material that will not meet the above condition, to say nothing of sickness and death caused by improper sanitary conditions.

Nature has distributed clay freely throughout the earth, but has been rather economical in distributing the ingredients necessary for the manufacturing of a material to meet the requirements heretofore mentioned. These must contain a large proportion of silica and alumina silicate and have a very low percentage of iron, sulphur, carbon and alkalies.

Modern Developments

For many years in the early history of our country, what sewer pipe was used was imported from Scotland and England. Some pipe was made in New York and New Jersey in the first half of the 19th century, but the rapid development of the sewer pipe business, like many of the other great industries, was left for the last half of the 19th century.

The late Mr. David E. Hill, who for fifty years was one of the leading factors in the business, was interested in the manufacture of sexangular clay water pipe, at Akron, Ohio, in 1849 and 1850, had become acquainted with the use and need of sewer pipe made from clay and the great possibilities for its future. After considerable prospecting, the necessary clay was found in the hills east of the city of Akron, Ohio, and in 1851 he began to manufacture the standard Akron shale sewer pipe. About two years later, Carlyle and McFadden located a factory at Newburg, now Toronto, Ohio, and began the manufacture of Ohio River fire clay sewer pipe. Thus began a business that to-day amounts to several million dollars per year.

Like all other industries the means for manufacturing improved as the demand increased, and the potter's wheel gave way to the mould and auger. This in time was succeeded by the screw press. These machines only made band or ring pipe. The socket, or bowls, were made by hand and stuck on. During the next ten or fifteen years, plants were erected in Boston, New York, Baltimore and St. Louis.

In 1868 quite a change was made in the method of manufacturing, when David E. Hill and Ozias Barber perfected the first steam press, and about the same time a die that would make the socket on the pipe. This machine was a great step in advance of anything that had been invented, and, in a few years, was in general use by those already in the business.

The clay is procured either by removing the loam and rock, by drafting into the hill and mining, or by sinking a shaft to the clay and mining and hoisting it. The next process is to pulverize the clay in a dry pan, which is usually eight or nine inches

in diameter, having a circular bottom which revolves and, at the same time, revolves two large iron meullers. The clay is thrown into this pan as it comes from the mine, where it is crushed and passed through the sifting plates in the bottom of the pan to the bucket elevators; then it is elevated 40 or 50 feet and thrown on to a screen, which it passes over, the dust going into a bin and the uncrushed part returning to the dry pan. From the bin the dust is conveyed to the wet pan, where sufficient water is added to render the mixture about like putty. It is again elevated and conveyed to the clay cylinder attached to the steam press. Steam is then turned on and with a pressure of several tons the clay is forced through the die which forms the pipe.

The pipe is made in lengths of 2 feet, 2½ feet and 3 feet, and taken to dry floors which are heated to a proper degree. There it remains until it becomes hard enough to handle without breaking, which is from four to six days. It is then taken to a kiln, which is usually of the circular down-draft type, made of brick and 30 to 40 feet in diameter. The pipe is placed in the kiln in stands from six to eight feet high, the smaller sizes inside the larger. When the kiln is filled, the door is built up and plastered over with clay, and a fire is built in the fire mouths of the kiln, which consist of eight to twelve openings at equal distance apart around the kiln. The fire burns very slowly at first and is gradually brought up to a heat from 2,300 to 2,500 degrees Fahrenheit. At this temperature the body of the pipe is vitrified and ready for salt, which is thrown into the fire mouths. The fumes arising therefrom pass into the kiln. That of the chlorine, passing out through the stack of the kiln, and the sodium fumes coming in contact with the molten silica, form a glass or glaze on the pipe. The kiln is allowed to cool gradually for four or five days, so as to properly anneal the pipe. The pipe is then taken from the kiln and is ready for use. By the foregoing process an absolutely impervious and indestructible material is produced.

Mainly about the Brick Industry

By and by conservation will apply to clay banks as well as to trees, and some day we will learn that our clay banks are even worth more to us than our timber resources.

After you figure up the amount of your kiln waste during the past season, you may then be able to spend a little time profitably preparing ways and means to reduce it next year.

A good idea is not only to plan this winter for pushing clay products more extensively next year, but also do some mission work among dealers in building material and work them into a boosting spirit, too.

There are other things to save in the manufacture of brick besides labor; and a dollar saved on the coal bill, on oil, or tools used about the works is just as big a dollar as if saved on labor.

The Port Credit Brick Company, Port Credit, Ont., has begun work on the erection of a wider bridge over the Credit river at the Lake Shore road. The present structure, a bridge 30 feet wide, is far too small for the amount of traffic it carries, and it is the company's plan to widen it about 25 feet more. To assist in the work a tug and a couple of scows have been brought from Toronto. A large quantity of scrap iron and earth is being removed, and soon everything will be ready for the bridge. In order to eliminate the grades on either side of the bridge it will be raised about four feet and the space filled with earth.

According to the public works report submitted to the city council of Calgary, Alta., last week, there are now 19.06 miles of water main in the city, 19,327 feet having been laid this year: 253 water connections have been made during 1910, making a total of 1,482 connections. The total sewer connections number 1,193, the number for the first 11 months of 1910 being 253. The total number of miles of main sewer is 20.25 and the mileage laid this year is 11.83.

Montreal Reports Good Season

Close of Record Year Notable for Promising Outlook and Prospects of Even Greater Prosperity

Montreal Office of the Contract Record,

December 17th, 1910.

Conditions in the building and allied trades generally, are quiet in Montreal and vicinity just now. Contractors and supply men are getting a little breathing space after their tremendous exertions of the period just closed. Taking it all round, there has never before been such a boom in building of all kinds as during the past summer. True, trouble was experienced with the bricklayers and stonemasons, but this was only temporary and did not hold up any of the big jobs to any extent.

The outlook for next season is bright and promising. Many big works are to be undertaken when spring comes, and contracts for most of these will be let during the winter months. It is rumored that several modern steel construction office buildings will be erected on St. James Street, while Mr. Frank Truaisch and Freeman's, Limited, will have two large restaurants under way.

The Foundation company is pushing the work on the excavation and foundation for the new C.P.R. office building at the corner of St. James and St. Francois Xavier streets, on the site of the old St. Lawrence hall.

Blick dealers report the close of the best season in their history. Day and night their plants have been in operation in an endeavor to keep up with the abnormal demands, and it is only in the last week or two that any of the plants have been able to discontinue the night shift.

Building Inspector Chausse is coming in for considerable criticism for his stand in connection with the Forum, a large wooden building on St. Catherine street west used as a skating rink, bowling alleys, restaurant, etc. It is alleged that this building is constructed contrarily to the building by-laws, and the inspector declares that he has not the authority to order its demolition. The board of control is dealing with the matter at present.

A permit has been taken out at the city hall for the construction of the new Montreal Art Gallery at the corner of Sherbrooke street and Ontario avenue. The contractors are the George A. Fuller Company, of New York, who are at present erecting the Chateau Laurier for the Grand Trunk Railway at Ottawa. The architects are Messrs. E. W. & S. Maxwell. Specifications call for a handsome three storey building, sixty-four feet high with a front of 139 feet. The porch will be supported by four Doric columns, and the front wall will be of granite and marble. Within, on the gallery floor, will be nine galleries and a large exhibition hall. School rooms and reading rooms will occupy the floor above. The estimated cost of construction for the present is \$300,000, although the full plans call for a structure twice as large as will be built just now, and costing in proportion. Ground will be broken shortly.

In connection with the projected building of the new art galleries, the hope was expressed locally that the beautiful marble of Missisquoi county would be used, but the Canadian tenderers were from \$18,000 to \$30,000 higher than the United States firm who were awarded the contract. It has been decided to use Vermont marble for the construction of the building.

It is expected that the alterations and new buildings of the C.P.R. at Place Viger station will be completed by June next.

Work is proceeding rapidly on the structural steel work of the new annex to the Windsor station of the C.P.R. It is the intention of the Dominion Bridge company to carry on

operations all winter, in which case if the present speed is kept up, the entire skeleton of the building will be in position by the end of April. The reinforced concrete work is also being pushed towards completion, about 500 cubic yards having been laid up to date.

A deputation from the Chambre de Commerce visited Ottawa to urge on to the Premier the early construction of the Georgian Bay canal, and to voice their remonstrances against the proposed deepening of the Welland canal. They were accorded a favorable hearing by Sir Wilfrid.

Judgment has been rendered by Justice Fortin in a case of vital interest to contractors and others interested in building operations. The action resulted from a claim for extras by the contractors, Messrs. John Quinlan and Company, in connection with the erection of the Redmond building, in this city. During the course of building operations, Messrs. Quinlan and Company were verbally ordered by the architects to make certain changes in the original intentions, requiring extra work to be done by them. This they did, but it eventually turned out that the proprietor was in ignorance of the whole matter of extras, and refused payment of the bill. The architects acknowledged in writing to the contractors having given the instructions, but held that the charges were too high, reducing them a certain amount. In effect the judgment rendered nullifies the instructions of the architects for extra work without knowledge of the proprietors, and this point will have a direct bearing on many contracts now being completed. This is the most interesting phase of the judgment handed down, in the opinion of local contractors.

Items of Interest

Bids will shortly be called for the erection of a modern high-class restaurant building in the heart of Montreal's business district, as the result of an important real estate deal that has just been consummated. Mr. Frank Truaiseh has bought the land and buildings at 235 to 237 St. Thomas street, now occupied by the Stewart Shoe store and the Semi-Ready Company, respectively. The property was purchased from the Molson estate, and the price is stated to be \$50,000 and other valuable consideration. The land extends right back to Fortification Lane, and has been in the possession of the Molson family for over half a century. It is understood that Mr. Truaiseh will order the demolition of the present buildings around May 1st next, when he will immediately start the construction of a modern high-class building. It is understood that the new building will be of an imposing nature and that competitive plans will be asked by the owner.

The city council of Sherbrooke, Que., at its regular monthly meeting passed a motion authorizing the expenditure of \$2,000 for the year 1911 to assist in carrying on a campaign for a Greater Sherbrooke. With the money already raised by the citizens, this means that Sherbrooke will now have \$6,000 a year with which to advertise the city and attract industries.

The plans of the Grand Trunk Pacific for their grain terminal on the Mission River at West Fort William provide for the construction of three large piers devoted to the grain trade. Along these piers a series of half a dozen elevators will be built. The first of these with a capacity of three and a quarter million bushels has now been completed and is being filled with grain.

The foundations of a large shirt factory for the firm of Cluett Peabody, of Troy, N.Y., have been started at St. John, Que. The city has granted them a free site.

Stanstead granite has come to be known all over the continent, and has attracted the attention of American capitalists. A company has been organized at Coaticook, Que., under the firm name of the Frontier Granite Company, which has

installed works on the line and secured an immense quantity of this granite at Stanhope, Que., and Norton Mills, Vt. It is said that this granite, while, of course, not equal to that of Beebe Plains, which has made this section so well known, is of a marketable quality and worthy of being offered for sale for building purposes. As the raw material can be secured from either side of the line, shipments can be made into the United States and into Canada from the same building.

An action for the cancellation of a \$142,000 contract for a school house in Maisonneuve has been entered in the Superior court at Montreal. The plaintiff, who is a ratepayer of the town, alleges that a profit sharing contract has been given to a favorable contractor of the town. Two of the school commissioners are named as receiving part of the contract money. Attorneys for the plaintiff declare that the granting of the contract was a conspiracy between members of the Commission. The case will be heard at the next sitting of the court, which will be after the holidays. It is attracting much attention in the building trades.

A Prominent Ontario Brick man

Mr. J. S. McCannell, one of the best known brick men in Ontario, was born 45 years ago at Acton, Ont. He was educated at the high school at Vankleek Hill, after which he went to Montreal, where he became identified with the wholesale dry goods firm of James Johnston & Co. He remained there for some little time and married the eldest daughter of Dr.



Mr. J. S. McCannell

Robertson, ex-M.P.P. for Halton. Some little time afterwards—some 21 years ago—J. S. launched into the brick business, with his father-in-law as president of the company. He was under the impression at that time that taking shale out of a bank and manufacturing it into brick was quite as lucrative a business as running a gold mine, but it was not long before this idea was rudely dispelled. Adversity threatened, and several brick plants went to the wall, but thanks to the ambition and untiring energy of Manager McCannell, Milton brick pulled through. When Mr. McCannell went into the brick business he kept one purpose steadfastly in view—to give Milton pressed brick a reputation unexcelled in Canada. The measure of success he has met with may be estimated by the excellent results obtained in recent years.

While J. S. is enthusiastic over his business, he is not a slave to it. He has a family of five and a beautiful home



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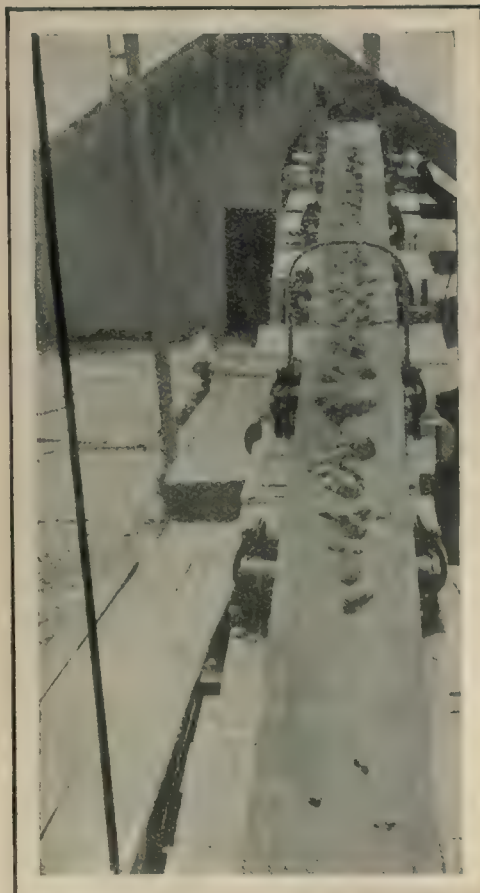
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Agents Wanted in Other Cities.

with eleven acres around it. Like all other good men, he has a hobby. In his case it is horses and cattle. And J. S. is no more half-hearted in his hobby than in his brick business. He has several good drivers and a herd of about fifty of the finest bred Holsteins in Canada. He works over 300 acres of land.

Two years ago J. S. McCannell was president of the Canadian Clay Products Manufacturers' Association. He does everything in his power to promote the interests of his trade and is a worker from the word "go."

Personal News and Notes

Mr. E. A. Evans, chief engineer of the Quebec Railway, has resigned.

Building permits issued at Winnipeg so far during 1910 total over fifteen million dollars.

Mr. Chas. W. Mitchell has resigned as general superintendent of the Dominion Iron and Steel Works, Sydney, N.S.

Mr. George H. McGougall has been appointed mechanical superintendent of the Dominion Steel Corporation, at a salary of \$9,000 per annum.

Mr. F. Neill Brodie, architect, St. John, N.B., left recently for Boston, N.Y. While in the latter city he attended the big cement show in Madison Square Garden.

The Grand Trunk station at Richmond, Que., was recently destroyed by fire, which originated from unknown cause. It will be rebuilt in the spring.

The city council of Vancouver have decided to take a plebiscite next month as to whether new buildings shall be limited in height to ten storeys.

Mr. W. G. Van Egmond, of the well known architectural firm of Storey & Van Egmond, Regina, Sask., read an interesting paper on Grecian and Roman Architecture before the Regina Arts Society last week.

A Calgary dispatch announces the appointment of Mr. C. W. Peterson to the position of superintendent of irrigation for the C.P.R., made vacant by the recent elevation of Mr. J. S. Dennis to executive duties.

Mr. E. McGaffey, secretary, Vancouver Island Development League, was one of the delegates to the convention of the Oregon Good Roads Association, which opened at Portland on December 12.

Mr. Joseph M. Bourke, civil engineer, has been appointed by the Temiskaming & Northern Ontario Railway Commission to take charge of building the Provincial railway from Kelso into Porcupine, as decided recently by the government. His head office will be North Bay.

A feature of a busy year at New Westminster, B.C., has been the increased amount of contract work awarded under the direction of City Engineer Blackman. The total construction of this kind, let and under way, represents a value of nearly half a million dollars.

The new bridge on the St. Guillaume division of the C.P.R., at Farnham, Que., is practically completed. The piers, which are of concrete, were built during the summer, while the spans were put in place one or two or a time, causing no delay to traffic.

Building permits issued last month at Montreal represented a total value of \$905,427, compared with \$479,540 for November, 1909. For the eleven months of the current year the permits are valued at \$14,871,042, as against \$7,622,236 for the corresponding period of last year.

Mr. W. P. Robinson, of Detroit, has opened an office in Toronto as representative of the Northern Engineering Company, makers of overhead travelling cranes. Mr. Robinson will also handle the output of the American Electric Fuse

Company of Muskegon, Mich., and the Hoover-Owens Rentschler Company, of Hamilton, Ohio.

The action of Mr. E. J. Lennox, architect, against the city of Toronto is being set down for trial. Mr. Lennox is endeavoring to recover \$208,093, with interest, in connection with the design and erection of the city hall carried out under his supervision.

A cablegram from Buenos Ayres last week announced the death of R. B. Ross, civil engineer, representative of the Marine Signal Company, Ottawa. The late Mr. Ross was a graduate of the School of Practical Science, Toronto. He was 26 years of age and had been living at Buenos Ayres for two years.

We understand that the annual convention and exhibition of the Canadian Cement and Concrete Association, which was announced to take place the third week in January, has been unavoidably postponed. The meeting will probably be held early in March, but a definite announcement will be made later in these columns.

Mr. J. H. Corbett was a visitor to Ottawa last week. Mr. Corbett with his partner, Mr. J. Floesch, has just completed the fifty miles of the National Transcontinental Railway out of Moncton, N.B. Before leaving Moncton the town paid a tribute to the contractors in the shape of a banquet, presided over by Mr. C. W. Robinson.

The Grand Trunk Railway has negotiations under way for the purchase of land on the Canadian side of the Detroit River. If the negotiations go through the company will build a line from the yards in Windsor, Ont., around to the Michigan Central terminal station and make a connection somewhere near there with the Michigan Central tunnel.

The city council at Victoria have been asked to strike out from the conditions for paving work the clause which compels successful tenders to leave 15 per cent. of the contract price in the hands of the city for a period of ten years. No final decision has yet been reached in the matter, but in view of the fact that the city engineer is strongly opposed to such cancellation, it is not likely that the contractors will be successful.

The Montreal Board of Control have recommended that Mr. Geo. Janin, superintendent of the water department, be appointed city engineer. City Surveyor Barlow will remain at the head of the roads department. Mr. Stuart Howard, Mr. Barlow's assistant, will be known as superintendent of the sewer department, while Mr. T. W. Lesage, Mr. Janin's assistant, will be superintendent of the waterworks department.

Mr. A. H. N. Bruce has made a preliminary survey of the proposed route of the electric railway from Ottawa to Kingston, following approximately the course of the Rideau canal. From this city to about 20 miles south of Smith Falls the route is over comparatively level country, but from there to Kingston the course will be much rougher. Mr. Bruce states that he will recommend that a line capable of competing in freight handling as well as passenger work be built. This, of course, would be much more expensive than the ordinary trolley lines, built for passenger traffic only.

The new annex now being built at the Windsor street headquarters will have a sixteen-storey tower, rising 280 feet from the foundations to the top of the flag-staff. Rapid progress is being made on the work, and over a thousand tons of structural steel have already been rivetted up. Five hundred men are engaged, and steel is being placed at the rate of 300 tons a week. Work will continue all winter, and it is expected that the steel will be finished by April, when the stonework will be started. It is expected that the whole work will be finished by the end of 1912, when the station will be one of the big railway terminals of the world.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Chilliwack, B.C.

The directors of the Elk Creek Waterworks company, Limited, of New Westminster, are preparing to expend about \$40,000 towards improving and extending the waterworks system in the valley. It is the intention of the company to put in another main, ten inches in diameter, from the intake and carry it down from Elk creek to the reservoir on Shannon mountain.

Gleichen, Alta.

The Galt Engineering Co., Ltd., of Winnipeg, have made the preliminary surveys for the waterworks here. On the approval of ratepayers, contracts will be called, probably in March. Probable cost, \$30,000.

Pembroke, Ont.

Tenders will be received by E. A. Dunlop, chairman Water Committee, Pembroke, Ont., to Jan. 9th, for cast iron water pipe. For further particulars see advertisement in the "Tenders and For Sale Department" of this issue.

Tenders will be received by E. A. Dunlop, chairman Water Committee, Pembroke, Ont., to Jan. 9th, for steel piping. For further particulars see advertisement in the "Tenders and For Sale Department" of this issue.

Sydney, N.S.

At the next meeting of council, Ald. MacLennan will move that the city borrow \$150,000 for permanent street work.

The city engineer submitted his report on the cost of permanent paving in which the totals were as follows: Hassam paving, total length, \$6,750 feet, area 36,187 square yards, total cost \$81,420; concrete paving on same areas and length, \$64,136.60. Total cost of concrete curb and gutter, \$4,310, two of the streets not requiring same.

Stratford, Ont.

City Engineer Ferguson presented the following report on Romeo creek drainage: Concrete culvert, 2,300 cubic yards, at \$7, \$16,100; Backfilling, \$2,000; 10 manholes at \$50, \$500; 12,972 feet of tile excavation, laying, etc., \$7,783.20; 40 catch basins at \$12, \$480; preparing plans, assessment, etc., \$1,000; extras, \$1,000; total, \$28,863.20.

AWARDED.

Belleville, Ont.

Mather & Platt's turbine pumps will be installed in the pump house here.

North Vancouver, B.C.

The following tenders were received for supply of vitrified pipe: Robt. Jean & Co., vitrified pipe, \$30,694; M. P. Cotton Co., \$31,303.55; Wm. Dart & Co., \$31,573 (semi-wet piping); McDougall & Co., \$32,952; W. D. Grant, \$37,291. The award was first given to lowest tenderer, but this was disclaimed because of it having been

delivered two minutes behind the schedule time. The contract was given to M. P. Cotton.

Railroads, Bridges and Wharves

Edmonton, Alta.

The Peace River & Great Western R.R. Co. is reported incorporated to construct a railroad northwesterly and continuing as far as Dawson City. Capital \$2,500,000. J. J. Hill, St. Paul, Minn., is reported interested.

Gravenhurst, Ont.

Tenders addressed to R. C. Desrochers, secretary, Public Works Department, will be received until January 16th for construction of wharf here. Plans at offices of the district engineers at London and Toronto and on application to local postmaster.

Kamloops, B.C.

It is reported that the C.N.R. has decided to commence work on one of its proposed 21 tunnels along the route between Yale and this place. T. Turnbull, assistant chief engineer.

Leitch's Creek, N.S.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until January 16th for construction of wharf here. Plans with district engineers at Halifax, Antigonish and on application to local postmaster.

Montreal, Que.

Mr. C. C. Ballantyne, chairman of the Harbor Commission, is authority for the statement that Montreal will have a first-class dry dock with a lifting capacity of 25,000 tons, to be built at Longue Pointe by a British firm and to be finished by next September. Work has already been commenced on the reclamation from the bed of the river of the 30 acres required. Estimated expenditure, \$4,000,000.

Ottawa, Ont.

The C. N. R. will construct a bridge over Metcalfe road south of Billings bridge.

The city council have given permission to the C. N. R. to cross Hurdman's road on the level under certain restrictions.

Shigawake, Que.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until January 18th for construction of extension to wharf here. Plans, etc., at offices of district engineers at Quebec, Montreal and on application to local postmaster.

Victoria, B.C.

Tenders addressed to Mackenzie, Mann & Company, Limited, Toronto, Ont., will be received until December 30th for construction of C. N. P. Ry. from here westerly for twenty miles. Tenders to include grading, fencing, bridging, trestles, culverts and masonry. Plans, etc., at offices of the above at Room 30 Hastings street, Vancouver, and at the Pemberton Block, this city.

AWARDED.

Brockville, Ont.

Contract for pier here has been awarded to S. Cowan, \$6,500.

Black Point, N.S.

The contract for breakwater here was awarded to contractors A. W. Girroir and K. Sweet, of Antigonish, \$7,166.

Brockton, Alta.

C. J. Digby has been awarded the contract for erecting the new C.P.R. bridge over Pincher Creek, near here. About 75,000 feet of sawn timber will be used.

Montreal, Que.

The C.P.R. has placed orders for seven million dollars' worth of new equipment, to be delivered next summer. At the Angus shops 2,000 freight cars and 200 passenger coaches will be built. Outside firms have been called on for 2,000 steel frame cars, 500 stock cars, and 800 flat cars. Seventy-five heavy locomotives have also been placed on order.

Paspebiac, Que.

Contract for breakwater has been awarded to Peter Nadeau & Sons, of Grand Caspédia, \$15,719.

Providence Bay, Ont.

Contract for wharf extension has been awarded to Chas. H. Sherwood, of Port Arthur, Ont., \$15,438.

St. Joseph de Sorel, Que.

Contract for landing pier has been awarded to Joseph Gardin, of Sorel, \$9,100.

St. Croix, Que.

Contract for landing pier has been awarded to contractor O. Poliquin, Portneuf, \$22,000.

Westport, N.S.

Contract for pile work wharf here has been awarded to Reid & Archibald, Halifax, \$16,670.

Victoria, B.C.

The clearing of the right-of-way of the Cowichan Lake E. & N. extension was awarded to Moore & Pitheak, of this city. That which has just been authorized comprises practically the entire route and instructions have been given to have the task executed as quickly as circumstances permit.

Winnipeg, Man.

Contract for pile protection pier at Winnipeg Beach has been awarded to John Gunn & Sons, of Winnipeg, \$19,192.

Public Buildings, Churches, Schools, etc.

Brockville, Ont.

The council have authorized Mr. Dalton to prepare plans for the repairs necessary to the municipal offices recently wrecked. Tenders will be called shortly.

Brantford, Ont.

Messrs. Green & Wicks, the architects in connection with the proposed extensions and alterations to the general hospital,

estimate the addition of new ward, \$40,000; central dining-room about \$10,000; contagious ward and alterations in present building, \$10,000; central heating plant, \$10,000.

Forrester's Falls, Ont.

We have been informed that the tenders received for school house S. S. No. 6 Ross were too high. More money will be raised or the school will be built by a committee appointed to supervise construction. W. S. Coleman, jr., secretary. J. D. McNicol, architect, Lenore.

Montreal, Que.

The Mac-Vicar Memorial Presbyterian Church have decided on extension.

Tenders addressed to La Societe des Artisans Canadiens Francais, 115 St. Francois Xavier street, will be received until January 9th for construction of a building for above. Plans at offices of Alphonse Venne, architect, 15 St. Lawrence Boulevard, and Dalbe Viau, architect, 76 St. Gabriel street, both architects working jointly.

Mr. Philip J. Turner, architect, the Board of Trade, Montreal, is preparing plans for a new mission building and chapel to be erected at the corner of Colonial avenue and Prince Arthur street for the mutual auxiliary of the London Society for promoting Christianity among the Jews. Work will be commenced next spring.

New Westminster, B.C.

Through the offer of Mr. W. J. Walker, of this city, the districts of Cloverdale and Port Mann and other localities, not decided upon, will be furnished with churches and equipment.

Ottawa, Ont.

In all probability tenders for new departmental building will be called about last of January and work will start early in the spring. The building will be about 600 ft. long and 19 ft. wide, of five storeys, on Mackenzie avenue side, and 6½ on Sussex street. The cut stone will be from Nova Scotia, and the other will be Nepean. There will be a great deal of rock excavation as the rock is practically on the surface. Estimated cost, about \$4,000,000. It is expected work will be let by bulk contract.

Port Simpson, B.C.

Tenders are called by public works department, Victoria, until January 20th for erection of new school house here.

Quebec, Que.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until January 23rd for restoration of and addition to custom house here. Plans, etc., at office of district engineer, this city, and at local post office; also with H. N. Lymburner, Supt. of Public Buildings, Montreal.

Regina, Sask.

The Baptist Church will erect a handsome new edifice at the corner of Lorne street and Victoria avenue.

Red Deer, Alta.

The Presbyterian synod of Alberta will erect here next year a college for young girls, to cost, including equipment, about \$100,000. Rev. N. D. Keith, president.

Sturgeon Creek, Man.

Tenders for school site for Bannatyne S. D., No. 1549, are being called until December 27th, D. A. Macdonald, secretary-treasurer.

St. John, N.B.

W. H. Golding, manager of the Nickel, has announced the intention of his company to erect a first-class theatre with 75 ft. frontage, and depth, nearly 158 feet. Construction, it is stated, will start shortly.

Truro, N.S.

The council have recognized the necessity of a municipal hospital in the near future. A temporary arrangement has been made for a year.

Toronto, Ont.

The Bricklayers' Union have decided to erect a trade hall in the city. Estimated cost, \$50,000.

Building permit has been issued for addition to Brown school on Avenue road, \$40,000.

Vancouver, B.C.

The head office of the British & Foreign Bible Society has promised \$25,000 towards the establishment of suitable Canadian headquarters in this city if the province raises \$50,000. A site has been purchased on Howe street, and \$4,000 already subscribed. The annual meeting takes place on February 7th. J. Knox Wright, provincial secretary, Canadian Bible Society. Noted previously.

Watrous, Sask.

Work has been started on a union church here.

Wallaceburg, Ont.

The by-law providing for the expenditure of \$20,000 for new school buildings has been ratified.

AWARDED.

Dresden, Ont.

Contract for public building has been awarded to W. E. Clark of Wallaceburg, \$13,000.

St. Louis du Mile End, Que.

Contract for addition to post office has been awarded to N. Allard & Fils, of Montreal, \$4,600.

Victoria, B.C.

The following tenders were received for the construction of the new school on Bank street. Thomas & Hodgson, \$19,599 (accepted); Thomas Ash, \$19,889; Luney Bros., \$20,445; Parfitt Bros., \$20,247.20.

Residences

Ottawa, Ont.

Arthur Ryan will probably erect a large apartment house on the corner of Slater and Metcalf streets.

Vancouver, B.C.

Among the permits issued was one to Mr. P. Tardiff for a six-storey apartment house at 1092 Broughton street.

AWARDED.

Nelson, B.C.

John Burns & Son have received the contract for building two houses for R. C. and A. H. Green; also for another house on Carbonate street.

Business Buildings and Industrial Plants

Brantford, Ont.

The Watrous Engine Works have submitted building specifications for an addition to their present factory at a cost of \$45,000.

Bradwardine, Man.

The business section, including Ortenburg's general store, F. & J. Fields' hard-

ware, Massey Harris warehouse, Bank of Hamilton and the Beaver Lumber Company's office was destroyed by fire on the 22nd inst. Total loss, about \$60,000.

Cranbrook, B.C.

James Finlay proposes erecting a new building on the site of the Prospector office, to cost \$2,500.

Guelph, Ont.

The Bowles Syndicate stores branch was damaged on the 20th inst. to the extent of about \$11,000.

It is announced that a prominent Calgary syndicate have purchased lots on the north bank of the Fraser river on which it is their intention to erect large grain elevators. The Royal Financial Company, Winch building, effected the sale.

Edmonton, Alta.

The Seton-Smith Company have taken an option of the double southeast corner of Jasper and Fifth.

Guelph, Ont.

The plans for the G. T. R. improvements in Guelph have been received and approved of by the city engineer. They provide for two subways and a foot passageway under the tracks. The main building of the station will be 120 feet in length and 43 feet wide.

Lakefield, Ont.

The Canoe Building & Manufacturing Company's factory was destroyed by fire on the 23rd inst. Loss, about \$5,000.

Maisonneuve, Que.

The steel construction work has just been commenced on the new \$100,000 building being erected for the United Shoe Machinery Company. The masonry and carpentering contracts are the only ones let in addition to the foundation and steel construction. The architect is Mr. H. C. Stone, 84 St. Francis Xavier street, Montreal; Canadian offices, Dorchester street, W., Montreal.

Montreal, Que.

Messrs. Lande Bros., St. Lawrence Boulevard, Montreal, have purchased two houses on St. Catherine street west, near Bleury street, and intend erecting a modern fireproof building there.

Mr. W. H. Leach, piano dealer, St. Catherine street, has purchased lot 171-9 St. Lawrence Ward, with buildings fronting on Bleury street. Mr. Leach's present intention is to erect a five-storey building on the lot.

The Herald Publishing Company will erect their building on the corner of Craig and St. Alexander streets as early as possible next spring. J. S. Brierley, president. On the former site of the Herald building, it is stated, the owners, Messrs. Brierley and Araham, may erect a modern office building.

Ottawa, Ont.

Mr. Gordon Stewart will erect a three storey commercial building on Queen street of brick with stone front. Work will begin in the spring.

James Mather, architect, is calling for tenders for the carpentering work of the Shim-Shouldis bakery.

The Geo. Matthews company, Limited, is preparing to build a large addition to the cold stores on Nicholas street. W. E. Noffke is architect.

Regina, Sask.

The excavation for the \$100,000 Donahue block on Eleventh Avenue has been fin-

ished, work on the new building will be started early next spring.

Plans have been prepared for a modern four-storey block on Hamilton street, south of Eleventh avenue.

The Bank of Ottawa will erect a handsome office on Searth street.

Sydney, N.S.

A New York syndicate represented by Messrs. G. H. Browne, Homer C. Wise, a practical iron and steel man, and Henry Henderson, mechanical engineer, are considering the location of a rolling mill here. Two sites have been secured under option.

Tate, Sask.

The general store of W. J. Kenett was destroyed by fire on the 21st inst. Loss about \$6,000.

Toronto, Ont.

Permit was issued to the Imperial Life Assurance Company for 8-storey brick and steel building on Victoria street, near King street, \$180,000.

Vancouver, B.C.

Excavation has been commenced for the five-storey block to be erected for Capt. W. H. Forrest. Estimated expenditure, \$90,000.

The Western Lumber & Shingle Co., of Vancouver, has purchased the lumber mill and limits of the Salmon River Lumber Company which they will operate. A shingle mill and dry kiln may be added. Mr. Mitchell is in charge.

Victoria, B.C.

The Rainy River Gravel Company, Limited, has been incorporated with a capital of \$150,000. They have purchased the large gravel deposit at Rainy River on Howe Sound about 25 miles from Vancouver. Plans have been prepared by Mr. C. E. Cartwright, consulting engineer for the immediate erection of a plant to cost about \$50,000. The company have opened offices at 701 Bower Building.

Wawanesa, Sask.

The McKenzie block was destroyed by fire on the 18th inst. Estimated loss, \$18,000.

Wallaceburg, Ont.

At the municipal elections a by-law will be voted on to exempt from taxation, etc., the Wallaceburg Brass & Iron Manufacturing Company, Limited, in return for which they will erect a plant costing not less than \$6,000.

AWARDED.

Ottawa, Ont.

W. C. Edwards Company have been awarded the tender for the finishing work of the Rosenthal Building. C. E. Deakin, general contractor.

Regina, Sask.

Peter Lyall & Sons have the contract for the new banking house of the Canadian Bank of Commerce on Searth street.

The contractors have commenced work on the new block to be built on Searth street, south of the Pharmacy, for McIntyre & Fell. It is intended to complete the building by March next.

Power Plants, Electricity and Telephones

Hamilton, Ont.

A Provincial charter has been obtained for an electric railway between Port Dover and this city. Estimated cost, \$1,000,000. G. L. Staunton, K.C., solicitor.

Moncton, N.B.

It is expected that tenders for poles and ties for the street railway will be called for this week. Tenders for gas piping and installation have been received.

Montreal, Que.

The Directors of the Saraguay Electric & Water Company have authorized Mr. Charles Brandeis, civil and electrical engineer, 4 Phillips place, Montreal, to proceed with the plans for their new power house, machinery, etc., at an estimated cost of \$225,000. Contracts will be placed on or about the 1st of February next. Steam turbines will be installed in units of 3,000 h.p. each. Plans and specifications can be seen at Mr. Brandeis' office at an early date.

Ottawa, Ont.

Tenders addressed to the chairman of the Municipal Electric Department will be received until January 10th, 1911, for supply of switchboard materials. J. E. Brown, elect. supt.

Peterborough, Ont.

Tenders addressed to Canadian General Electric Company, Limited, will be received until January 5th for construction of power house on the waterworks dam near Peterboro. Plans, etc., on application to the above company, 212 King street west, Toronto, or at office of Wm. Kennedy, jr., 8 Y. M. C. A. building, Montreal, Que.

Regina, Sask.

The Street Car Committee will call for tenders for supply of cars. Commissioner MacPherson submitted blue prints for two classes of cars, pay-as-you-enter, and the ordinary car.

Strathcona, Alta.

Electrical Engineer Ewing has advised the installation of a generator almost treble the 250 k.w. limit of the present big unit as a further equipment for the municipal power plant.

AWARDED.

Ottawa, Ont.

The contract for supplying poles and lamps for Sparks street was given by the city council recently to Carnoch, Goddard & Co. Their price was \$2,807 for 60 poles and 300 lamps.

Winnipeg, Man.

Acting upon the report of the power engineers, the Board recommends that the contracts be awarded as follows, being the lowest satisfactory tender in each case, namely:—Section "B," Cedar Poles (for Western poles): Northern Electric & Manufacturing Company, Limited, (No. 1), total \$16,376. Tenders ranged from this to \$23,163. Section "C," Cross Arms: The Northern Electric & Manufacturing Company, Limited (No. 1), total \$108.55. Section "D," Hardware Supplies: The Steel Company of Canada, Winnipeg (No. 7), for 8,000 machine bolts for the total sum of \$700; the Northern Electric & Manufacturing Company, Limited (No. 1), for the remainder of the supplies under this section for the total sum of \$2,128.66. Section "E," Pins and Side Brackets: The Northern Electric & Manufacturing Company, Limited (No. 1), at \$195.50. Section "F," Guy Wire: The Steel Company of Canada, Winnipeg (No. 7), all rail \$471, lake and rail \$457.50.

Miscellaneous

Ottawa, Ont.

Tenders are being called by Public Works Department, for 15-inch suction

dredge for Maritime Provinces until Jan. 11, 1911. R. C. Desrochers, secretary.

Tenders addressed to Alexander Johnstone, Deputy Minister of Marine and Fisheries, will be received until February 15th for construction of twin screw steel steamer for survey and inspection work in connection with the St. Lawrence river ship channel to be delivered at Quebec.

Vancouver, B.C.

Vancouver has passed money by-laws amounting in the neighborhood of three million dollars. The city's fiscal agents, Jarvis & Company, of Toronto, say an issue will be made early in 1911.

Recent building permits include:—J. Hendry, 2129 First avenue east, \$2,000; J. McDiarmid, 1788 Seventh avenue east, \$2,800; Canadian Fishing Company, Inlet waterfront near Gore avenue, \$33,000; J. W. Ogden, 1036 Broadway east, \$7,500; Quong Chin, 347 Harris street, \$20,000; W. H. Walsh, 2043 Whyte street, \$2,800; A. Stoeff, 1743 Seventh avenue east, \$4,000; C. J. Mayne, 2110 Eighth avenue east, \$2,000; J. W. & N. R. Ogden, apartment house, 1096 Broadway east, \$7,500.

AWARDED.

Collingwood, Ont.

The contract for a new steel steamer for the lighthouse service on the Pacific coast has been awarded to the Collingwood Shipbuilding Company for \$260,000. The vessel will be 200 feet long and modern in every respect.

Summit Lake, B.C.

The Summit Lake Lumber Company has a contract to supply 50,000 poles to Lidsay Bros., Spokane, Wash., the poles to be delivered during 1911.

An Unusual Reservoir for Fire Protection

A very serviceable supply reservoir for fire protection combining cheapness of construction, freedom from depreciation and protected from freezing even in the coldest weather, has been built by the Lowney Chocolate Company at their Mansfield, Mass., factory on design furnished by Mr. F. W. Dean, mill engineer and architect of Boston. A circular hole 4 feet deep and 44 feet in diameter was dug, with a ring 4 feet wide on the circumference going down 2 feet deeper. This ring was then filled with concrete and an 8-inch layer of concrete laid over the entire bottom of the excavation. Concrete walls were then placed, being vertical on the inside with a diameter of 36 feet and battered on the outside to a thickness of 2 feet 6 inches at the top, 15 feet 9 inches above the finished floor. The cover is a concrete dome 42 feet 6 inches inside radius, 15 inches thick at the springing line and 12 inches at the crown. There is a 16-inch by 1-inch steel ring placed 2 feet from the top of the outside wall to take the horizontal thrust of the dome. This ring is 40 feet in diameter and the ends are joined by butt joints with 16-inch by 1½-inch cover plates, 2 feet 8 inches long, containing in five rows 50 ¾-inch rivets. This ring also serves to strengthen the walls somewhat to resist the hydrostatic pressure. The reservoir has a capacity of 7,614 gallons per foot of depth and a total capacity of 102,789 gallons. It is entirely covered with earth, sloped 2 to 1 on the sides, with a minimum depth of 2 feet at the top.

Narcisse Desjardins, lumber merchant, Montreal, is reported to have assigned.

Tenders and For Sale Department

Tenders for Cement

Tenders will be received up to DECEMBER 30TH for the supply of Cement during the year 1911.
Specifications and particulars furnished on application.

M. FERGUSON
City Engineer.

Stratford, Ont., Dec. 19 1910. 51-52

To Machinery Users

For 15 years we have handled both new and second-hand Machinery and Contractors' Equipment, and the name, Willis Shaw, is familiar to users of Machinery all over the United States.

We issue a printed list of our offerings with prices, sizes, etc. This we will cheerfully mail on request. We submit it with the assurance that we have investigated, inspected, or have reliable reports on every item in it.

We know how, and do protect the interests of our customers. Confer with us and get prompt service. Large Chicago stock to select from.

WILLIS SHAW MACHINERY CO.,
second-hand Machinery and Contractors' Equip-

Tenders

Sealed tenders are asked (for all and part) for Brick Church, Foldens. Tenders open till JANUARY 14TH, 1911. For plans, etc., see Wm. Pullin (chairman), or O. W. Budd (secretary), Foldens, Ont. Bell phone service 49, ring 14, Ingersoll. Lowest tender not necessarily accepted.

WM. PULLIN,
Foldens, Ont.

52-2

Wanted

Wanted—Large American firm manufacturing waterproofing compounds, wants to secure Canadian representatives with good connection. Product is now widely used in United States and is an absolutely reliable and economical waterproof of concrete and cement mortar. For full information write Box 178, CONTRACT RECORD, Toronto. 52-1

Railway Construction

Tenders will be received up to noon JANUARY 2ND, 1911, for the construction of the Roadbed and Structures of the following sections of the Manitoulin and North Shore Railway:—

Clean Hill mile 22.7 west of Sudbury, to connection with present line at Espanola.

Espanola, south to a point at or near Mile 61. Plans, profiles and specifications may be seen at the office of the chief engineer, Sault Ste. Marie, Ontario, at the offices of the "Canadian Engineer" at Montreal, Toronto or Winnipeg, and at the office of the "Railway & Marine World," Toronto.

All tenders addressed to R. S. McCormick, Chief Engineer Manitoulin and North Shore Railway, Sault Ste. Marie, Ontario.

The lowest or any tender not necessarily accepted. 51-52

The City of Regina

Street Railway Materials

Sealed tenders marked "Tenders for Street Railway Materials," will be received by the City Commissioners, Regina, until 12 o'clock noon, JANUARY THE TENTH PROXIMO for the supply of Rails, Track Specials, and Overhead Material.

Full particulars may be had upon application to the City Engineer.

A marked cheque covering 5 per cent. of the amount of the bid must accompany each tender. The lowest or any tender not necessarily accepted.

(Signed) L. A. THORNTON,
City Engineer.

Regina, Sask., Dec. 17, 1910. 52-52

City of Vancouver

Tenders for Road Roller

Tenders will be received by the undersigned up to TUESDAY, FEBRUARY 7TH, 1911, at 2 p.m., for the supply of a new Road Roller, weighing not less than fifteen tons, for the City of Vancouver, B.C.

Tenderers are required to submit specifications with their proposals.

A deposit of an amount equal to 5 per cent. of the contract price must be made with each tender, by marked cheque payable to the City Treasurer.

The lowest or any tender not necessarily accepted.

WM. McQUEEN,
City Clerk.

City Hall, Vancouver, B.C.,
December 20th, 1910. 52-2

The Town of Pembroke, Ontario

Tenders for Cast Iron Water Main

Tenders are required by the 9TH JANUARY for the delivery of Cast Iron Water Main.

Prices to include for 16-inch diameter cast iron hub and spigot joints. Approximate length 5,900 feet. At least in 12-foot lengths, exclusive of socket. Pipes to be in accordance with the Canadian Society of Civil Engineers standard specifications for cast iron pipe and special castings. Class D. Tenders to specify price per foot and include delivery f.o.b. cars Pembroke.

Tenders to be sent in to Mr. E. A. Dunlop (Chairman of Water Committee, Pembroke).

The right is reserved to reject any or all tenders. Any tender will only be accepted on condition of entrance into a bond as to specification of quality and time limit for delivery.

Tenders to specify earliest possible delivery with limit period for completion of delivery.

By Order,
A. E. FORTIER,
Town Clerk, Pembroke.

T. AIRD MURRAY,
Consulting Engineer, Toronto. 52-52

City of Regina

Tenders for Power Plant

Tenders are asked for by the City of Regina for the supply and installation of any or all of the following, together with the necessary connections ready for operation:

- 1 1500 k.w. Steam Turbine Generating Unit.
- 1 500 k.w. D.C. Generating Unit.
- 2 500 Horse Power Boilers.
- 1 Economizer.
- 1 Hand Power Travelling Crane.
- 1 Coal and Ash Conveyer.

Tenders will be received for the above until 10 p.m., TUESDAY, JANUARY 17, 1911. Specifications and all information will be furnished on application to the undersigned or to E. W. Bull, City Electrician.

(Signed) A. J. McPHERSON,
City Commissioner.

51-2

The Town of Pembroke, Ontario

Tenders Required for Steel Tubes for Intake Pipe

Tenders are required by the 9TH JANUARY for either rivetted or lapwelded Steel Piping.

Prices to include for 18 inch diameter steel piping ¾ inch thick—approximate length 6,000 feet—cast Steel Flanges—Wood or other approved Gaskets—Approximate number fifteen Flexible Joints, Cast Iron Double Flanged Ball and Socket Joints.

Prices to include delivery f.o.b. cars Pembroke.

Tenders to specify price per foot for piping, including flanges, bolts and gaskets complete. For Flexible Joints, price per joint is to be specified. Tenders to specify earliest possible delivery with limit period for completion up to end of February, 1911.

Tenders to be sent in to Mr. E. A. Dunlop (Chairman of Water Committee, Pembroke).

The right is reserved to reject any or all tenders. Any tender will only be accepted on condition of entrance into a bond as to specification of quality and time limit for delivery.

By order,

T. AIRD MURRAY,
Consulting Engineer,
Toronto.

A. E. FORTIER,
Town Clerk,
Pembroke.
52-52

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

A reliable and well established firm wish to represent for Manitoba a manufacturer of Canadian Concrete Mixers of reliability and moderate cost. Address Box 176 Contract Record, Toronto, Ont. 51-52

J. Napoleon Gignac, sash and door factory, Quebec P.Q., is stated to have assigned.

Robert & Frere, plumbers, Montreal, are reported to have assigned.

New Companies

The South Shore as Company, Limited, Montreal, Que., incorporated, capital, \$100,000. Incorporators: A. Huntly Duff, advocate; R. T. Heneker, K.C., and Hugh Wylie, all of Montreal.

McDonald & Wilson Company, Limited, Montreal, Que., capital, \$25,000. Incorporated to manufacture and deal in heating, gas and electric fixtures, etc. Incorporators: C. S. McDonald, merchant; H. and May W. Wilson, and F. J. Parsons, merchant, all of Toronto.

The Producers Natural Gas Company, Limited, Hamilton, Ont., incorporated, capital, \$200,000. Incorporators: W. Southam, publisher; J. Milne, manufacturer, and G. Lynch-Staunton, K.C., and A. W. Penne, architect, all of Hamilton, Ont.

The Tekton Manufacturing Company, Limited, Niagara Falls, Ont., capital \$40,000, incorporated to manufacture and sell lumber and building material, etc. Incorporators: H. D. Rubin, Buffalo, N.Y.; F. O. Geyler, manufacturer, and E. M. Sergeant, chemical engineer, Niagara Falls, N.Y., and J. M. A. Stillesen, chemist, Niagara Falls, Ont.

The Maximilian Pneumatic Tool and Machine Company, Limited, Woodstock, Ont., incorporated, capital, \$100,000. Incorporators: D. W. Karn, manufacturer; R. T. Parke, physician, both of Woodstock, Ont.

Canadian Carbonate Company, Limited, Montreal, Que., incorporated, capital, \$100,000. Incorporators: W. I. Powers, manufacturer; C. L. Stuart, town clerk, both of Lyndonville, Vermont, U.S.A.; J. E. Colby, Montreal West, and D. Burley Smith, both of Montreal.

National Hydro-Electric Company, Limited, Montreal, Que., capital, \$1,000,000, incorporated. Incorporators: A. Survever and Royal LeSage, civil engineers, both of Montreal, Que.

Canadian Electric Automatic Machines, Limited, Ottawa, Ont., incorporated, capital, \$225,000. Incorporators: L. S. Macoun, manufacturers' agent; J. B. Prendergast, banker, both of Ottawa.

The Lightning Furnace Company, Limited, Montreal, Que., incorporated, capital, \$90,000. Incorporators: R. Houle, real estate dealer; E. Roy, plumber, both of Montreal, Que.

Automatic Electric Cook Co., Ltd., Toronto, Ont. Capital, \$100,000. Incorporators, Wylie Hart, barrister, and Chas. H. C. Leggett, accountant, both of Toronto.

The Central Canada Power Co., Limited, Toronto, incorporated; capital, \$10,000,000. Incorporators: Strachan Johnston, R. H. Parmenter, solicitors, Toronto.

Operating Blast Hole Drills with Common Laborers

The writer has visited many railroad contracts and quarries throughout the United States in the interest of drilling equipment for blast holes and has talked with a great many superintendents regarding the production of stone, and it is surprising the number of concerns who have not been able to solve the problem of drilling and blasting; which is due entirely to their lax method of handling that end of the business.

The big majority of men in charge of this class of work seem to consider that the drilling and shooting of material is of

minor importance, and place in charge of the work men who are totally ignorant of the proper drilling and spacing of holes or the proper handling of explosives, and the also equally important item of operating the drills successfully in order to get the maximum number of feet per day.

The steam shovel is manned by a competent engineer and craneman; the locomotive by a skilled engineer; in fact, everything necessary for the handling of material is in charge of experienced men. But when it comes to the production end, this is too often dependent upon the cheap labor obtainable.

If there is no material to be handled, the entire outfit is at a standstill; if the material is not properly broken up, the entire efficiency of the outfit is curtailed.

The men in charge of drilling and blasting hold the key to the production of the plant; they vary the profits to such a degree that this, being the most important factor in connection with the plant, it should be under the care of competent men to not only operate the drills successfully, but to be able to space the holes and use the right amount of explosive to do the work properly without waste of material.

The saving of drilling by proper spacing and springing of holes, the material broken up properly for economical handling, the delays of the entire shovel crew incident to the improper production of material, have no comparison to the trifling saving as between a cheap man and a competent man in charge of the drills.

Contractors who have tried out the experiment of placing drill men in charge of their outfits and that it is the most economical by big odds; the writer refers to drills of the well-driller type.

When they are being used for deep holes and light charges, it is no small problem to handle the drilling and blasting end of a big contract, as there are no set rules that can be strictly adhered to, on account of the varying conditions of materials to be handled.

A plan carried out successfully on one job does not mean that it can be done in exactly the same manner on the next job, even if the material seems to be about the same, so that each proposition must be worked out according to its own peculiarities.

A man who can adapt himself to the varying conditions can save the contractor more money than any other man on the job, and a cheap drill foreman can break up more machinery, cause more delays, and, through inexperience, waste more explosives, therefore causing more loss, than any one else on the job.

Strengthening Railway Tracks for High Speed Traffic

At the recent International Railway Congress four lengthy papers were presented on the subject of "Strengthening Railway Track for High Speed Traffic." It is interesting to note that there was a general agreement that in Europe no improvements over existing methods of track construction were thought necessary or desirable. In Germany the primary need of strengthening tracks was said to be due to increase of heavy freight traffic, rather than to high speed passenger traffic, although in that country the limit of axle load is about 18 tons, as against 20 to 22 tons in England and 24 to 26 tons in this country.

In England the present track construction is thought amply strong, provided it is maintained in good condition, Mr.

Jacoub Hood stated that the perfection of design in track might be neutralized by neglect to maintain such track in the best possible condition to meet the exacting requirements of heavy loads and high speed service; and Mr. Rosche pointed out that the stiffer the original track the less the cost of maintenance might be.

The paper by Mr. Herman Rosche, of Austria, was an important treatise on track design. When strengthening is necessary he recommended a general revision of the entire roadbed in order to keep all its parts in proper relation as to strength and resistance. The ballast should be made deeper and of better quality. He recommends a minimum depth of 18 inches of hard stone. He also advocates extreme length and width of ties (8 feet ten inches by 10 1/4 inches), but puts less emphasis upon thickness. Steel ties of recent design, he says, are equal to or even better than wooden ties, and their use is clearly an economic consideration. Improvement in the quality of the steel rail is considered of more importance than the weight. Closely spaced ties and double-angle splices are advocated, and special emphasis is laid on secure fastenings on the joint ties.

The American contribution to the subject was from M. L. Byers, of the Missouri Pacific Railway, who said that one way of strengthening is by increasing the sustaining power of the sub-grade, which is in general too costly. The other way is to reduce the pressure upon the sub-grade by using rails of heavier weight or higher grade steel, by spacing the ties more closely and by giving a greater depth of ballast or by a combination of these means.

The Engineering News, considering the whole subject editorially, says that while American railways have a very large mileage of high class track construction, high speed service is by no means confined to such track, and suggests that foreign practice indicates a track structure that is in some respects more substantial and perhaps more economical than much of the track carrying high speed trains in this country. What is needed here is the more extended use of the present type of high class track construction over a greater mileage, with ample attention to the maintenance of such track in condition suitable for the loads and speeds which it carries.

Depositing concrete for street foundations by mechanical means has been adopted in a number of cases and by different types of apparatus. With a portable concrete mixer the concrete may be delivered upon a belt conveyor, a gravity chute (of very slight inclination), or a dump bucket travelling to and fro upon a horizontal boom. The boom, chute or conveyor is attached to the mixer and is pivoted so as to distribute concrete within a wide sweep. The conveyor and chute can deliver the concrete only at the ends, and the latter will require a man to keep the concrete moving with a spade or hoe. The bucket, however, can be dumped at any point between the mixer and the end of the boom. With appliances of this kind there is a considerable reduction of labor as compared with the distribution of concrete by wheelbarrows.

Allard & Company, manufacturers of sash and doors, Montreal, Que., are stated to have dissolved.

J. A. Nadeau and J. H. Gosselin, Drummondville, Que., have registered as Nadeau & Gosselin, contractors.

Turbine Pumps for Toronto Water Supply

The accompanying cut shows two of the turbine pumps being supplied to the city of Toronto by the Canadian Boving Company, Ltd. The total number of pumps to be at present installed includes four pumps for the main pumping station, two fire pumps and also two domestic pumps for the high level station on Cottingham street. The four pumps in the main station will be capable of delivering, each, 13 1-2 million gallons per day, against 250 foot head, running at 750 revolutions, normal power 890 h.p., overload 1,500 h.p. The two fire pumps are to deliver each 10 million gallons per day against 110 pounds pressure, at 720 revolutions. The two high level domestic pumps will deliver each 10 million gallons per day against a 65-pound pressure, at



Turbine Pumps for Toronto—Jens Orten-Boving type

750 revolutions. The pumps, on test, showed an efficiency of 84 per cent.

The pumps are of the high pressure multi-stage type, fitted with impellers and guide wheels of a special bronze, the position of which has been determined by protracted tests and experience in the manufacture of pumps and water turbines. The inner surfaces of the impellers and guide wheel channels are carefully finished throughout, so that the water during its whole passage through the pump, from the first impeller to the delivery casing, never comes in contact with any rough surface. This is an important point, as experience has proved that wheels treated thus have a much longer life when dealing with gritty or muddy water. In addition it is clear that the consequent decrease in friction materially improves the efficiency. The casing is of cylindrical bore. Dismantling and re-assembly of the wheels and diaphragms which fit cylindrically into the casing is an easy matter, as they have only to be pushed in one after the other from the open end. All these parts are interchangeable, the pumps being made to limit gauges throughout. The shaft is made of high grade nickel steel to secure strength and rigidity as well as to resist corrosion. Where it passes through the stuffing boxes, it is covered by renewable bronze bushes, and thus protected from undue wear due to packing material or gritty water. The bearings are of the ring lubricating type, specially designed for high speed and separated by a gap of 2 inches from the packing so that it is impossible for any grit, mud or water to enter.

The Resilience of Reinforced Concrete

A recent issue of the *Cornell Civil Engineer* describes a very interesting set of experiments made by E. J. McCaustland, to determine the relative amount of permanent deformation or set in concrete beams with different types of reinforcement bars and loaded up to about the safe working stresses. Only 24 beams were tested, and, since the results are not sufficiently concordant, the experimenter does not believe that they warrant general conclusions, but merely suggest the need for further tests.

Twenty of the beams measured 6 x 8 in. in section and were tested on a span of 6 ft. They were made in proportions of 1:3:8 with 1-in. limestone, run of crusher. The beams were tested at the age of 30 days, and the reinforcement was placed 6½ in. below the top of the beams. Six-in. cubes of the concrete mixture were tested for compression at 30 days and gave an ultimate stress of 980 lb. per sq. in.

The remaining four beams were 8 x 11 in. in section and were tested on a span of 12 ft. The concrete was mixed in proportion 1:2:4 with 1¼-in. limestone. They were tested at the age of 60 days, and the reinforcement was placed 10 in. from the top of the beams. The average crushing strength of the mixture at 60 days, determined by tests on 14 6-in. cubes, was 1,670 lb. per sq. in.

The tests seemed to indicate that the permanent deformation was considerably larger with the deformed than with the plain rods and bars. The deflection and permanent deformation curves of the beams containing plain reinforcement seemed to partake of the same general character as like curves for a plain concrete beam, which was also tested. Two of the beams made with the leaner concrete failed by the slipping of the bars, and the curves of these two bore a greater similarity to the curves for the deformed bars than to those of the other plain rods and bars. Mr. McCaustland is of the opinion that the curves indicate that a smooth rod or bar does not act to modify in any marked degree the resilience of the beam as a whole. In the beams where the rods slipped the concrete was unusually lean, and the resilience of the concrete itself did not seem to be sufficient to overcome the friction of the rods and force the beam to resume its original form.

In the beams reinforced with deformed bars the deflections usually were large and the recovery after the removal of the loads quite small, seeming to indicate that while certain types of deformed bar allowed greater deflection they also acted to prevent the recovery of the specimens when the load was removed. Though this was the general rule, some beams with deformed bars showed a recovery almost equal to those with plain rods and bars. The tests are not believed by Mr. McCaustland to be sufficiently thorough to determine in what manner the relative stiffness of beams of approximately equal strength is affected by the type of reinforcement, or to determine what effect the latter has on the ability of the beams to absorb loads and shocks without permanent injury.

The Passing of the Indentured Apprentice

At the December meeting of the Builders and Contractors' Association of Essex, held at Windsor, Ont., recently, the following resolution was passed:

Be it resolved that this Association views with no small measure of alarm the passing of the indentured apprentice. It is our opinion that unless something is done by which their places may be filled by others equally skilled in the building trade, the time is not far distant when the lack of skilled mechanics will militate seriously against the proper and prompt construction of all residential and industrial buildings.

We recognize the necessity of prompt action, as those who now are classed as skilled mechanics are fast disappearing, with little prospect of any one capable to take their places. It is our opinion after mature consideration that we must practically depend upon the sons of the working man for our future skilled mechanics, therefore it becomes necessary to place an opportunity in their way, and in view of such we would make the following suggestion:

That technical training be added to the public school curriculum, so that our sons may have the advantage of being trained in the theories connected with the different branches of the building trade, that later on they may be able to apply this knowledge in a practical way. This, we believe, would eventually bring about desired results.

Contract Record

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No. 52

Local Preference

Not an infrequent source of trouble in municipal circles is the awarding of contracts for local work to local concerns. The matter has been discussed in these columns before but it is continually cropping up. Those who favor local companies often do not possess a very clear idea as to why it should be done. It seems to us that there are a number of arguments against local preference.

The advocates of the "local contracts for local men" principle urge that the extra money, being spent locally, all comes back again, and is, therefore, not really a loss. Of course, it is not a loss—except indirectly—to those employed on the contract, but it is to those who pay for the contract, and it does not require a Solomon to realize that people who habitually pay 10 per cent. more for their goods than is necessary are virtually reducing their income by 10 per cent.

There is no justification for paying a local firm a high price because it is too ignorant to realize that it could do the work for less. To do so would be simply to subsidize the employers and shareholders at the expense of the purchasers. Nor is there any reason for not accepting a low tender because, from stupidity or ignorance, a non-local firm has offered to do the work at a figure which may mean a profit of only 3 or 4 instead of 10 to 15 per cent. One of the causes operating to determine price is the cost of material. Here, obviously, it is senseless to subsidize a firm which buys its material wastefully or without due consideration for market changes, or which has placed its works so that carriage on material is excessive.

Another condition affecting the price is the equipment—we mean not only the buildings, cranes, tools,

and machinery, but also the men, the designers, and the management. If one firm by its enterprise and judgment can produce more cheaply than another, then, surely, that is a legitimate reason for encouraging that firm and saving the pockets of the purchasers.

A Lesson in Punctuality

The value of punctuality in the contracting business was emphasized rather forcibly at Vancouver last week, when a firm of contractors lost a \$30,000 job through being two minutes behind in delivering their bid. The contractors in question submitted a bid for vitrified pipe at \$30,694, which was recommended for acceptance. One of the other tenderers, however, through his solicitor, raised the objection that the bid was not submitted by 4 p.m., Dec. 12th, as called for in the specifications. They had taken the trouble to investigate and had found that the tender was not deposited at the City Hall until past the hour. Some discussion followed, but it was moved that all tenders not complying with the advertisement be cancelled, and the motion carried. The next highest bid was accepted. The losing firm will at least have the satisfaction of watch-

A HAPPY NEW YEAR!

The time-honored wish is again our pleasure and privilege.

May this season be gladdened by a retrospect of one of the most successful years in the history of Canada's development. May the dawn of the New Year be brightened by the assurance of continued prosperity.

The story of 1910 is told. Speaking for ourselves, it has been worth the telling, for we have been gladdened and encouraged in our work by countless practical evidences of the reader's co-operation and goodwill.

We are confident that nineteen hundred and eleven will be a great year in the field covered by the CONTRACT RECORD. May we all rise to the occasion. Eternal progress is the price of success. With us, to-day is but a stepping-stone by which we rise to a little higher eminence to-morrow. And so, doubtless, it is with the reader.

Here's to the New Year! Reader, your hand!

ing developments closely and forming an opinion as to whether the year indebted to a special interposition of providence or to their own unpunctuality for losing the contract. Be this as it may, the occurrence points a moral. "Better late than never" has no application in the contracting business.

Two Important Fixtures for 1911

January 24-27 at Winnipeg:—

Annual Convention of the Canadian Society of Civil Engineers. Secretary, Professor C. H. MacLeod, 413 Dorchester Street West, Montreal.

March 6-11 at Toronto (St. Lawrence Arena):—

Annual Convention and Exhibition of the Canadian Cement and Concrete Association. Secretary, Wm. Snaith, 57 Adelaide Street East, Toronto.

Windsor St. Station Foundation, Montreal

Further Details of the Methods Employed and Equipment Used by the Contractors — The Various Problems Encountered in Excavating

The introduction of the "Chicago" system in the foundation work for the extension of the Windsor Street Station of the C.P.R. at Montreal, and the novel methods employed by the contractors (the Bishop Construction Company, Montreal, associated with the New York Foundation Company) were discussed in the *Contract Record* of March 9, 1910. Further details of the work, as furnished *Engineering Record*, are given below. Additional interest will be found if reference be made to the photos and particulars given in the former article:

A large and variable quantity of ground water was encountered. The surface of the rock in many cases had numerous seams filled with mud and water, and had to be removed to a maximum depth of 15 ft. to afford satisfactory solid bearing for the piers. Fortunately, the site was bounded on three sides by streets, so that most of the excavation could be done without jeopardy to adjacent buildings. On the fourth side the new building is

was usually firm enough to stand up while the excavation was carried to about 5 ft., and 2-in. vertical lagging, from 5 to 8 in. wide, with planed radial tongue and grooved edges, was set up and maintained in the usual manner by a pair of inside horizontal flange-bolted rings of 3 x $\frac{3}{4}$ -in. steel. The excavation was then carried 5 ft. lower, another set of lagging put in place, making butt joints with the lower ends of the first set, and so on. Where there appeared to be reason to fear special difficulty the excavations, about 40 in all, were started with their diameters 18 in. too large, in order to allow for driving inside, if necessary, one set of 16-ft. tongue and groove sheet piles. When the latter were used they took bearing against 4 x 4 x $\frac{1}{2}$ -in. angle iron rangers 2 ft. apart, or against 3 x 8-in. wooden rangers when the angle irons could not be received quickly enough. In either case the rangers, like the flanged iron rings, were removed when the concrete was placed.



Arrangement of Rope Drive for a Row of Pier Shafts

an extension of the old station and trainshed, with foundations usually 20 ft. or more from its piers.

The original contractors started numerous open-sheet-pier excavations, but encountered so much difficulty from the water and from the unstable soil that they abandoned the work. In November, 1909, the work was turned over to other contractors, who completed it the following June.

A rectangular pit about 6 $\frac{1}{2}$ ft. wide and 22 ft. long was excavated 24 ft. deep, and was lined with two lengths of tongue and groove-sheet piles driven with mauls. The rock was leveled at each end of the pit to receive the foundations for rectangular piers, and the space between the latter was blasted out several feet deeper to form a main sump drained by a 3-in. Cameron steam pump, working continuously. The sump was located at a point where, according to indications, the surface of the rock was lowest, and was supplemented by a number of other pier excavations left for a time unfilled to serve as pumping wells. By their aid and by the use of pulsometers and 2-in. steam siphons in the pier excavations, the latter were kept dry and the work was accomplished in the open without serious difficulty.

The abandoned excavations were found to be generally in very bad conditions, and work on them was resumed by replacing the old lagging with new lagging set just outside of the old, or, where serious trouble was anticipated, by replacing it entirely with sheet piling driven by mauls as the old lining was cut out. In some cases sheeting was driven inside the lagging, and in advance of the excavation.

The new pier excavations were made by the standard Chicago method of open digging and lagging. The ground, after being well drained, as already described,

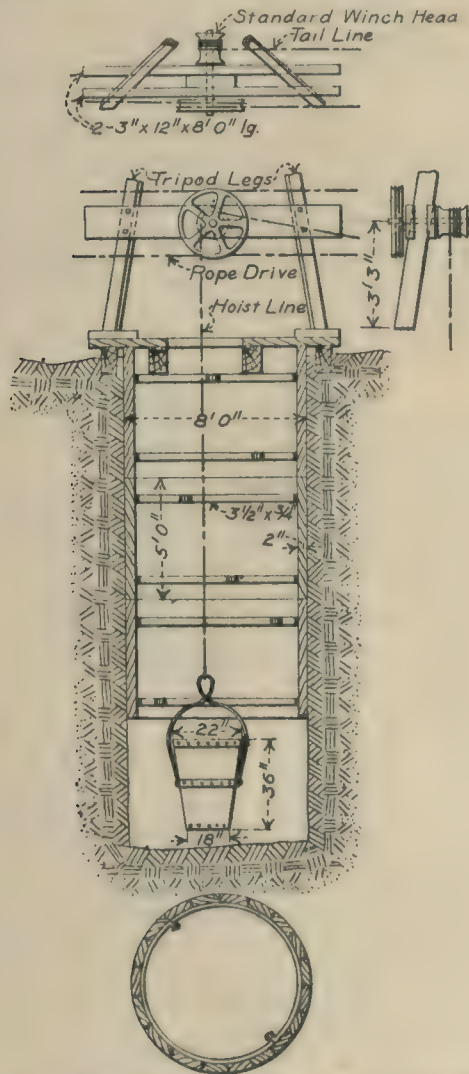
The material was excavated by hand with shovels, mattocks and picks, and was hoisted in special galvanized iron buckets weighing about 75 lb. each, which were about 3 ft. high, 22 in. in diameter at the top and 18 in. at the bottom. They had swinging bails locked by a catch on one side and were hoisted from the deepest pit in about 1 min. by 1 $\frac{1}{4}$ -in. Manila lines operated by winch heads engaging rope drives installed by the contractor.

The pits were excavated in sets of 8 or 10 in each of 5 parallel adjacent rows, and the material was thrown out by hand until they had been carried down and sheeted to a depth of 5 or 6 ft., when they were covered by protecting platforms at the surface of the ground with a hole in each for the passage of men and buckets. A small wooden tripod was set on each platform with the ends of the legs permanently secured to it by cleats. On each tripod there was mounted a short horizontal shaft with a 26-in. grooved pulley on one end and a standard 10 x 11-in. winch head on the other end.

The pulleys, on the outside ends of the shafts, were set in the same vertical plane and were all driven by two or three turns of an endless $\frac{1}{2}$ -in. crucible steel rope about 600 ft. long, which engaged an idler at one end, and at the other end took several turns around the drum of the hoisting engine and then passed around two idler pulleys in the same horizontal plane; one of which was anchored and the other connected to an adjustment tackle. By this arrangement all of the winches in one row were continuously driven by a single engine, and several buckets could be simultaneously hoisted at any time by the men on the platform, who threw two or three turns of the hoist rope around the winch head and

tailed off the slack as the bucket rose. The buckets were hoisted just clear of the platform, the latches sprung and their contents dumped by hand on the platform and shoveled into carts, an operation not involving any additional cost because it was performed by the hoist rope men who would otherwise have been idle while the men in the well were digging. Five hoisting engines and rope drives were provided so that one set could be prepared in advance while the excavators were at work on four rows of holes, and was in readiness for them without involving any delay when the holes were completed.

Broken stone and sand were stored in heaps on the



Hoisting Arrangement and Shaft Lining

surface of the ground, and were delivered by wheelbarrows to the Ransome mixer, where the concrete was made with Lakefield Portland cement. The machines discharged into Ransome carts which dumped the concrete directly into the excavation.

The contractors for the piers also constructed a 6 x 6-ft. (inside dimensions) steam pipe tunnel, 150 ft. long, between the boiler house and the main building, involving a 9 x 8-ft. excavation, 23 ft. below the surface. They also changed 500 ft. of 12-in. and 20-in. sewers to different positions at the station site.

The work involved about 18,000 cu. yds. of excavation and 11,000 yds. of concreting, and was executed in accordance with the plans and specifications of Mr. J. G.

Sullivan, chief engineer, and Mr. W. S. Painter, architect for the Canadian Pacific Railroad Company. Mr. Alexander Allaire, manager of the Foundation Company, Limited, was in charge for the contractors.

Day Labor Work in England

In England many cities do a considerable part of their public work construction by day labor instead of by contract. Quite recently the Town Council of Norwich in reversal of its general policy, decided to ask bids on a piece of public work. In connection with the decision the City Engineer, Mr. A. E. Collins, M. Inst. C. E., made the following statement of his reasons for preferring that the work be done by contract instead of day labor:

My reason for recommending the Executive Committee to carry out the proposed convenience near St. Giles' Gates by contract instead of direct labor is that in the execution of general building works during the past 18 months or two years I have been forced to the conclusion that much of the extra labor engaged by me, or on my behalf, is not satisfactory. The men are not as expeditious as should be the case; there is a tendency for them to regard the corporation as having a "bottomless purse," and to consider there is no special necessity for them to exert themselves. My freedom of action in dealing with employees is not the same as that of a contractor. It is not uncommon for my action to be called in question by members of the Council for discharging men with whom I am not satisfied, and while the evidence upon which I have acted would be considered quite sufficient by a contractor in dispensing with the services of men, yet in my case it might not be sufficient to enable me to answer the very numerous detail questions often put to me. There are a large number of men who may be described as in the regular employ of the corporation, many of them having been selected out from time to time as the most satisfactory of those casually employed; these men can be relied upon to earn their wages and often a bit more. This enables me to carry out the regular work of the corporation with generally satisfactory results, but it is when a sudden expansion of staff is necessitated by some special work, generally of a building character, that I have difficulties in getting works carried out to my own satisfaction as regards cost of labor.

Economy of Contract Work

J. W. B. Blackman, City Engineer of New Westminster, B.C., writes: "I have found your discussion, 'The Contract System vs. Day Labor,' of considerable interest, and regret that I am unable to furnish you with any data. Until quite recently our Board of Works carried out all construction by day labor. Several contracts are now in hand, however, and I am quite confident that the results obtained from these will show a considerable saving over day labor."

Mr. John McLeish, Statistician, Mines Department, Ottawa, writes us regarding a somewhat ambiguous statement contained in the article, "Clay Products," published in our issue of December 7. The following is an extract from his letter of December 12: "In the paragraph on page 48, referring to imports, you state that the total imports for 1909 (twelve months ending March) were \$815,038 as compared with \$1,079,556 in 1908. There is just a possibility that the average reader may not realize that this refers to brick and tile products only and does not include earthenware, china and crude clays."

The Construction of an Electric Railroad

Methods Employed on the Lansing and Northern Railway, Michigan— General Principles Worth Noting—Details of Equipment and Organization

The construction of electric interurban railways is carried on in generally much the same way as that of steam railways, but differs in a number of respects as to the equipment used and the details of the work.

The Lansing & Northeastern Railway is an electric railway being constructed from Haslett to Owosso, Mich., a distance of 24 1-2 miles. It is of the third rail type of construction, except that trolley construction is used in passing through cities and villages along the line. The Michigan United Railways own and operate an electric railway from Lansing to Pine Lake, a summer resort 8 1-2 miles distant from the city and near to Haslett. This resort affords plenty of business during the summer months, but after the expiration of the season, car service is infrequent; hence the desire to reach out into new territory.

The grading averages about 10,000 cubic yards of earthwork per mile, although on some miles these figures were greatly exceeded on account of the location of sink holes which abound in the lake region. The railway is being built upon private right of way. It is not desired to exceed a 1 per cent. grade as a maximum, although conditions have necessitated the use of 1.75 per cent. grades upon short stretches of the line. Vertical curves are used at summits and sags.

The curves do not exceed 3 per cent. on any track outside of city limits. The maximum curves are 10, 12 and 24 per cent., all being located in cities or villages. All curves above 2 per cent. are spiralled and are elevated as follows: 3 ins. for 1 degree curves, 4 ins. for 2 degrees, 5 ins. for 3 degrees, and 5 1-2 ins. for 4 degrees. In no case does the elevation exceed 7 ins. for any degree of curvature. It has been found that the electric road needs a greater elevation than is usually given on steam railways, on account of the high speed of the electric cars. This condition is due probably to the fact that the centre of gravity of the cars is much lower than on locomotives, thereby bringing a greater strain upon the track.

Track Construction

The track construction is designed to ensure safe high-speed track which can be operated at the minimum cost of maintenance. The existing track (trolley line) is laid with 67-lb. rails. The new work is being laid with 70-lb. track rails, spliced with continuous joints. The third rail is a 60-lb. low-carbon steel rail of the following analysis: carbon, not over 0.14 per cent.; phosphorus, 0.11 per cent.; manganese, 0.40 per cent.; sulphur, 0.08 per cent.; silicon, 0.050 per cent. The full carrying capacity of this rail section is equivalent to 1,091,000 c. m. of copper. At farm and road crossings, where the third rail is interrupted, the current is carried across by means of overhead jumper cable construction. The track rails are bonded with all-wire rail bonds, having compressed terminals which are attached to the outside of the head of the rail.

There are 16 ties for each 33-ft. rail, or 2,560 ties per mile. Each sixth tie is 9 ft. in length to provide support for the third-rail insulator blocks. Cedar ties are used for all work outside of city work; and either chestnut or oak ties for city work.

The grading is done by contract, work being let to the lowest responsible bidder. The balance of the work

(such as tracklaying, ballasting, trolley and telephone construction, and building of fences and all other incidental work) is done by a construction company (the Northern Construction Co.) for the railway.

The tracklaying has all been done by hand labor, as the work is not insuch shape or of such extent as to warrant the use of a track-laying machine. The material yard is located at about the middle of the line, and material is delivered at any point along the line by the use of engines and flat-cars. Enough rails are loaded on the cars to keep the force busy for one day, and at night sufficient material is again loaded to carry on the work for the succeeding day. The ties are distributed by teams, piles of ten ties each being placed at intervals of 24 ft. There is one 9-ft. tie in each pair of piles. A gang of six men with a foreman places the ties on the roadbed, lining and spacing them ready for the rails. As the line parallels a steam railway for about half the distance, ties can be delivered at railway stations, so that the team haul is not prohibitive.

Equipment and Labor

In laying track, a flat car equipped with aprons and rollers is used, this car being attached to the front of the train carrying the rails. This car also carries rail splices, bolts and spikes needed. Each rail is run forward along the rollers by manual labor to the first car, where the rail gang is in readiness to receive it and place it in position. When this is done and the forward end is laid to gage and the heel joints are half bolted, the rail joint is attached to the track end, the second rail being laid in the same manner. The rails are then quarter spiked, and the train moves ahead. The rails are laid with broken joints.

The tracklaying gang is made up as follows:

1 foreman, 1 assistant foreman, 6 men unloading rails from cars, 12 men with tongs, to place the rails, 2 splice men, 4 spikers, 2 nippers, 1 man to line ties, and 1 man to distribute spikes.

The back-bolting (behind the train) is done at the same time that the joints are bonded, as it is the practice to bond the rails as soon as they are laid and before the track is ballasted. This back-bolting requires two extra men for the bonding gang, and they are in charge of the foreman of that gang.

Ballast is secured from a gravel pit at a point near the middle of the line, and is distributed from centre-dump cars. The ballast is placed under the track by jacking it up into position, no attempt being made to distribute ballast head of the track. The engines can handle a train of from eight to ten centre-dump cars. After unloading these cars, the spread is made by a centre plow which is attached to the rear or plow car of the train. In ballasting there are from 40 to 50 men in a gang, one man being used to prepare the holes for the reception of the jacks; two jacks and four jackmen give good results with a force of this size.

The pole line for both trolley and telephone construction is erected after the track is laid, thereby permitting all material to be distributed by the work trains. The transmission line (40,000 volts) is strung upon a line of tower construction, but as electric power is furnished by a separate corporation the railway has nothing to do with this work. The trolley line is installed

upon wooden poles with bracket construction, excepting in cities, where iron poles and span-wire construction are used.

Vitrified pipe is used for waterway openings up to 18 ins. diameter. Reinforced concrete pipe is used for openings from 30 ins. to 48 ins. diameter. The larger waterways have reinforced concrete culverts designed for Cooper's E-50 loading. Such bridges as there are on this line are pile bridges or trestles.

As to the organization, the construction company has a superintendent of construction, Mr. N. B. Atwood, who cares for track work, ballasting, line work and all other work incidental to the construction of the railway above sub-grade. He also has charge of the construction and placing of all the openings for waterways. He is assisted by the track, line and bridge foremen and the material clerk, together with the office force required to handle the pay-rolls of his department. The Engineering Department of the railway company is in charge of Mr. W. J. Sullivan, as Chief Engineer, assisted by two field assistants and by a draughtsman who takes care of the design of structures and substations. The Engineering Department has charge of the designing and building of all structures, the grading, the preparation of the preliminary monthly estimates, setting of ballast stakes and track centres, and all the work incidental to such a department.—Engineering News.

Effects of Temperature and Moisture on Road Surface Treatment

It is generally recognized that the success of a road surface treatment for dust-laying depends to a large extent upon the condition of the road as to temperature and moisture at the time of the treatment. Some interesting information regarding these road surface conditions are given in a recent issue of our English contemporary, "The Surveyor." It is stated there that experiments have shown that approximately 18 to 22 per cent. of an average macadam road consists of dust and fine particles of stone, small enough to pass through a fine sieve of 40 meshes to the inch, and of this 14 per cent. is as fine as cement. Thus 18 to 22 per cent. weight of a macadam road consists of very fine particles—that is, after all moisture has been removed—but it is also worthy of note that after a period of 12 hours without rain and with about six hours' bright sunshine, the fine material extracted from a macadam road contained approximately 20 per cent. of moisture, although the road surface was apparently quite dry. The following experiment is cited in "The Surveyor" to show that the presence of moisture in a road is detrimental to its successful treatment with a tar composition:

A quantity of fine material from a macadam road and containing 20 per cent. of moisture was divided into two portions, both of which were well compressed in a mould into small slabs 6 inches square by 2 1-2 inches thick. On the surface of both an equal quantity of a reliable tar compound was poured, one of the slabs having been previously dried. After a period of 24 hours, the tar composition had penetrated seven-eighths inch into the dry slab, but only five-eighths inch into the slab containing 20 per cent. of moisture. It is therefore evident that moisture prevents the penetration of a tar composition.

Portions of both slabs were examined microscopically after the penetration of the tar composition, when it was found that in the dry slab the particles were thoroughly coated with the tar composition and the interstices between the particles were also full of tar composition. In the other slab the penetration was seen to

be irregular; the particles were only partially coated and some of the interstices were void, instead of being filled with the tar composition.

Apparently, then, even where a tar composition does penetrate a damp road, the tar does not get hold of the fine particles or fill the interstices as in the case of a dry road. Further, the dry slab after some days set into a fairly stable cake, which could be handled without breaking, but the moist slab showed no signs of setting. It further appears, therefore, that moisture resists the binding action of the tar composition. It will readily be seen that the effect of moisture in a road to be treated with any tar compound is extremely detrimental, but temperature also plays an important part.

As to the effect of temperature it is stated that roads were treated with a particular composition applied by the same machine, one road being treated about mid-day and the other about midnight. In the first case the temperature of the road exposed to the sun's rays was about 80 degrees F., while the temperature of the road treated at midnight was about 40 degrees F. In the first case the tar composition readily penetrated the road, while in the other case the cold road surface chilled the composition, causing it to congeal on the surface. Much of it never penetrated the road; but was subsequently carried off the road surface by the traffic.

The Quebec Legislature is considering a revised good roads bill with a view to giving greater assistance to the smaller municipalities throughout the province. If the bill now contemplated becomes law, it will be possible for every municipality, even if there are fifty in one county, to obtain a minimum grant of \$400. Any municipality will be able to obtain an additional grant of \$500 for macadam roads, provided that they bind themselves to maintain in good order a section of a road upon which a sum of not less than a thousand dollars shall have been spent in macadamizing. The Government contemplates the purchase of a stone crusher for the use of the municipalities. It is understood that the appropriation for good roads next year will be \$250,000 instead of \$75,000.

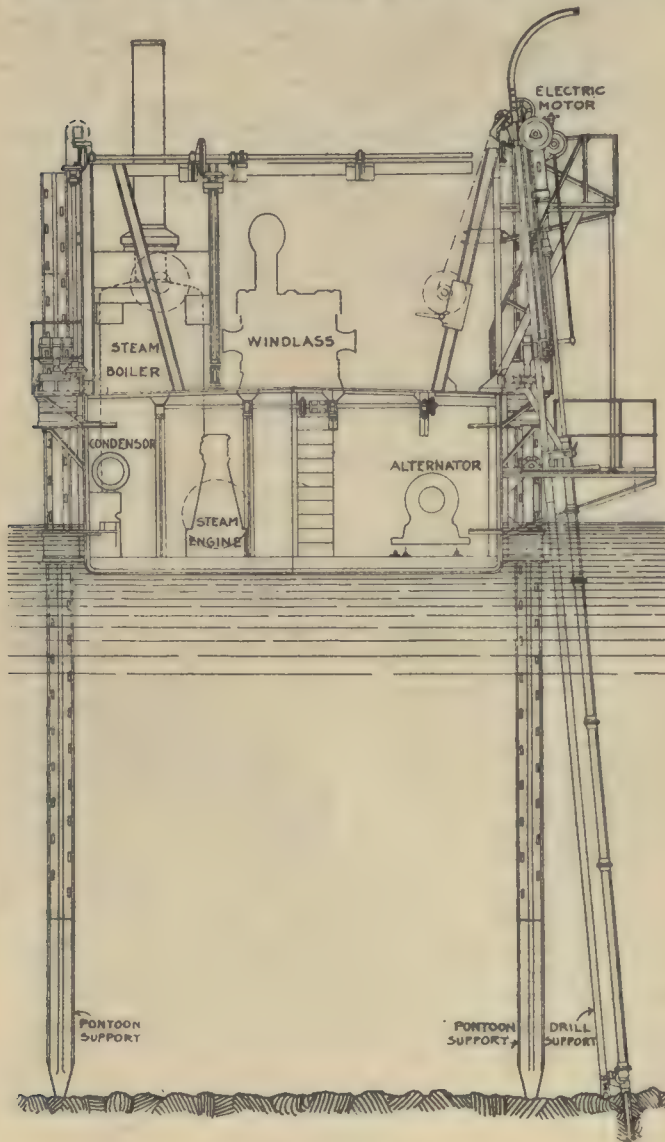
The Galt Art Metal Company, Limited, Galt, Ont., have favored us with one of their souvenir Christmas pocket books, a useful and durable article that will afford a constant reminder of this enterprising firm. A policy for a thousand dollars on the Imperial Guarantee and Accident Insurance Company is enclosed with the folder.

An injunction of cement was the novel method lately adopted to make strong and serviceable two crumbling stone railway bridges at Hamburg, Germany. The arches—fifty-one feet in span—were cracked in all directions and small holes were bored partly through the masonry at the sides of the cracks, and thin cement mortar was forced into the apertures at a pressure of five atmospheres. When this had hardened, the stone work was found to be thoroughly consolidated.

The Brandon Electric Light Company has been the pioneer in the establishment and development of public utilities in the province. From a plant of 50 horsepower it has developed a system of power-generating plants of nearly 4,000 horsepower; and it is altogether likely that the new system of heat transmission will meet the necessities of the public in a most satisfactory manner.

Submarine Rock Excavation

As an alternative to the simple but tedious process of drilling holes by divers and blowing up submarine rocks by dynamite, the Lobnitz method has been used with advantage in many places for removing obstructions from and deepening canals and harbors. The Lobnitz apparatus consists of a pontoon provided with one or more hoists of the pile-driver type for operating a pointed "monkey" weighing from 10 to 15 tons. Re-



Rock Excavating Pontoon

peated blows from this weight disaggregate the rock to be removed, and the debris are cleared away by dredging.

Another system is that adopted by the port authorities of Trieste, where a pontoon is employed having two percussion drills operated by electric motors, and capable of perforating vertical or slightly-inclined holes of about 3 inches diameter by 6 feet 6 inches deep, in which explosives are subsequently placed and discharged.

We give a cross-section illustrating the general arrangement, of the pontoon, which measures 60 feet long by 20 feet wide, and in order to prevent movement during the operation of the drills is furnished with four tubular cast-iron supports each with a pointed end. The supports are lowered by means of worm gearing driven by a steam-engine, and the operation is continued until the

pontoon has been raised bodily for a few inches, the pressure thus developed ensuring the stability requisite for working the percussion drills. The exterior diameter of the supports is $10\frac{1}{2}$ inches, and, being composed of jointed sections, their length can be adjusted according to the depth of water in which the apparatus may be required to work.

During trials conducted at Trieste the pontoon was raised by means of the supports so as to exert the total pressure of 105 tons, and preserved perfect stability for a period of three days.

The two drills are mounted outside the hull of the pontoon, and, being suspended from an articulated joint, can be moved to any angle within 15 degrees from the vertical. The stem of the drill is hollow, so as to permit water to be injected at the point for cooling purposes. The drill strikes 380 blows per minute, and is turned slightly about its axis after each blow.

When the drill-holes have been perforated and charged the pontoon is hauled away from the site by means of cables attached to the windlass, and is brought back to continue work after the mine has been fired.

Training the Engineer-Contractor

Editor Contract Record:

I believe in teaching engineering students as much of the business features of engineering as possible without interfering too greatly with instruction in the fundamental principles of engineering science. If the engineering courses in the technical schools and universities could be lengthened to five or even six years, it would be possible to instruct students in a number of matters that at present have to be ignored. For the last twenty-five years I have been advocating five-year courses in civil engineering and now they are commencing to be given. It is my opinion that ten years hence all of the leading technical schools and universities will have extended their engineering courses to five years.

Very truly yours,

J. A. L. Waddell.

Kansas City, Mo., December 20th, 1910.

Wages and Compensation at St. John's, N.B.

St. John, N.B., Dec. 15, 1910.

Editor, Contract Record:

Replying to your inquiry concerning the employment of labor. The method in vogue in the city of St. John is to employ workmen at whatever the ruling prices may be. The rate of wages varies from \$1.25 a day for the poorest quality of common laborers up to \$3.00 a day for the best of skilled mechanics.

We have a law, recently enacted, which provides that if a workman is injured through the negligence of a fellow workman to such an extent as to incapacitate him for labor he must be paid one-half time for a period of about three months.

Yours very truly,

Wm. Murdock, City Engineer.

We are informed by Mr. Geo. S. Gould, secretary of the London, Ont., Builders' Exchange, that a Builders' Exchange has been organized at St. Thomas, Ont., with the following officers: President, A. E. Ponsford; Vice-President, W. J. Green; Secretary-Treasurer, E. O. Penwarden. Mr. Gould states that there was much enthusiasm at the inaugural meeting, which furnished many proofs of the wide sphere of usefulness for the new Exchange.

New Methodist Church, Wallaceburg

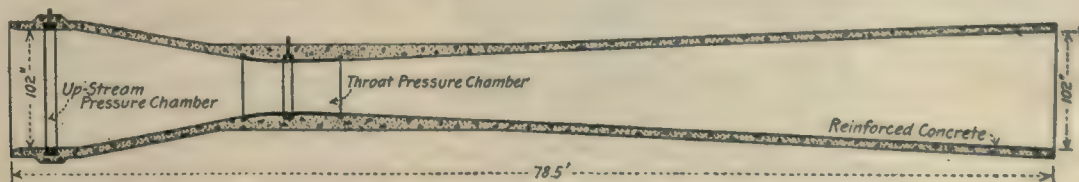
The new Methodist church at Wallaceburg, Ont., illustrated herewith, will be 80' x 78', constructed of brick, steel, and stone.

The basement provides for entertainment and dining rooms, four class rooms, kitchen, store room, fuel room, toilet rooms, etc. The auditorium and gallery seat 1,200 people. At one end of the auditorium is an annex which is to be used for a Sunday school room. This will open into the main auditorium by a series of folding doors. The choir loft will contain the organ and seat fifty choristers. On the left hand corner a vestry 16' x 16', has been provided for, with a circular staircase to basement. On the other corner is a choir room 16' x 16', which can also be reached from the basement by a circular staircase. Over the respective rooms are a board room and a secretary's room with entrance from the gallery. The building will be heated by three hot air furnaces. The main auditorium floor has a proper slope in every direction so that a good view may be had from any point in the church. The roof is supported by steel girders extending from the different pilasters. The ceiling will be panelled off with plaster moulds. All interior finish throughout the building will be Georgia Pine stained, rubbed down and waxed. The ornamental glass for the three main windows will be furnished by the Church Board at a later date.

The church in general will be of a modern type and will cost \$38,000. Tenders have already been received and work will commence early next spring. Messrs. Jacques & Williamson, Windsor, Ont., are the architects.

A Large Venturi Meter for the Montreal Water Works

The Builders Iron Foundry of Providence, R. I., has completed parts of a 102-inch tube for a new conduit which will supply water for the municipal system of



Section through 102 in. Venturi Meter for the Montreal Water Supply System

Montreal, Canada. The head is low at this point and, as the conduit is of re-inforced concrete, it was decided to make the cones of the meter of the same material. The up-stream pressure chamber and the throat section are of cast iron, the latter being bronze lined. The construction is shown in the accompanying figure.

It is not expected that this meter will be required to measure beyond 70,000,000 Imp. gals. (84,000,000 U. S. gals.) per 24 hours, but if the head should be increased, to increase the capacity of the conduit, the meter will register up to 230,000,000 U. S. gals. per 24 hours.

The registering and recording attachment is actuated by floats in wells connected to the pressure pipes, similar to the Divi Island plant. The counter dial is a straight-

reading type and shows total number of gallons passed. A chart recorder shows the rate of flow at all hours.

The Builders Iron Foundry has under construction the parts for a much larger meter than any yet installed anywhere. This is for the New York City Catskill Aqueduct, and it will have a maximum inside diameter of 210 ins. and a throat diameter of 93 ins.

Foreign Cement Barrels

The European cement barrel, especially that used for export trade, is a very substantial affair. The foreign barrel is made of Norway spruce. Its staves are tongued and grooved as well as jointed while the head is of the usual construction of the same wood. The hoops are of cherry wood, a much better grade than used in domestic barrels, and there are also two hoops of steel. When ready for packing the barrel is lined with black waterproof paper, through which cement cannot sift and

moisture and water cannot penetrate. Some shipments from Belgium involve ocean voyages of thousands of miles and it is said the cement invariably arrives in fine condition when packed in these barrels.

The province of Ontario expended over \$500,000 on good roads work during the season of 1910, as compared with \$435,000 during 1909.

A tax upon motor oil, together with the revenue from car licenses, has netted the old country \$5,000,000 in one year. This will be distributed upon road improvements all over England. Applications have been made for grants amounting to upwards of \$27,500,000.



New Methodist Church, Wallaceburg, Ont.—Architects: Jacques & Williamson, Windsor, Ont.

New Waterworks System at Vancouver

Additional Supply Obtained from Seymour Creek — Noteworthy Features of Design and Construction — Detailed and Summarized Cost Data*

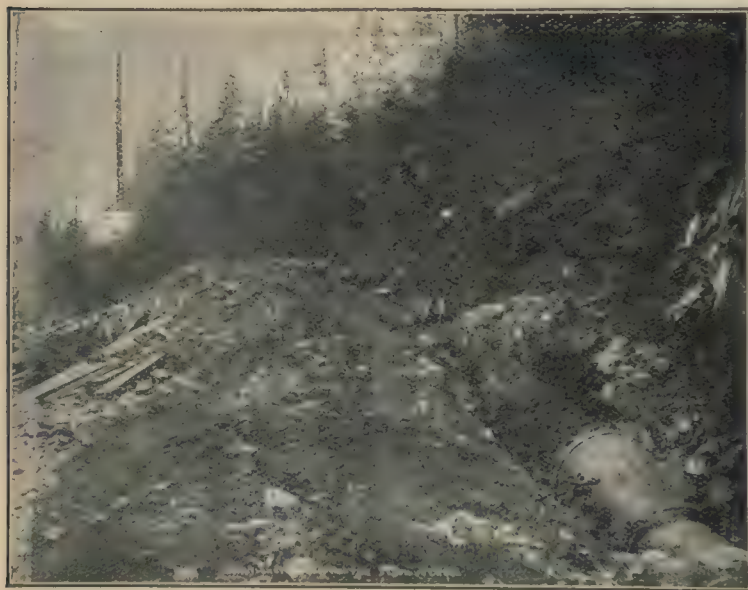
By H. M. Burwell

The City of Vancouver, B. C. has heretofore depended on Capilano Creek for its water supply. This creek empties into the northerly side of Burrard Inlet at a point about a mile and a half from the city. The supply has been adequate up to the present time, but owing to the recent rapid increase in the population, the necessity of securing water from another source was apparent for the following reasons:

(1) Capilano Creek at its extreme low water stage would not afford a sufficient supply for the future population.

(2) Owing to the rapid fall of this creek and its narrow valley it would be impossible to create storage reservoirs at a permissible cost.

(3) The crossing of the supply main under the First Narrows (being the entrance to Vancouver Harbor), made a dangerous point in the system, several of the submerged pipes having already been broken by ships' keels.



Junction of Wood and Iron Pipe, Seymour Creek

The city council therefore decided to secure an additional supply from Seymour Creek. This new system is now almost completed, and the following is a description of its chief features.

Seymour Creek empties into the northerly side of Burrard Inlet at a point about three miles east of the city. It is a beautiful, clear mountain stream (except once or twice annually, when it becomes a raging torrent), and has a fall at the lower part of about 65 to 70 feet per mile. Its drainage area is about 80 square miles, and its mean annual run-off about 500 feet per second. The extreme low water flow is about 80 cubic feet per second. The source of the stream is a lake of from 400 to 500 acres, at an elevation of 3,200 feet above sea level. In this neighborhood there are also two glaciers, which will help to maintain the supply of water during the summer months.

The waterworks intake is located seven miles above the

mouth of the stream at an elevation of 465 feet above sea level. Owing to the large amount of boulders, gravel, and finer sediment which the creek carries down during freshets, it was necessary to design the intake so that it would not become completely choked up under such conditions, and means had also to be provided to prevent the finer sediment entering the pipe.

The intake is formed by a hewn cedar crib with rock filling, 13 feet high. It has two openings, each 5 feet in width, and on the face of each opening is placed an oak rack, set in an iron frame. The water enters the intake at right angles to the direction of the stream, the faces of the racks being parallel with the axis of the stream. This allows boulders and most of the heavy sediment to be swept away, as the current of the stream is stronger than the current of water entering the intake.

About 50 feet below the intake a low weir, composed of large, broken rocks, extends across the creek. This weir is only of such height as to keep a sufficient depth of water on the intake during extreme low water periods.

The water, after passing through the racks, enters an 11 x 14 feet forebay. From this there is an open conduit 6 feet in width, of hewn cedar cribwork. This conduit extends down stream along the bank of the creek for a distance of 300 feet. Its upper end is furnished with a 6 x 10 head-gate. At the lower end of the open conduit is placed a scour-gate, discharging into the creek, to flush out the sediment which may enter the intake and deposit itself along the flume.

Just below are located two sediment tanks, designed to separate the finer sediment and floating matter from the water and prevent it entering the pipe. These tanks are built of 6 in. x 1 in. sawn cedar timbers, the sticks all being placed flat and drift-bolted together, with frequent tie-sticks extending into the bank. Each tank is 20 x 100 x 6 feet deep, and is lined with 3 inches of concrete, fastened on the sides with expanded metal, spiked to the timber walls.

The floors of the tanks were made by first covering the ground (which consisted of a compact mass of boulders and gravel), with expanded metal, held in place by numerous 3/4-inch anchor bolts driven between the boulders. On this as a bed 3 inches of concrete was floated.

Each tank is supplied with a 4 x 5 feet inlet gate, and there is also one of the same dimensions at the lower end.

A few feet in front of the lower gates are placed two rows of screens, extending across the entire width of both tanks. There are 16 screens in all, each 5 feet square, having iron frames, backed with heavy steel wire netting, and fitted in front with light wooden frames on which the fine screens are fastened. The screens are operated by a hydraulic hoist, which lifts a row of 8 at a time, the whole row being cleaned by means of a strong jet of water. The refuse falls into a cement trough in the floor and is carried out into the creek. The water for this work is supplied from a small mountain stream through a 4-inch pipe, under a 125-foot head.

* Read before the General Section of the Can. Soc. C.E., Dec. 8, 1910

Across the bottom of both tanks is placed a weir or baffle, 18 inches in height, situated about 6 feet in front of the screens. Its duty is to prevent the sunken matter and heavier sediment from coming in contact with the screens.

Just above the weir is built a skimmer, which crosses both tanks. This contrivance makes provision for the overflow and carries off all floating matter.

Each tank is provided with a scour-gate, 24 inches square, placed on the floor. A tank can thus be flushed out without interfering with the supply.

The Supply Main.—Before constructing the supply main, a good wagon road was built along the pipe line. It has a maximum grade of $4\frac{1}{2}\%$ and a total length of 7 miles. For the first $3\frac{1}{4}$ miles below the intake it is located on the westerly side of Seymour Creek. It then crosses the creek on a steel bridge, and extends along the easterly side to the Second Narrows of Burrard Inlet. About half a mile below the bridge the creek passes through the Seymour Canyon, a deep cleft in the rock, having almost perpendicular walls. Here the road is excavated through rock along the edge of the canyon for some distance and is very picturesque.

Wood-stave Pipe.—The pipe line is along the side of the road farthest away from the creek. For the first 1,000 feet it consists of a continuous wood-stave pipe, 36 inches inside diameter. From this point, where there is a slight summit in profile, the wood-stave pipe is 30 inches diameter. The staves, of which the pipe is built, have a thickness of 2 inches, and were chiefly fir timber, although some cedar was used. These staves were manufactured near the site of the work. The lumber used in the sediment tanks and intake buildings was also cut on the works, a portable sawmill and logging donkey engine having been procured for this purpose.

The price of the class of lumber required would have been \$40 per 1,000 feet B.M. if purchased at the mills in Vancouver. The necessary haulage and handling would have increased the cost to at least \$50 per 1,000 feet. The actual cost of the lumber used in the pipe, including equipment, was \$28.50 per 1,000 feet.

The wood pipe is supplied with two 30-inch gate valves, one placed about $1\frac{1}{4}$ miles and the other 3 miles below the intake. These positions were selected partly for use in case of emergency and partly to facilitate the construction of the pipe. The pipe in one place will be subjected to a pressure due to a static head of 210 feet, and on this portion (which is near the bridge) the steel bands are spaced $1\frac{1}{4}$ in c. to c. The bands are of $\frac{1}{2}$ -inch steel, fitted with forged steel shoes, and have an average spacing of $3\frac{3}{4}$ inches c. to c.

Bridge Crossing.—The crossing of the bridge is made with a 32-inch continuous steel riveted pipe, with bends and special connections for wooden pipe at both ends. It rests upon the floor-beams of the bridge, and is provided with a 6-inch blow-off valve at the centre. The watertight connections between this steel pipe and the wooden pipes are made with ordinary lead joints. Where the pipe line crosses ravines or small hillside creeks, it is supported on substantial cedar trestles, and is enclosed in cedar cribwork filled in with sand and gravel.

In places where it is thought there might be danger from fires, the pipe line is supplied with 2-inch globe valves, with a length of hose and a nozzle in each place, enclosed in a small house.



New Intake for the Vancouver Waterworks System

Welded Steel Pipe.—From the canyon down to the Second Narrows the pipe line is constructed with 24-inch lap-welded steel pipe. The shell of the pipe has a thickness of 5-16 inch (being the standard thickness of plate with which this kind of pipe of the above diameter is made). It is in about 19-foot lengths, and is known as "Stewart's patent inserted lap-welded steel pipe," costing \$3.80 per foot delivered at Vancouver.

At the upper end the pipe is supplied with a gate-valve and a 6-inch blow-off. At the Narrows it connects with the two 18-inch submerged mains by means of a Y special, and is supplied with a 6-inch blow-off placed within a concrete well, which also encloses the Y and two 18-inch gate-valves. This portion is covered with tidal water at times.

Submerged Mains.—The total distance across the Second Narrows is 2,600 feet, but only 1,000 feet of the channel is deep water, the rest being tidal flats uncovered at low water.

In the central portion of the channel, which has a depth of 85 feet at low water, two 18-inch flexible cast-iron pipes are used, in lengths of 9 feet, with a $1\frac{1}{4}$ -inch shell. Each pipe length weighs 3,300 lbs. and each joint is capable of a deflection of 19° . The pipe is of the ball and socket type.



The Finishing Touch on the Seymour Creek Pipe Line

The ball is formed by running lead into the joint after the pipe has been placed.

The shore connections, amounting to 1,000 feet, are made partly of steel and partly of ordinary cast-iron pipes.

An interesting feature of the work was the placing of the flexible pipes along the bottom of the deep channel. This was accomplished by first building a wooden trough or chute on the tidal flat at the northerly shore, directly in line with the crossing, and extending out to the edge of the deep channel. The chute was made of 3 x 12-inch lumber, supported on trestles, and of a length equal to that of the flexible main. It was well greased on the inside, after which the pipes were placed and joined together, the bell ends each resting on a short board forming a sort of sled, used to keep the pipes in place and to reduce the friction in sliding them along.

A 1½-inch steel cable was then drawn through the pipe and fastened at each end to eye-bolts of 2-inch Norway iron of about 8 feet in length. These passed through cast-iron caps placed at each end of the pipe. The rear bolt was threaded for about 6 feet, and provided with a large nut by which the cable inside of the pipe was made taut. The front end cap was provided with a stuffing box to permit the movement of the eyebolt outward as the strain came on the inside cable, without admitting water into the pipe.

Three 1½-inch steel hauling cables were then fastened to the pipe, one about one-third the distance back from the front end, one at the front end, and the other was fastened to the above mentioned eye-bolt.

As the Canadian Pacific Railway passes along the southerly shore of the Narrows, close to the water's edge, a bridge had to be erected over the track to prevent interference with traffic. The cables were carried over on top of this bridge, which, owing to a high bank on the south side, was built on a slope of about 15°.

The platform was extended uphill to a large spruce stump, which was used as the chief anchor for handling the pipe. At the lower end of the platform, which was 85 feet in length, there was a wooden roller, over which the hauling cables passed.

The hauling was performed by means of 5 capstans, operated with horses, transmitting a strain of 180 tons to the hauling cables.

In hauling the several 12-inch mains across the First Narrows, in the Capilano system, it was noticed that, owing to leaks at the joints, the pipes were always full of water before the ends reached the south shore. This added to the weight and made the hauling more difficult, especially as the last part of the haul was up a steep hill. The new main being much heavier than any previously hauled, it was decided, in order to avoid leakage, to install an aircompressor and maintain a pressure of from 50 to 60 lbs. in the pipes while being hauled. The haulage was done by day labor without unusual difficulty.

The conduit from the Second Narrows to the city, where it connects with the Capilano system (a distance of about 3 miles), is a 24-inch lap-welded steel pipe, with the exception noted below. Its connection with the submerged pipe is made by means of a Y, the same as on the north shore, but, in addition, the two 18-inch gate-valves have two 18-inch check-valves bolted to them. The pipe passes under the railway tracks in a concrete-lined tunnel, in which is placed a special steel-riveted pipe, with the necessary T and bends, all riveted together and resting in concrete saddles and concrete backings at the bends.

The pipe line, after passing through the tunnel, follows the railway right-of-way for a distance of about half a mile, and, in accordance with an agreement with the railway company, this portion is made of ¾-inch steel plates.

The total length of the main from the intake to the connection with the Capilano system in the city is about 10½ miles, and the capacity of the system 9,000,000 gallons per day, or about equal to that of the present Capilano system.

Cost Data.—The wagon road along Seymour Creek was built by contract at a cost of \$44,500. The work contained some very heavy side-hill cuttings and a considerable quantity of rock work.

The pipe trench for most of its length was excavated through a compact mass of large boulders and gravel, deposited by glacial action. That portion along the edge of the canyon was excavated through granite rock.

The trench for the wooden pipe, 4 feet in depth by 5 feet in width, was excavated by contract, the price being 49 cents per lin. foot. The rock work was paid for per cubic yard, making the average cost of the trench 73 cents per lin. foot.

Cost of Wood-stave Pipe.

	Per lin. ft.
Excavation of trench (contract)	\$0.73
Building pipe	.39
Steel bands, including haulage	1.38
Lumber, including haulage	.65
Tongues, including haulage	.02
Paint for bands, including haulage	.02
Inspection	.01
Back-filling over pipe (day labor)	.25
Total	\$3.45

Cost of the Steel Pipe.

Excavating trench (day labor)	\$0.85
Steel pipe	3.80
Laying and making joints, including lead	.23
Back-filling	.25
Haulage of steel pipes (day labour)	.07
Total	\$5.20

SUMMARY OF THE COST OF THE WHOLE WORK PERFORMED.

North Side of Burrard Inlet:

Wagon road (contract)	\$ 44,500
Wharf and approach at Narrows (contract) ..	6,000
Steel bridge	7,000
Warehouse and camp buildings	1,500
Intake and sediment tanks, including lumber, screens, gates, complete (day labor)	19,500
Wooden-stave pipe line	78,500
Steel pipe line (day labor)	76,500
Gate-valves, special steel pipe, bends, air-valves, etc.	3,500
Trestles and culverts (day labor)	3,500
Repair work to road, cutting out slides and corduroy work (day labor)	3,500
Protection work to pipe line, riprap, and crib work (day labor)	5,500
Telephone line	1,000
Portable sawmill	6,000
Logging donkey engine	3,000
Rough lumber in stock	9,000
Teaming	1,000

Total **\$270,000**

Submerged Main:

Flexible c.i. pipe, 1,000 feet	\$8,500
Hauling flexible pipe (day labor)	4,000
1,600 feet steel and c.i. pipe (shore connection) ..	7,500
Laying pipe and making shore connections, including delivery from city of all pipes	1,000

Gate-valves and specials	2,500
Lumber and tools	500
Protection work, riprap, and concreting	1,000
Lead	2,000

Total\$ 27,000

South Side of Burrard Inlet:

Tunnel under railway track, concrete-lined, with 40-foot shaft	\$2,000
Special steel riveted pipe, with concrete saddles and anchoring	2,000
Steel main to city, connecting with Capilano complete	86,500

Total\$91,000

This brings the cost of the Seymour Creek system at the present date up to\$388,000

For engineering and superintendence 11,000

Total\$399,000

This amount does not include the cost of the land purchased for reservoir sites, foreshore land, pipe line right-of-way, and legal expenses. The cost of the ordinary labor varied from \$2.80 to \$3 per day of 10 hours.

The City of Vancouver holds records of water on Capilano and Seymour Creeks amounting to 2,900 B. C. miner's inches. This amount will be sufficient to supply a population of about 400,000. In order to make use of the water from any stream in British Columbia, it is first necessary to apply to the Government for a water record.

The combined water systems, as at present developed, are estimated to supply a population of 180,000.

Reservoir.—In addition to the above work there is now being constructed a 24,000,000 gallon distribution reservoir to be used for a high-level system. This reservoir is situated about 1 mile south of the city boundary on the top of a rocky hill, known as Little Mountain, and has an elevation of 395 feet above sea level at high water mark. At present it is connected with the Seymour Creek system by a single lap-welded steel pipe, 18 inches in diameter, but it is the intention to have it also connected with a high pressure pipe from the Capilano Creek system. This will insure safety from interruption in the supply and render the system an ideal one.

The formation at the site of the reservoir consists of a top layer of very compact sand, gravel, and boulders, from 3 to 4 feet in thickness, overlying hardpan, which rests on trap rock. The material excavated was used to form the banks of the reservoir, the finer being placed on the inside slopes and the coarser material and rock on the outside. The total excavation was about 80,000 cubic yards, of which 18,000 cubic yards were from solid rock. This rock was placed around the outside of the earth-bank, forming a riprap extending from the bottom to the top of the bank for its entire length, and adding to its stability as well as greatly improving its appearance. The excavation was performed under contract by Mr. M. P. Cotton, of Vancouver, who received 54 cents per cubic yard for earthwork and \$1 per cubic yard for rock-in-place.

With the exception of the top layer of about 3 feet, the entire mass had to be drilled and blasted, after which it was excavated with a steam shovel and hauled to place by dump cars. For this purpose a track was carried around on top of the bank and shifted as the work advanced. The earthwork in the bank was completed last autumn, so that it might settle during the winter. The wages paid on the work ranged from 25 cents to 35 cents per hour.

Tenders are now being asked to construct the concrete lining, which will be proceeded with at once. The bottom lining

will consist of concrete slabs not greater than 12 feet square by 4½ inches thick, with V-shaped joints, which will be filled with the best quality of clay or asphaltum.

The side slopes, which are 2 hor. to 1 vert., will be lined with reinforced concrete, with expansion or parting joints every 50 feet. This lining will have an average thickness of 4½ inches, and will be reinforced with Clinton electrically-welded wire. The reinforcement for the bottom half will weigh about 42 lbs. per 100 square feet, and the top half 24 lbs. per 100 square feet. This reinforcement will be held in place during the construction of the lining by flat anchor rods, driven into the bank, and the concrete will be poured into the forms in a wet condition.

All concrete used in the work will consist of the following ingredients: 1 part of Portland cement, 2 parts coarse, sharp sand, 2 parts broken rock, free from dust or dirt, which will pass through a ring 1 inch in diameter.

Inlet Pipe.—The inlet pipe is of continuous ¾-inch riveted steel, having a diameter of 24 inches and a length of 175 feet. This pipe was placed in its trench and embedded in concrete before the excavation of the reservoir. It passes through two concrete bulkheads or cut-off walls, and is provided at the reservoir end with a balanced valve arrangement, designed by the writer, and at the outflow end with a scour-gate, a swing check-valve, and an automatic regulating valve.

The second submerged main, with shore connections complete, cost about \$19,000, and the pipe line to the reservoir, including valves and specials, about \$75,000. The probable cost of the new reservoir will be \$80,000. This will bring the total cost of the Seymour Creek System up to about \$575,000, its capacity being about 9,000,000 Imperial gallons per day.

Canada's Longest Concrete Bridge

The reinforced concrete bridge at Weston, Ont., known as the Wadsworth Bridge, was officially opened to the public on the 8th inst. This structure is the longest arch span in Canada. The total span is 118 feet 6 inches and the length, over all, 178 feet. A constructional view and a brief description were published in our issue of November 2. The Wadsworth Bridge was designed by Messrs. Barber & Young, consulting engineers, Toronto, and the contractor was E. C. Lewis, of Toronto. The opening ceremony was performed by the warden, Mr. A. E. Pugsley. There was a representative attendance, those present including the commissioners, Messrs. R. P. Coulson, S. P. Foote and R. J. Bull, Professor Gillespie, and a number of visitors. After the opening an excellent dinner was served at the Central Hotel, Weston.

J. F. Hewitson, of the firm of Stewart & Hewitson, contractors, Fort William, returned to that city last week after a visit to Toronto, Montreal and Chicago.

Reports to the Temiskaming and Northern Ontario Railway Commission indicate the progress being made in the construction of the National Transcontinental Railway in the vicinity of Cochrane, Ont. On the 205-mile contract held by Mr. J. O'Brien, west of the 100 miles completed by Fauquier Brothers, three and a half miles of steel were laid in two days last week, and the work is being rapidly pushed forward. It is expected that the bridge over the Metagami River will be finished by the end of the month. To the east of the Town of Cochrane the steel is laid three miles east of the Whitefish River, or 86 miles east of Cochrane.

The Norton Griffiths Company, Limited, the well known London, Eng., contractors, have established a branch at Vancouver, B. C., with Mr. W. Burton Stewart in charge, as general manager.

Use of Binding Materials in Metalled Roads

Asphalt Oil, mixed with Gravel, Satisfactory and Economical for Ordinary Use—Addition of Asphalt for Heavy Traffic—Specifications and Directions*

By Harold Parker, Boston, Mass.

In this paper I shall describe a method that was used in building such a road as, it seemed to me, fulfilled the needs of modern traffic. This road has now been in use for nearly a year and it shows no sign of wear, is perfectly dustless and not unduly slippery.

The old road consisted of macadam constructed in 1900, of local granite, was out of shape, rutted and badly worn by automomile traffic, but with sufficient body to serve as a foundation for a bituminous surface of gravel and oil.

The old macadam surface was loosened by picking up with a steam roller, then shaped by shovels and rolled down with a ten-ton roller, but not tightly bound on top, the old stones being left rather loose to prevent the crawling or waving of the top gravel and oil surface when applied. On this was spread the bituminous mixture of gravel and oil.

This consisted of seven different grades of composition designed to determine as far as might be possible the comparative proportions of gravel, stones, sand and asphaltic oil that would give the best results. Each section, with the exception of the last one, was about 300 feet in length, 15 feet wide and 2 inches thick after rolling.

Section No. 1.—One part of gravel that would pass through a one-half inch and be retained on a one-quarter inch screen and one part of sand that would pass through a one-quarter inch screen was mixed with an asphaltic binder in the proportion of 18 gallons of binder to the cubic yard. The oil consisted of one part of pure asphalt and three parts of asphaltic oil, the oil conforming to the specifications given at the end of this article.

Section No. 2.—The same proportion of sand and gravel as in Section No. 1, mixed with asphaltic oil without the addition of asphalt or oil, was used in the proportion of 18 gallons to the cubic yard of material.

Section No. 3.—Two parts of gravel that would pass through a one-half inch and be retained on a one-quarter inch screen and three parts of sand that would pass through a one-quarter inch screen were mixed with an asphaltic binder in the proportion of 17 gallons of binder to the cubic yard. The binder consisted of 37.5 per cent. pure asphalt and 62.5 per cent. asphaltic oil.

Section No. 4.—The same proportion of sand and gravel as in Section No. 1 with 18 gallons of bituminous binder consisting of 12.5 per cent. pure asphalt and 87.5 per cent. asphaltic oil.

Section No. 5.—One part of gravel that would pass through a one-inch and be retained on a one-quarter inch screen and one part of sand that would pass through a one-quarter inch screen mixed in the proportion of 18 gallons to the cubic yard, with asphaltic oil without the addition of pure asphalt.

Section No. 6.—Gravel and sand of the same size and proportion as in Section No. 5 mixed with the same quantity of bituminous binder consisting of 87.5 per cent. asphaltic oil and 12.5 per cent. of pure asphalt.

Section No. 7.—Gravel and sand of the same size and proportion as in Section No. 5 mixed with the same quantity of bituminous binder consisting of 75 per cent. asphaltic oil and 25 per cent. of pure asphalt.

The gravel and sand was taken from a pit near the road, and, as previously shown, was screened first to separate the sand and then to eliminate the larger stones, making two screenings. The gravel contained a fair proportion of stones ranging in size quite regularly from the smallest to the largest described above. The sand was sharp, was composed largely but not entirely of quartz, and was not very clean. There was sufficient very fine sand or sticky earth in it to very nearly fill the finer voids between the particles of the coarse sand. The separation of gravel, stones and sand was made in order to determine the relative proportions of each to be used.

The oil used was in accordance with the following specifications:

Asphaltic Oil.

The oil shall be of uniform color, appearance, general character and viscosity and must fulfill the following requirements:

- (a) It shall not froth when heated to 100° C.
- (b) It shall have a specific gravity of at least 0.97.
- (c) It shall not contain more than 0.5 per cent. of dirt or adventitious mineral matter.
- (d) It shall not contain more than 1 per cent. of matter insoluble in carbon bisulphide.
- (e) It shall be of such viscosity that 60 c. c. measured at room temperature (78° F. or 26° C.) shall when at 100° C. be not less than 5 minutes nor more than 10 minutes in passing the Lawrence viscosimeter, or 200 c. c. measured and tested at the same temperatures shall be not less than 18 minutes nor more than 36 minutes in passing the Engler viscosimeter.
- (f) When 20 grams are heated in a flat bottom dish 3 inches in diameter for twenty-one hours in a well ventilated oven kept at a temperature of 250° C., the loss in weight shall not be greater than 20 per cent.

The asphalt was not a natural asphalt, but was a product obtained by distilling an asphaltic oil conforming to the following specifications:

Oil Asphalt.

The asphalt shall be of uniform color, appearance and character, and shall contain no body not naturally present in an oil asphalt.

- (a) It shall not contain more than 1 per cent. of dirt or adventitious mineral matter.
- (b) It shall have a specific gravity between 1.02 and 1.10.
- (c) It shall contain not more than 1 per cent. of matter insoluble in carbon bisulphide and should not contain more than 30 per cent. insoluble in petroleum ether.
- (d) It shall not lose more than 40 per cent. by weight by distilling to 360° C.
- (e) When 20 grams are heated in a flat bottom dish 3 inches in diameter for twenty-one hours in an oven kept at a temperature of 100° C. the weight shall remain practically constant.

It developed that the oil should be so free from ammoniacal liquors and lighter oils, and also so free from moisture, that it would not foam in heating. The presence of an ounce of water in a barrel of oil would cause the same to foam and expand to several times its natural volume while heating.

* Extract from paper presented at Second International Road Congress, Brussels

Preparation of the Surfacing Material.

(a) Oil and Asphalt.—The oil and asphalt were heated separately in kettles from 300° to 400° F., asphalt being generally hotter than the oil, care being taken not to burn by overheating in the kettle. The kettles used for this purpose were of two patterns, both designed by the Massachusetts Highway commission. The one used for heating the oil had a capacity of 300 gallons and the two for heating asphalt a capacity of 125 gallons. All three were on wheels, but they were all kept in the pit where all the heating and mixing were done.

(b) Gravel and Sand.—These were heated separately by means of thin iron smoke stacks laid on the ground, with wood fires. The stacks were about 10 feet long and laid in groups of four, about 18 inches apart and parallel with each other. The screened sand or gravel was thrown over them to a depth of about one foot and after being heated to a temperature approximately 225° F. the stacks with the fire in them were lifted out of the heated gravel or sand, laid down in another place and again covered with the material to be heated.

The mixing of the oil, gravel and sand was done by hand shoveling in wooden or steel mixing platforms, on the wooden first, afterward on the steel. The latter were much better, as they materially reduced the labor. The heated sand and gravel in the above proportions were measured out on the platform by means of a measuring box; hot oil in small quantities, perhaps one-third of the required amount, was thrown over the hot material and turned over once; then the full amount of oil was added and turned, then the full quantity of asphalt was added and thoroughly mixed until practically no sand could be seen that was not thoroughly coated and there were no lumps, and the completed mixture was ready to be shoveled into the carts and hauled to the road. From two to three gangs of mixers were kept working all the time when progress was satisfactory, the idea being that the steam roller, teams and foremen should be given all they could do, thereby increasing the output by working as many low cost units of labor as possible with a minimum of high cost units.

Placing the Road Surface Material.

The temperature of the mixture after reaching the road in the carts was from 150° to 250° F. It was shoveled from the carts into place, or dumped upon a dumping board and shoveled back into place. The best results were obtained when shoveled directly from the cart, perhaps because there was less cooling. One man could do all the spreading. All the coarser stones were carefully raked ahead into the bottom, so as to reduce as far as possible the voids in the surfacing.

The most careful spreading was given and a ten-ton roller followed directly after the material was spread. The surface could not be finally rolled at once, the rolling process being somewhat gradual and completed as the material hardened in cooling. It is probable that if, instead of a regular ten-ton road roller which was not perfectly adapted to the work, a five or six-ton tandem asphalt roller had been used, the rolling would have been cheaper and better.

To obtain perfect results, teaming should be kept off the road for a period which need not be longer than 24 hours after spreading, when the rolling would be completed.

The use of the different percentages of asphalt in the oil and the variations in the character of the gravel in these experiments was for the purpose of determining which of the different experiments served the ends sought most satisfactorily.

The conclusions reached were that all of these trials appear to be successful, that where the traffic is heavy, asphalt should be added proportionately. For ordinary use, however,

asphalt oil, as defined in this paper, without the addition of asphalt, mixed thoroughly with gravel composed of particles not larger than would pass through a one-half inch screen, will produce a road that will withstand the wear of automobiles and other traffic in a manner satisfactory and economical.

An Active Winter at Montreal

Construction Work Proceeding Apace—A Forecast for the Spring—Impending Contracts—Plenty of Business Ahead

Montreal, Dec. 23, 1910.

Christmas right on top of us, snow everywhere, the thermometer hovering round the little figures beneath zero, and building and construction work still going on! Three years ago, less perhaps, the first signs of winter meant the practical abandonment of all outside work except snow-shovelling. To-day, what a difference! No matter where one goes in Montreal, work is to be seen progressing almost as rapidly as in the summer. In the north end of the city they are still putting up tenement houses, and although outside work on the Protestant school on Christopher Colombe street is finished, not five hundred yards away, on Lasalle street, foundation work on a new religious institute is just being completed. Further north, in the same district, the city is erecting a pumping station on Laurier avenue, and along Papineau avenue and Gilford street gangs of men are at work laying water and gas pipes.

The erection of the big stores on St. Catherine street is also continuing at full speed. Incidentally, the beautiful terra cotta work which the Wolliscroft people are putting on the Blumenthal building is going to add to the beauty of Montreal's chief shopping street. Farther west, the stone work on Ogilvy's new store is beginning to cover the great steel framework which has looked so neglected all summer.

If rumour is to be believed, next spring will be the busiest in Montreal's history. Preparations are being made for extensive work on all parts of the Island. It was stated to-day on very good authority that Laval University is negotiating for the purchase of a large block of land between Atwater avenue and St. Mark streets on Sherbrooke street for the purpose of erecting a new University. This should be amongst the big things for the spring. The old building on St. Denis street will probably be purchased by the city for a library—at least that is the intention of the men who are handling the matter. Maisonneuve is to have several new factories, two shoe manufacturing firms in Quebec having purchased land for the purpose of removing their factories to this district, while the Dominion oil-cloth people and the Tetreault shoe manufacturing company are also concluding arrangements for erecting large factories there in the spring. Interests behind a new button manufacturing concern have purchased 12,500 feet of land in the town for the purpose of erecting a factory.

Tenders are to be asked this week for restorations and additions to the Quebec custom house about which Mr. Lyburner, superintendent of the Montreal Post Office can give further information, whilst the Dominion Steel Company are considering the extension of their blast furnaces and ovens at Sydney.

The extensions to the A. E. Rea company's departmental store are being opened up, making this building one of the largest of its kind in the Dominion, and it is not improbable that before the end of the spring the Scroggie corner on St. Catherine and Peel streets will be the scene of many transformations.

Canadian's Success in Detroit

Among the many Canadians by birth who have attained distinction in business and politics in the United States, is Mr. Robert Y. Ogg, of Detroit. He has just been elected for the third time to the Michigan House of Representatives from the City of Detroit.

Like a good many men in the limelight to-day, Mr. Ogg graduated from the journalistic ranks. He stated his career as a newsboy on the streets of his native town, Dundas, Ont., learned the printers' trade on the Dundas Standard and Hamilton Spectator, worked as a journeyman printer in many Canadian and American towns and cities, and about a quarter of a century ago located in Detroit, where he became a writer on municipal subjects. Later, he served for five years as Secretary of the Department of Public Works.

Mr. Ogg is now engaged as a manufacturers' agent with offices in the Majestic Building, Detroit, representing the Metropolitan Paving Brick Company, of Canton, Ohio, (manu-



Mr. Robert Y. Ogg, Detroit

facturers of Metropolitan paving brick); Republic Creosoting Company of Indianapolis, Ind., (creosoted wood block); Orleans County Quarry Company, Albion, N.Y., (producers of Medina blocks and curbing).

Mr. Ogg's popularity is shown by the fact that he had a majority of over 15,000 in the recent election. He is a staunch American, but always has a warm spot in his heart for Canada, where he has a wide acquaintance especially among town and city engineers and municipal authorities.

An Interesting Announcement

One of the largest exhibits at the 1911 Toronto Exhibition is to come from, Bristol, England, representing the trade and general commerce of Bristol and the West of England.

This information, which has not yet been sent to the Exhibition authorities has just been received from the English city by a Montreal gentleman whose correspondent states that a committee of manufacturers is being organized by Mr. Henry L. Riserley, of Cecil Road, Clifton, Bristol, to take charge of the exhibit.

"We want to show Canada," the letter runs, "that Bristol manufacturers are alive to the possibilities of trade with the Dominion, and we intend doing our best to make our section the finest and most talked about in the Exhibition."

It will be remembered that last summer a large deputation of Bristol manufacturers and merchants visited Canada, and

after a tour through to the coast expressed themselves as amazed and gratified with the progress being made. They regretted that so much trade was going to other countries outside the British Empire and determined to do what they could to capture as much as possible for themselves. Since then many of them have sent travellers to Canada and established agencies here whilst enquiries are now being made in various parts of the Dominion relative to sites for warehouses and factories. By next summer it is possible that several factories will be in course of construction by these energetic West of England men, and as the products of Bristol and vicinity extend right through the alphabet from acetylene apparatus to zinc manufactures, the visit should be productive of much good both to Canada and Bristol.

Personal News and Notes

Building permits issued at Calgary during 1910 total approximately \$6,000,000.

Mr. J. W. Stewart, of Foley, Welsh & Stewart, the well known railway contractors, sailed last week for Scotland.

The death occurred last week at Victoria, B. C., of Mr. Theodore Luble, one of the pioneer civil engineers of the province.

Mr. J. W. Wilson, the well known architect of Chatham, Ont., is appealing to the electors of that city for a position on the aldermanic board of 1911.

Mr. G. H. Broughton, civil engineer and surveyor, has opened an office in the Princess Theatre Block at Regina, Sask.

A report from Nelson, B.C., states that the C. P. R. will build a branch from below Elko in the Kootenay to the undeveloped coal fields at Waldo.

\$400,000 will be expended in present construction on the Royal Ontario Museum now being erected on the University property on Bloor St., Toronto.

City Engineer Rust, Toronto, returned recently from a trip to a number of large American cities, which he visited for the purpose of getting information for his report on a steam heating franchise for Rosedale.

Building permits issued at Vancouver last month totalled \$1,897,585, compared with \$610,189 for November, 1909. The total permits issued for 1910 to date are \$12,196,740. For the whole of 1909 the returns were \$7,258,565.

George A. Fuller & Company, of New York, the well known building and engineering contractors, have taken a temporary office in the Jacobs Building, Montreal. They are having permanent offices specially fitted up for them in the same building.

At a recent meeting of the Vancouver branch of the Canadian Society of Civil Engineers, presided over by Mr. Geo. Webster, Mr. Wm. Dart gave an address on the Testing of Concrete Pipe, and Mr. F. P. Wilson read a paper on Railway Organization and Cost Keeping. Messrs. Dart and Wilson are both resident engineers of the C.P.R.

Mr. E. H. Lea, a member of a Dominion Government survey party engaged in locating the Canadian-Alaska boundary line, had a remarkable escape while prosecuting his work. He was crossing a snow covered track when he suddenly fell down a crevasse 4,000 feet deep. Sixty-five feet from the surface he was wedged between two icy walls. Finally he was rescued by his companions. He has been laid up for two months by injuries, consisting principally of broken ribs and dislocations.

The annual convention of the Canadian Cement and Concrete Association will be held at the St. Lawrence Arena, Toronto, March 6-11, inclusive. Owing to pressure of sca-



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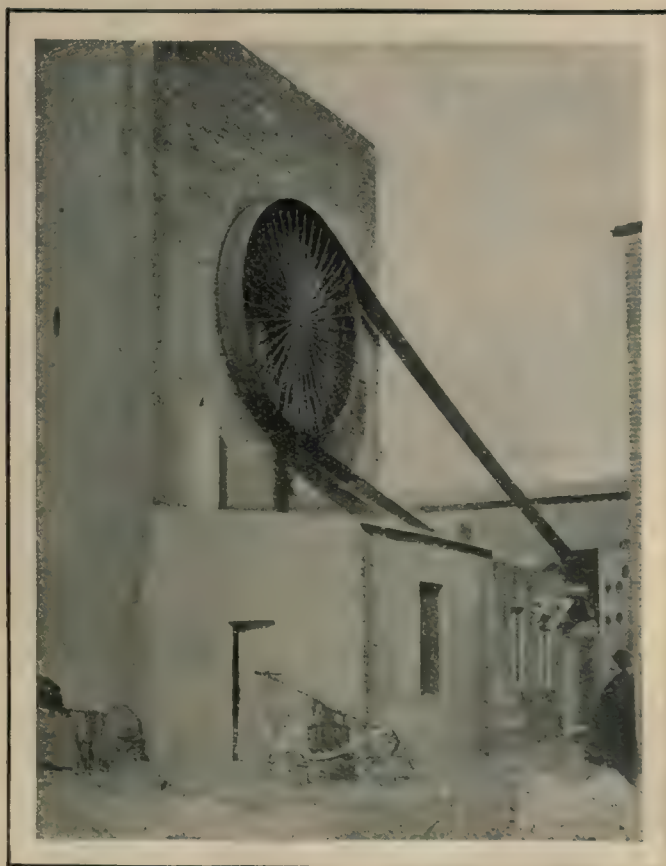
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Agents Wanted in Other Cities.

demical work and other duties, Mr. R. E. W. Hagarty has resigned his position as secretary-treasurer of the Association. Mr. William Snaith, of 57 Adelaide St. East, Toronto, has been appointed in Mr. Hagarty's stead.

The addition to the boiler shops of the J. I. Case Threshing Machine Company, Incorporated, Racine, Wisconsin, is just being completed. This is a building, 6 ft. by 215 ft., which will be used exclusively for a stock room for the Case boiler shops. A boiler storage has been completed 230 ft. by 60 ft. This is equipped with a travelling crane for movement of boilers from one part of the building to another. Under the supervision of the Case architect the above work has been undertaken and completed, also the remodelling of the Garfield warehouse, which is 100 ft. by 250 ft. and two stories high. This building, when the remodelling is completed, will be used as a machine shop. Machine shop facilities have not been adequate. As soon as the weather will permit, other buildings will be put under construction. The heavy business for the present year has necessitated all these changes.

Publications Received

Escher Wyss & Co., Zurich and Ravensburg, have favored us with a number of their most recent catalogues of water turbines, Zoelly turbo-compressors and Zoelly marine turbines. This firm has a world-wide reputation for these supplies. The total number of water turbines of all kinds built by Escher Wyss & Co. to the end of June, 1910, was 4,664, with a total output of 1,642,000 h.p.

We are indebted to the St. Bride's Press, Ltd., London, Eng., (proprietors of "The Surveyor") for a copy of "Practical Road Engineering," by H. Percy Boulnois, M. Inst. C.E., (140 pages and introduction; illustrations; price 5s. net). This book is compiled from the special "Roads" issues of The Surveyor and Municipal and County Engineer, and is unique in the respect that it is written by many authors, all of whom are well known experts on road questions. It deals exhaustively with a great variety of subjects and cannot fail to be of interest to all interested in good roads. The book is a veritable encyclopedia of the most approved English practice.

We are indebted to Messrs. Chas C. Thompson Company, publishers, Chicago, for a copy of "Dustman's Book of Plans and Building Construction." This book is designed for general contractors and builders and for prospective home builders. It contains, in addition to the plans for 150 modern houses, bungalows, barns, etc., a wealth of constructional information that should prove of the greatest value. The author, Mr. U. M. Dustman, is widely known as a practically expert architect, and as an authority on building construction. The contents include: General Construction Plans—Plans with Estimated Cost of 150 Houses, Bungalows, etc., in Frame, Concrete or Brick Construction—How to Estimate Costs—Store Fronts—Roof Construction—Directions for Concrete—Itemized Lists of Material Costs. The Book is well arranged and durably bound in green cloth. Price, \$2.00.

"Traité théorique et pratique de la Résistance Des Matériaux appliquée Au Béton et Au Ciment Armé," by N. de Tédesco and A. Maurel (second edition). 1 volume in-8°, 656 pages and 199 illustration. Published by Béranger, Paris, 1910. Bound in red cloth, 25 francs.

The authors of this important work have written it with the idea of publishing all that is actually known on the subject of reinforced concrete. Book I reviews the physical, chemical and mechanical properties of Portland cement, and

of cement mortars and concretes. It also contains a synopsis of the methods for calculating works in non-reinforced concrete. Book II. treats of the principal methods of calculus which have been proposed, among which is that of M. Considere, followed by interesting extracts of official regulations of different countries. In Book III., the authors give a first essay on the calculus of reinforced cement under compression, extension, shearing and oblique efforts; the general theory of the calculus of deformation is next treated. In Book IV., we find the results of application of the formulae obtained in the preceding book, in varied cases of pieces submitted to flexure, slabs, girders, elements of ribbed floors, etc., in which the different parameters are made to vary, such as the percentage of reinforcing material or the safety coefficient. These examples enable the reader to grasp the method completely, and have the advantage of showing the influence of different variable parameters. The last chapters are devoted to a general discussion on the variations of the parameters, to an explanation of Considere's system of hooped concrete and Pendaries system of reinforced metal. An appendix gives the results of a certain number of reasoned strength tests. The whole volume is altogether a useful and practical guide to all interested in reinforced concrete.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope, and stating number of enquiry:

1900. Agents.—An English firm manufacturing stone-breaking machinery, concrete block machines and concrete mixers, screens, elevators and conveyers, etc., is open to appoint reliable Canadian agents.

1909. Agents.—An English firm manufacturing plaster of Paris, Keene's and Parian cements, and other gypsum products, is desirous of entering the Canadian market, and of appointing first-class representatives.

1913. Prepared clay, glazes, silicates of lead, etc., etc.—A Staffordshire firm manufacturing prepared clay, glazes, silicates of lead, oxide of cobalt, borax, white lead, potters' chemicals, metal enamelling, etc., asks to be placed in touch with earthenware manufacturers in Canada open to purchase supplies. They can also supply machinery for the pottery and enamelled iron industries.

The annual banquet of the Engineering Society of Queen's University was held at Kingston, Ont., on Dec. 20th. Those present included Lieutenant-Governor Gibson, Toronto; T. W. Gibson, Deputy Minister of Mines, Toronto; A. B. Wilmot, M.A., professor of mining and geology, Toronto; Mortimer Lamb, Secretary of the Canadian Mining Institute; J. G. G. Kerry, consulting electrical engineer, Toronto; H. E. T. Haultain, professor of mining engineering, Toronto University; P. W. Sothman, chief engineer of the Hydro-electric Commission, Toronto; J. W. Kynoch, chief engineer of the Canadian General Electric Company, Peterboro; J. W. Weller, chief engineer of the Welland Canal; R. W. Leonard, President of the Coniagas mine, Cobalt; A. W. Campbell, Deputy Minister of Railways and Canals, Ottawa.

At a meeting of the Trades and Labor Council last week a report was submitted by a special committee, in which it was recommended that a deputation be sent to the Board of Control, asking that body to apply to the Legislature for power to cancel any contract for public works upon which the contractor failed to comply with union conditions.

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